2013

Jetta SportWagen

Quick Reference Specification Book

2013 VW Jetta SportWagen
Quick Reference Specification Book

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ENGINES

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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.

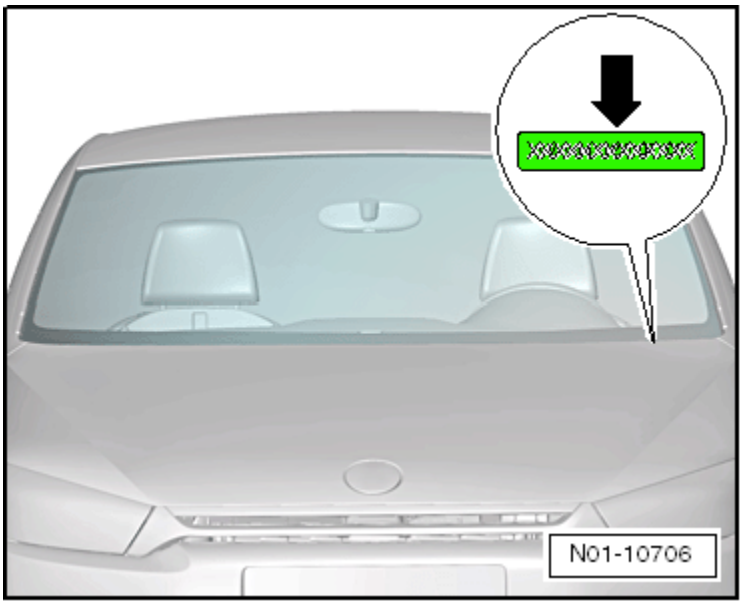
(CAUTIONS cont'd on next page)

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.

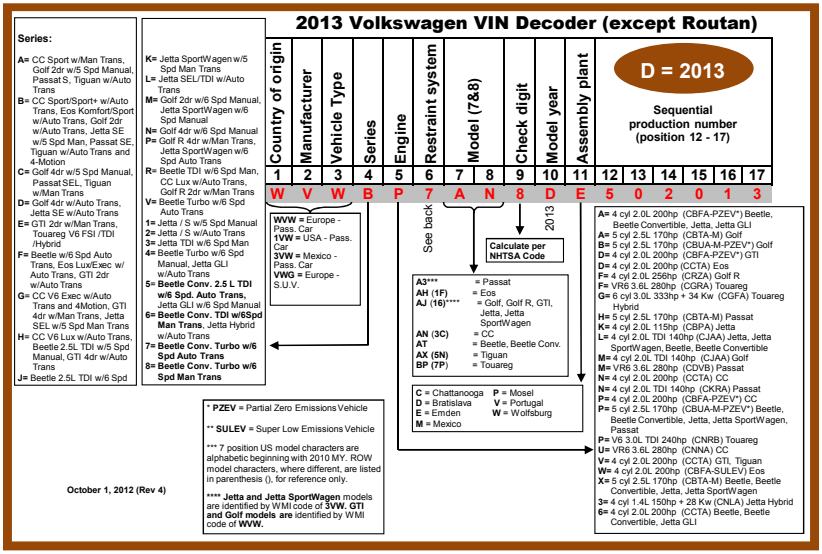
VEHICLE IDENTIFICATION

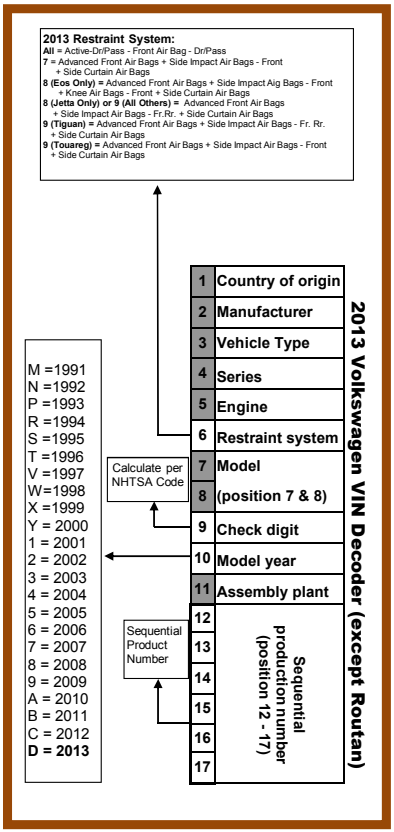
Vehicle Identification Number (VIN) Location



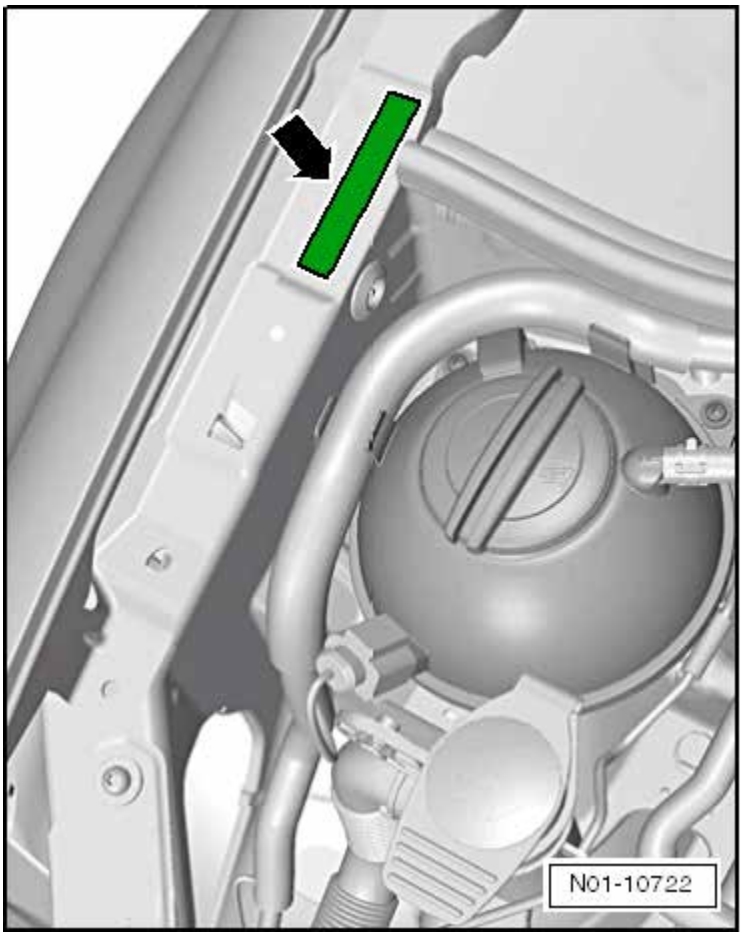
The VIN (➡) is on the left side of the vehicle in the area of the windshield wiper mount. It is visible from the outside.

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
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= Beetle Conv. 2.5 L TDI w/6 Spd. Auto Trans, Jetta GLI w/6 Spd Manual
6= Beetle Conv. TDI w/6Spd Man Trans, Jetta Hybrid w/Auto Trans
7= Beetle Conv. Turbo w/6 Spd Auto Trans
8= Beetle Conv. Turbo w/6 Spd Man 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 = Bratislava
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
October 1, 2012 (Rev 4)
* 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 WVW.

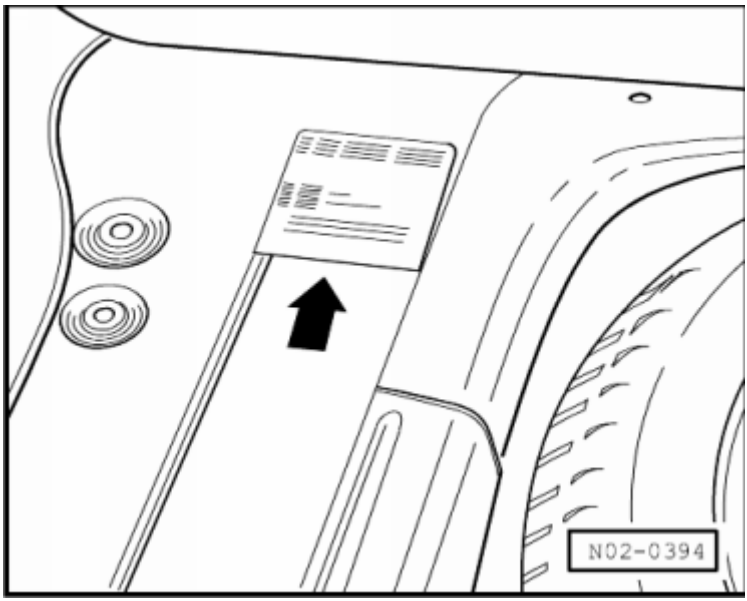

2013 Restraint System:
All = Active-Dr/Pass - Front Air Bag - Dr/Pass
7 = Advanced Front Air Bags + Side Impact Air Bags - Front + Side Curtain Air Bags
8 (Eos Only) = Advanced Front Air Bags + Side Impact Aig Bags - Front + Knee Air Bags - Front + Side Curtain Air Bags
8 (Jetta Only) or 9 (All Others) = 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 extension of the longitudinal member (➡).

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

CJAA	2.0L TDI 4-cylinder 4V turbo diesel
CBTA/CBUA	2.5L 5-cylinder 4V

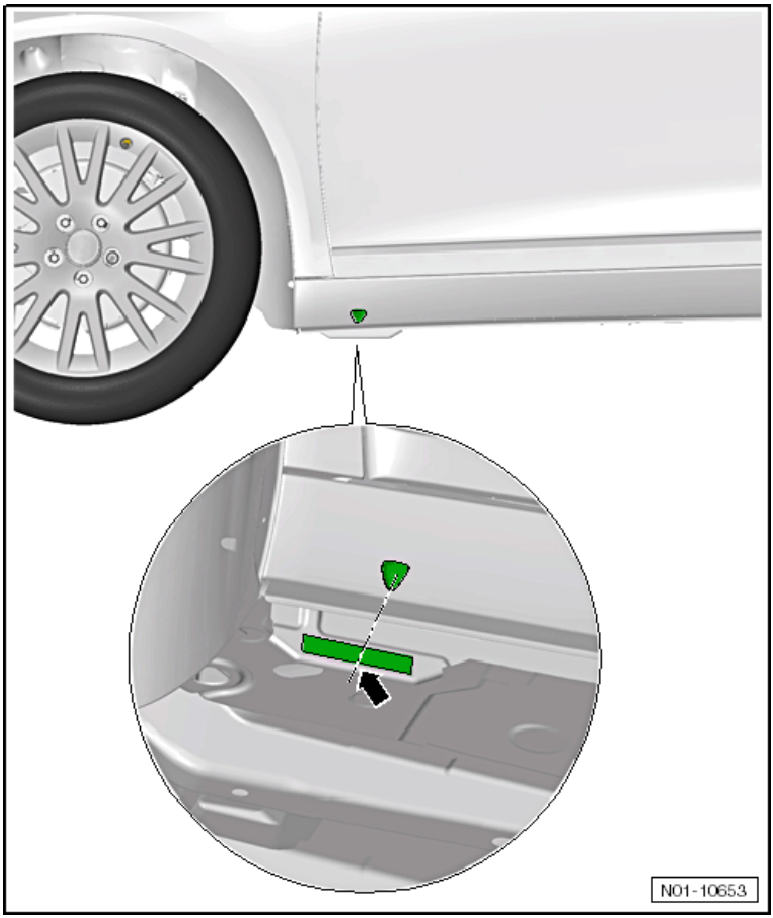
Transmission Codes

0A4	5-speed manual
02Q	6-speed manual
02E	6-speed direct shift gearbox (DSG)
09G	6-speed automatic

VEHICLE LIFTING

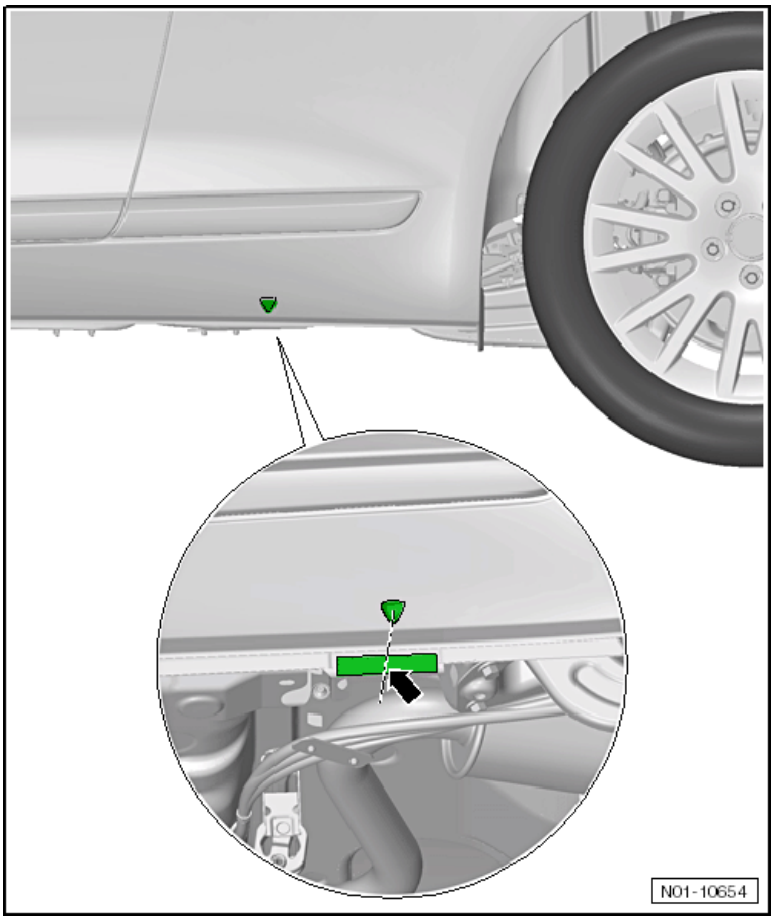
Hoist and Jack Mounting Points

Front



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

Rear

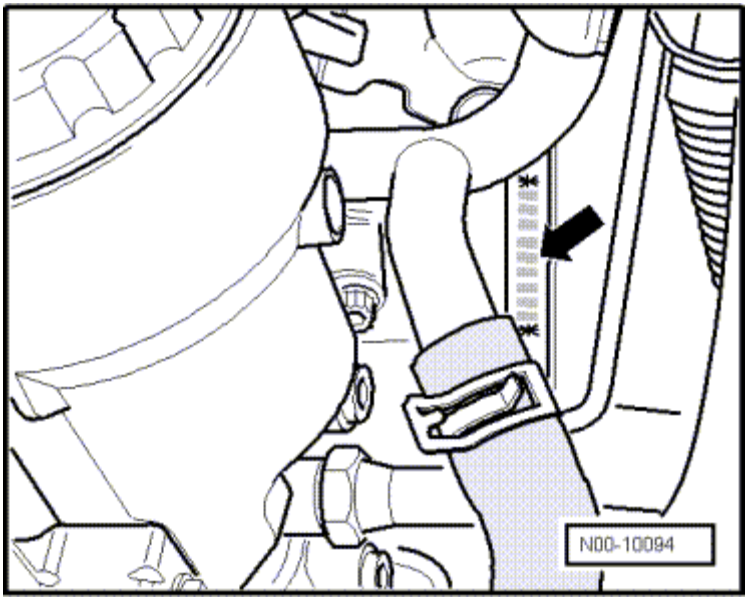


Position the support plate in the side member vertical reinforcement area (➡).

ENGINE MECHANICAL – 2.0L CJAA (TDI)

General Information – 2.0L CJAA (TDI)

Engine Number Location



The engine number (engine code and serial number) (➡) is located at the front of the engine/transmission joint. There is also a label on the toothed belt guard that shows the engine code and serial number. Engine codes beginning with C are four digit. The first 3 digits of the engine code indicate the displacement and the mechanical structure of the engine. They are stamped in the cylinder block, including the serial number. The fourth digit describes the engine output and torque.

Engine Data

Code letters		**CJAA**
Manufactured		From 05.09
Emissions values	in accordance with	ULEV 2 Standard [2)]
Displacement	liter	2.0
Output	kW at RPM	103 @ 4000
Torque	Nm at RPM	320 @ 1750 to 2500
Bore	diameter mm	81.0
Stroke	mm	95.5
Valves per cylinder		4
Compression ratio		16.5
Diesel fuel	in accordance with	ASTM D 975 Standard [1)]
Ignition sequence		1-3-4-2
Balance shaft module		No
Nitrogen Oxide (NOx) reduction catalytic converter		Yes
Reduction catalytic converter		Yes
Exhaust Gas Recirculation (EGR)		Yes
Turbocharger, Supercharger		Turbocharger
Charge Air Cooler (CAC)		Yes
Diesel particulate filter		Yes

[1)] With a sulfur content less than 15 mg/kg of diesel fuel.
[2)] Ultra Low Emission Vehicle (ULEV) 2.

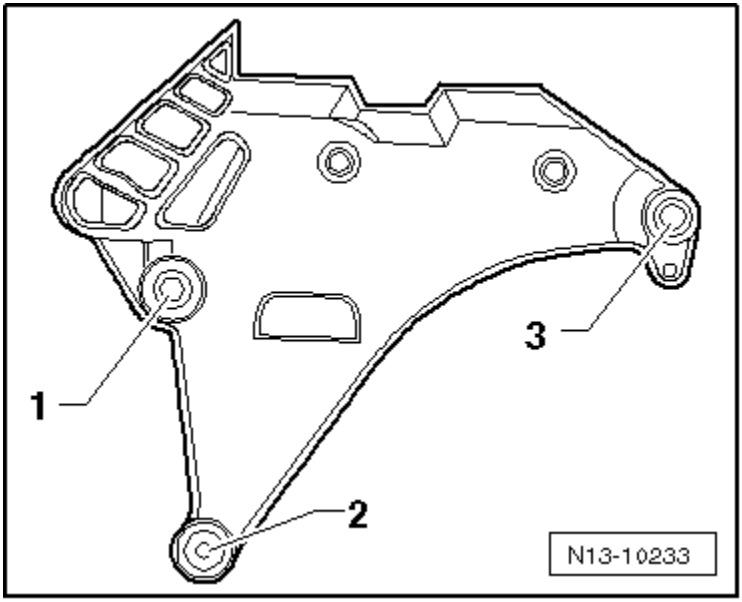
Engine Assembly – 2.0L CJAA (TDI)

Fastener Tightening Specifications

Component	Fastener size	Nm
Bolts and nuts	M6	10
	M7	15
	M8	20
	M10	40
	M12	65
	M23	75
Bracket-to-body bolt [1) 2)]	-	20 plus an additional 90° (¼ turn)
Engine mount bracket bolt [1) 2)]	-	20 plus an additional 90° (¼ turn)
Engine mount-to-body bolt [1)]	-	40 plus an additional 90° (¼ turn)
Engine mount-to-engine mount bracket bolt [1) 2)]	-	60 plus an additional 90° (¼ turn)
Pendulum support-to-subframe bolt [1) 2)]	-	100 plus an additional 90° (¼ turn)
Pendulum support-to-transmission bolt [1) 2)]	-	50 plus an additional 90° (¼ turn)
Transmission mount-to-body bolt [1) 2)]	-	40 plus an additional 90° (¼ turn)
Transmission mount-to-transmission mount bracket bolt [1) 2)]	-	60 plus an additional 90° (¼ turn)

1) Replace fastener(s).
2) For bolt tightening clarification, refer to ElsaWeb, *Engine and Transmission Mount Overview.*

Engine Mount Bracket Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 3 in sequence [1)]	Hand-tighten
2	Tighten bolts 1 through 3 in sequence	40
3	Tighten bolts 1 through 3 in sequence	an additional 180° (½) turn

[1)] Replace fastener(s).

WARNING

Always use the correct tightening sequence and specifications for the engine mount bracket bolts. Tension could develop in the engine mount bracket and damage to the bracket could occur.

Crankshaft, Cylinder Block – 2.0L CJAA (TDI)

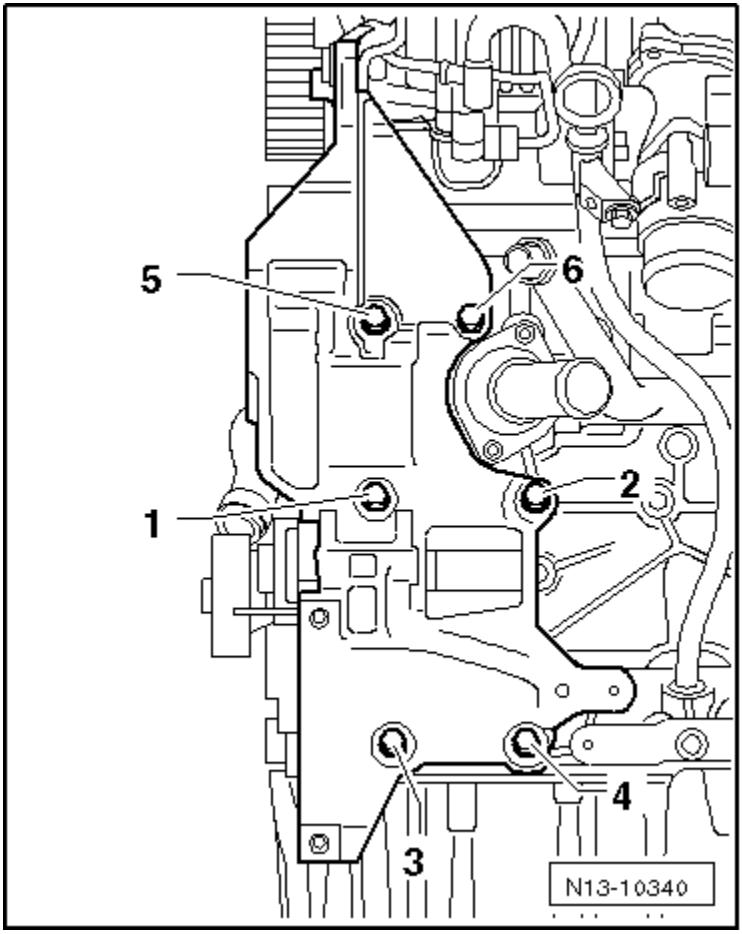
Fastener Tightening Specifications

Component	Nm
Accessory bracket-to-belt tensioner bolt [1) 2)]	20 plus an additional 180° (½) turn
Air conditioning compressor-to-accessory bracket bolt	45
Camshaft toothed belt gear-to-camshaft bolt [1)]	20 plus an additional 90° (¼ turn)
Center toothed belt guard-to-lower toothed belt guard bolt [1)]	10
Connecting piece-to-cylinder block bolt	15
Connecting rod cap-to-connecting rod bolt [1) 7)]	30 plus an additional 90° (¼ turn)
Coolant pump-to-cylinder block bolt	15
Crankshaft bearing cap-to-cylinder block bolt [1)]	65 plus an additional 90° (¼ turn)
Crankshaft toothed belt gear-to-crankshaft bolt [1) 2)]	120 plus an additional 90° (¼ turn)
Engine mount bracket-to-cylinder block bolt	40 plus an additional 180° (½) turn
Engine speed sensor-to-cylinder block bolt	5
Flywheel-to-crankshaft bolt [1)]	60 plus an additional 90° (¼ turn)
Generator-to-accessory bracket bolt	25
High pressure fuel pump toothed belt gear-to-camshaft bolt [1)]	20 plus an additional 90° (¼ turn)
Hub-to-camshaft bolt	100
Hub-to-high pressure fuel pump nut	95
Oil filter bracket-to-cylinder block bolt [1) 5)]	15 plus an additional 90° (¼ turn)
Oil pan-to-cylinder block bolt [6)]	15
Oil spray jet-to-cylinder block bolt	27
Protective plate-to-rear toothed belt guard bolt	5

Component	Nm
Rear toothed belt guard-to-cylinder block/head bolt [3]	10 [1]
	20
Sealing flange-to-cylinder block bolt	15
Toothed belt idler roller-to-cylinder block bolt [4]	25
	50 plus an additional 90° (¼ turn) [1]
Toothed belt idler roller-to-cylinder block nut	20
Toothed belt tensioner-to-cylinder head stud nut [1]	20 plus an additional 45° (⅛ turn)
Vibration damper pulley-to-crankshaft bolt [1]	10 plus an additional 90° (¼ turn)
Wiring harness bracket-to-oil filter bracket bolt	10

1) Replace fastener(s).
2) Do not lubricate or grease the threads or collar.
3) For bolt tightening clarification, refer to ElsaWeb, *Toothed Belt Overview,* items 14 and 15.
4) For bolt tightening clarification, refer to ElsaWeb, *Toothed Belt Overview,* items 10 and 17.
5) Fasten the upper left and lower right bolts first and then tighten all four bolts in a diagonal sequence.
6) Tighten in a diagonal sequence and in steps.
7) Lubricate the threads and contact surface.

Accessory Bracket Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence	40
2	Tighten bolts 1 through 6 in sequence	an additional 90° (¼) turn

Crankshaft Dimensions

Honing dimensions in mm	Crankshaft bearing pin diameter		Connecting rod bearing pin diameter	
Basic dimension	54.000	-0.022	50.900	-0.022
		-0.042		-0.042

Piston and Cylinder Dimensions

Honing Dimension in mm	Piston diameter [1)]	Cylinder bore diameter
Basic dimension	80.960	81.010

1) Take the measurement approximately 12 mm in from the lower edge of the piston and offset 90° to the piston axis.

Piston Ring End Gaps

Piston ring gap dimensions in mm	New	Wear limit
1st compression ring	0.20 to 0.40	1.0
2nd compression ring	0.20 to 0.40	1.0
Oil scraping ring	0.25 to 0.50	1.0

Piston Ring Clearance

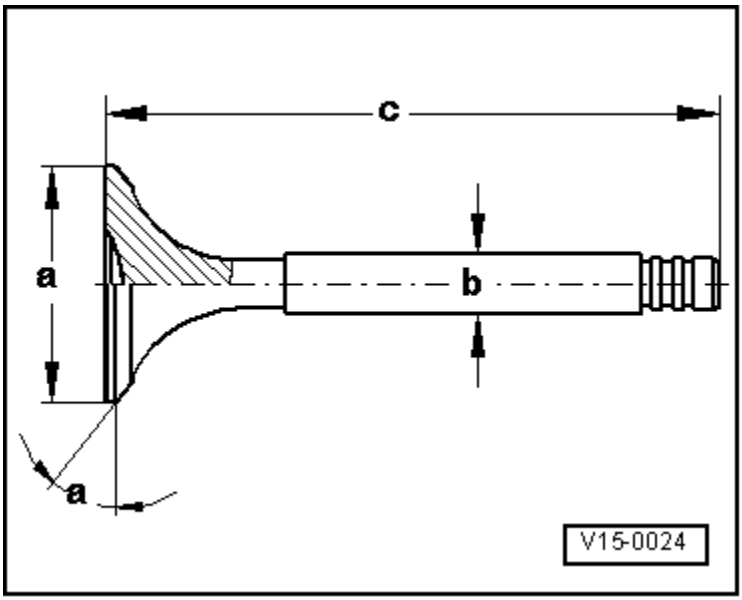
Piston ring to groove clearance dimensions in mm	New	Wear limit
1st compression ring	0.06 to 0.09	0.25
2nd compression ring	0.05 to 0.08	0.25
Oil scraping ring	0.03 to 0.06	0.15

Cylinder Head, Valvetrain – 2.0L CJAA (TDI)

Fastener Tightening Specifications

Component	Nm
Camshaft Position (CMP) sensor-to-cylinder head bolt	10
Coolant connection-to-cylinder head bolt	10
Fuel rail-to-cylinder head cover bolt	22
Heat shield-to-cylinder head cover bolt	5
Injection unit cover-to-cylinder head cover bolt	5
Injection unit tensioning bracket-to-cylinder head cover nut	10
Lifting eye-to-cylinder head stud/bolt	25
Vacuum pump-to-cylinder head bolt	10

Valve Dimensions



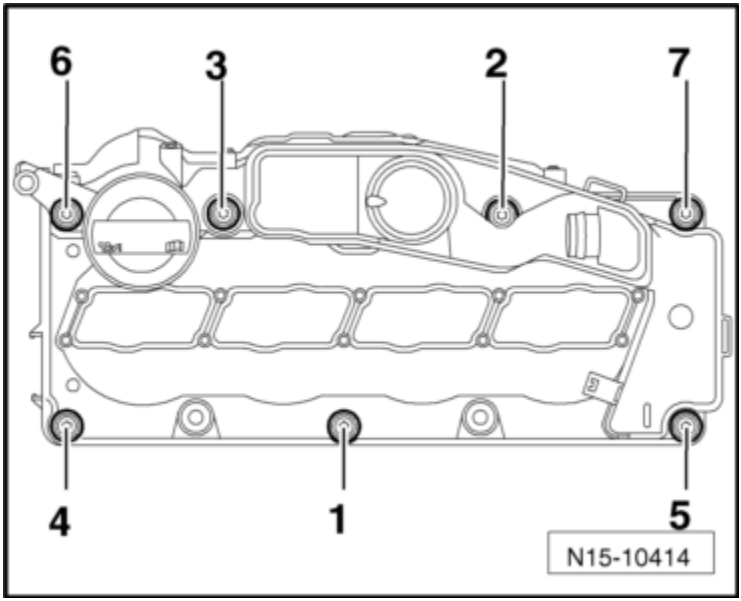
Dimension		Intake Valve	Exhaust Valve
Diameter a	mm	26.60	26.00
Diameter b	mm	5.940	5.940
c	mm	99.30	99.10
α	∠°	45	45

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

Compression Pressures

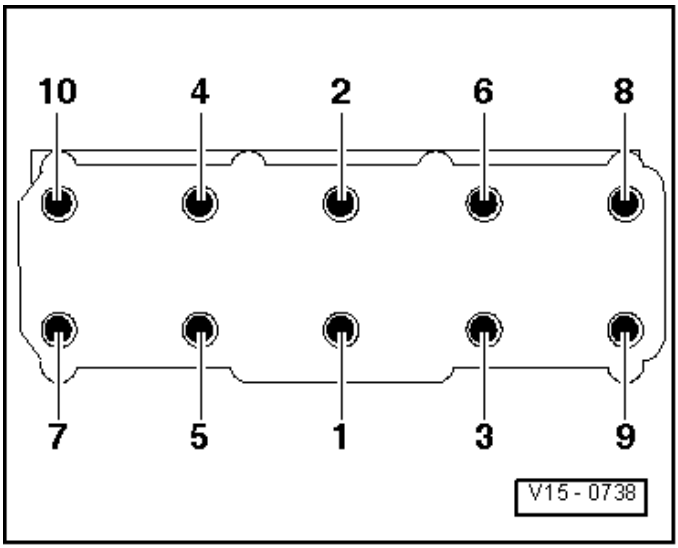
New Bar positive pressure	Wear limit Bar positive pressure	Difference between cylinders Bar positive pressure
25.0 to 31.0	19.0	Maximum 5.0

Cylinder Head Cover Tightening Specification



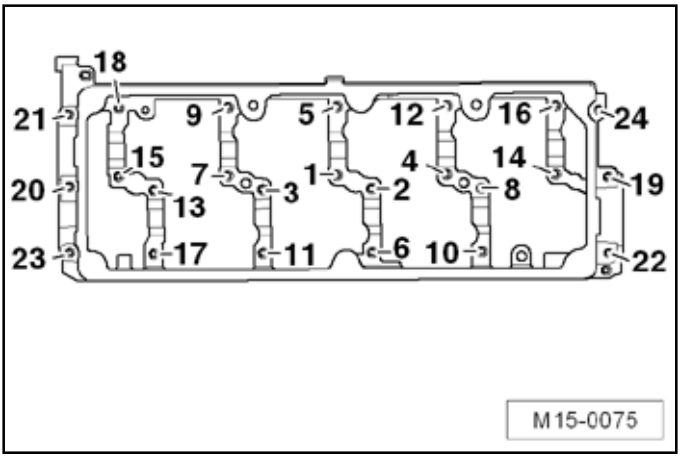
Step	Component	Nm
1	Tighten bolts 1 through 7 in sequence	10

Cylinder Head Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	35
2	Tighten bolts 1 through 10 in sequence	60
3	Tighten bolts 1 through 10 in sequence	an additional 90° (¼) turn
4	Tighten bolts 1 through 10 in sequence	an additional 90° (¼) turn

Bearing Frame Tightening Specification



Step	Component	Nm
1	Tighten bolts and nuts 1 through 24 in sequence	10

Lubrication – 2.0L CJAA (TDI)

Fastener Tightening Specifications

Component	Nm
Oil filter bracket connection	30
Oil filter bracket cover	25
Oil cooler-to-oil filter bracket locking bolt	25
Oil filter bracket-to-cylinder block bolt [1) 2)]	15 plus an additional 90° (¼) turn
Oil pressure switch-to-oil filter bracket	22
Oil supply line clamp bolt	10
Oil supply line-to-connection	22
Wiring harness bracket-to-oil filter bracket bolt	10
Chain tensioner with tensioning rail-to-cylinder block bolt	15
Oil level thermal sensor-to-oil pan bolt	10
Oil pan-to-cylinder block bolt	15
Oil pan drain plug [1)]	30
Transmission oil pan bolt	40
Oil pump sprocket-to-oil pump bolt	20 plus an additional 90° (¼) turn
Oil spray jet-to-cylinder block bolt	27
Cylinder block sealing flange bolt	15
Cylinder block splash wall bolt	15
Oil pump suction line bolt	15

1) Replace fastener(s).

2) Tighten the upper left and lower right bolts first and then tighten all four bolts in a diagonal sequence.

Cooling System – 2.0L CJAA (TDI)

Fastener Tightening Specifications

Component	Nm
4/2 way valve with thermostat-to-cylinder block bolt	15
Cylinder block connecting piece bolt	15
Coolant fan shroud nut	5
Coolant pump-to-cylinder block bolt	15
Coolant reservoir-to-body stud bolt	3
Engine pre-warmer coolant pipe bracket bolt	10
Engine pre-warmer coolant pipe-to-charge air pipe bolt	10
Radiator fan shroud bolt	5
Radiator bolt	5
Ventilation pipe-to-intake manifold bolt	10

Fuel Supply – 2.0L CJAA (TDI)

Fastener Tightening Specifications

Component	Nm
Accelerator Pedal Position (APP) sensor/Accelerator Pedal Position 2 (APP2) sensor-to-body bolt	9
Auxiliary fuel pump bolt	20
Exhaust pressure sensor 1 bracket bolt	8
Fuel filler door unit-to-body bolt	1.5
Fuel filler tube-to-body bolt	11
Fuel filter housing bolt/nut	8
Fuel filter housing cover-to-fuel filter housing bolt	9
Fuel tank securing strap-to-body bolt [1)]	25
Fuel filter housing cover locking bolt	5
Fuel tank lock ring	110

[1)] Replace fastener(s).

Turbocharger – 2.0L CJAA (TDI)

Fastener Tightening Specifications

Component	Nm
Turbocharger stud brace bolt	20
Charge Air Cooler (CAC) mount bolt	5
Charge air pipe bolt	8
Charge air pressure sensor-to-charge air pipe bolt	3
Charge air pipe connecting hose clamp	5
Turbocharger connecting piece bolt	8
Exhaust manifold connecting pipe nut [2]	20
Control line/heat shield-to-exhaust manifold stud nut	23
Turbocharger damper bolt	10
Exhaust Gas Recirculation (EGR) filter-to-stud bolt nut	23
Exhaust gas temperature sensor 1-to-exhaust manifold	45
Turbocharger intake scoop bolt	8
Turbocharger oil supply line bracket bolt	10
Oil supply line-to-oil filter bracket	22
Oil supply line-to-turbocharger	22
Turbocharger oil return line bolt	15
Particulate filter-to-turbocharger clamp [1]	7
Turbocharger brace-to-cylinder block banjo bolt [1]	60
Turbocharger/exhaust manifold-to-cylinder head nut [1] [2]	23
Vacuum actuator with charge pressure actuator position sensor-to-turbocharger bolt	8
Warm air collector plate bolt	8
Wiring harness bracket bolt	8

[1] Replace fastener(s).
[2] Lubricate with hot bolt paste.

Exhaust System – 2.0L CJAA (TDI)

Fastener Tightening Specifications

Component	Nm
Exhaust Gas Recirculation (EGR) housing connecting pipe bolt	23
Control line bracket-to-particulate filter bolt	9
Control line bracket nut	23
Exhaust Gas Recirculation (EGR) housing control line fitting	23
Diesel particulate filter control line fitting	45
Exhaust Gas Recirculation (EGR) cooler-to-Exhaust Gas Recirculation (EGR) housing bolt	8
Exhaust Gas Recirculation (EGR) cooler-to-Exhaust Gas Recirculation (EGR) housing bolt	23
Exhaust Gas Recirculation (EGR) filter-to-particulate filter clamp [1)]	3.5
Exhaust Gas Recirculation (EGR) filter-to-turbocharger stud bolt nut	23
Exhaust Gas Recirculation (EGR) valve 2-to-Exhaust Gas Recirculation (EGR) housing bolt	8
Exhaust Gas Recirculation (EGR) temperature sensor-to-Exhaust Gas Recirculation (EGR) housing bolt	20
Exhaust gas temperature sensors 2 and 3-to-diesel particulate filter [3)]	45
Exhaust gas temperature sensor 4-to-diesel particulate filter with Nitrogen Oxide (NOx) reduction catalytic converter [3)]	45
Exhaust pipe suspended mount-to-body bolt [1)]	23
Exhaust pressure sensor 1-to-auxiliary fuel pump bracket	4
Exhaust pressure sensor 2 bolt [2)]	4
	8
Front muffler-to-rear muffler clamping sleeve nut	23
Nitrogen Oxide (NOx) reduction catalytic converter-to-exhaust flap control module clamp [1)]	7
Nitrogen Oxide (NOx) reduction catalytic converter-to-front muffler clamping sleeve nut	23
Oxygen Sensor (O2S)	52
Diesel particulate filter bracket-to-cylinder block nut	25
Diesel particulate filter bracket-to-diesel particulate filter/cylinder head bolt/nut	23
Diesel particulate filter-to-Nitrogen Oxide (nox) reduction catalytic converter clamp [1)]	7
Diesel particulate filter-to-diesel particulate filter bracket nut	23

Fastener Tightening Specifications *(cont'd)*

Component	Nm
Rear muffler suspended mount-to-body bolt	23
Particulate filter shield bolt	10
Suspended mount-to-subframe bolt	25
Tunnel bridge-to-body nut	23
Turbocharger-to-diesel particulate filter clamp [1)]	7

1) Replace fastener(s).
2) For bolt clarification, refer to ElsaWeb, *Particulate Filter with NOx Reduction Catalytic Converter Overview,* items 3 and 4.
3) Lubricate with hot bolt paste.

Ignition/Glow Plug System – 2.0L CJAA (TDI)

Fastener Tightening Specification

Component	Nm
Glow plug	12

Diesel Fuel Injection – 2.0L CJAA (TDI)

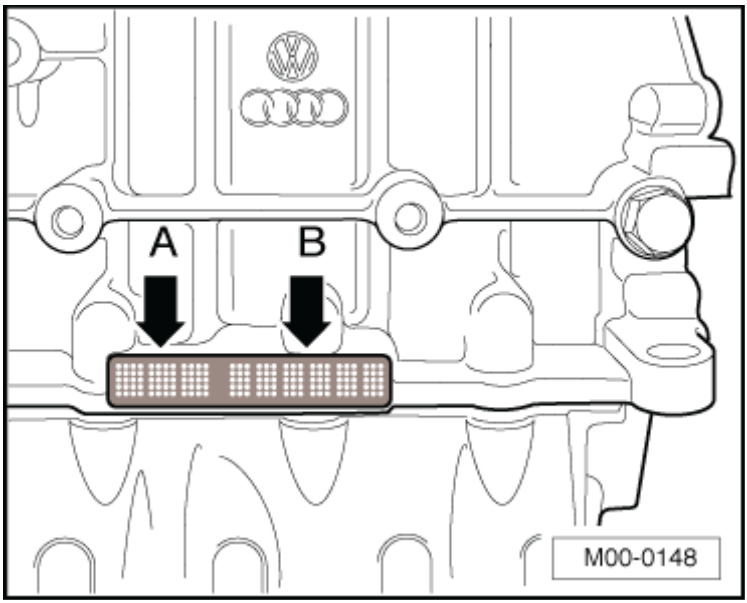
Fastener Tightening Specifications

Component	Nm
Exhaust Gas Recirculation (EGR) vacuum regulator solenoid valve connecting pipe bolt	20
Exhaust Gas Recirculation (EGR) vacuum regulator solenoid valve-to-intake manifold bolt	8
Fuel injection unit sealing cap-to-cylinder head cover bolt	5
Fuel injection unit tensioning plate-to-cylinder head cover nut	10
Fuel pressure regulator valve-to-fuel rail	80
Fuel pressure sensor-to-fuel rail	100
Fuel return line clamp nut	8
Fuel rail-to-cylinder head cover bolt	22
High pressure fuel pump-to-cylinder block bolt	20
High pressure line fitting	28
High pressure line clamp nut	8
Intake air guide-to-lock carrier screw	5
Intake manifold-to-cylinder head bolt	8
Lower air filter housing-to-body bolt	8
Mass Air Flow (MAF) sensor-to-upper air filter housing screw	3.5
Throttle valve control module-to-Exhaust Gas Recirculation (EGR) vacuum regulator solenoid valve bolt	8
Throttle valve control module-to-oil dipstick tube bolt	8
Upper air filter housing-to-lower air filter housing screw	2

ENGINE MECHANICAL – 2.5L CBTA, CBUA

General Information – 2.5L CBTA, CBUA

Engine Number



The engine code (A) and engine number (B) (serial number) are located on the rear side of the engine, above the cylinder block/ upper oil pan partition. The engine number consists of up to nine characters (alphanumeric). The first part (maximum of 3 letters) represents the engine code; the second (six digits) is the serial number. If more than 999,999 engines with the same engine code are produced, the first of the six characters is replaced with a letter.

In addition, a sticker with the engine code and engine number is applied to the cylinder head cover. The engine code letters are also located on the vehicle data label. The vehicle data label is located in the customer's service schedule as well as in the spare tire wheel well or on the luggage compartment floor.

When four digit engine codes are used, the first three digits indicate the mechanical structure of the engine and are stamped on the engine. The fourth digit describes the engine output and torque.

Engine Data

Engine Code		CBTA	CBUA
Manufactured		from 07.07	from 07.07
Emission values in accordance with		through MY 2009: ULEV 2 [1] from MY 2010: TIER 2/BIN% (US coalition)	SULEV [2]
Displacement	cm^3	2480	2480
Output	kW at RPM	125 @ 5700	125 @ 5700
Torque	Nm at RPM	240 @ 4250	240 @ 4250
Bore	diameter mm	82.5	82.5
Stroke	mm	92.8	92.8
Compression ratio		9.5	9.5
Valves per cylinder		4	4
RON	minimum	95 unleaded [3]	95 unleaded [3]
Fuel injection, ignition		through 05.08: Motronic ME 7.1.1 from 06.08: ME 17.5	through 05.08: Motronic ME 7.1.1 from 06.08: ME 17.5
Knock control		2 sensors	2 sensors
Variable valve timing		Yes	Yes
Variable intake manifold		No	No
Oxygen Sensor (O2S) regulation		2 sensors	3 sensors
Catalytic converter		Yes	Yes
Exhaust Gas Recirculation (EGR)		No	No
Turbocharger, Supercharger		No	No
Secondary Air Injection (AIR) system		through MY 2009: Yes from MY 2010: No	Yes

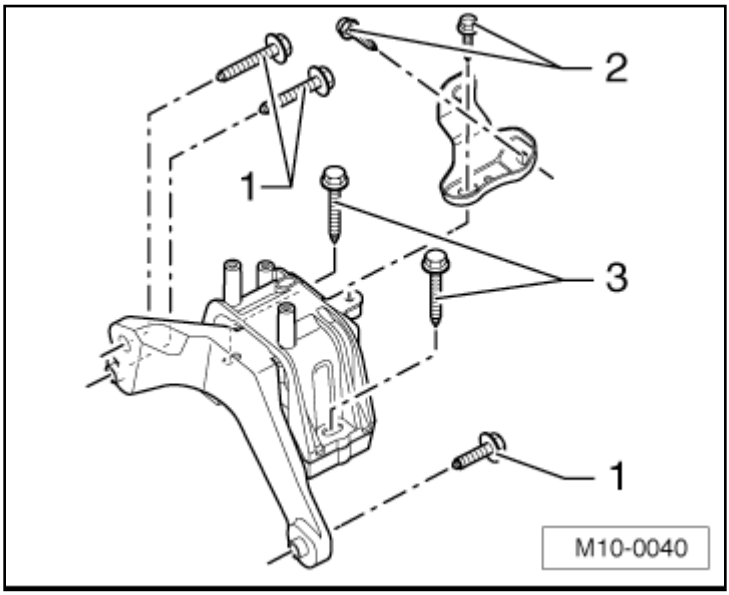
[1] ULEV 2: Ultra Low Emission Vehicle 2.
[2] SULEV: Super Ultra Low Emission Vehicle.
[3] Unleaded RON 91 is permitted but performance is reduced.

Engine Assembly – 2.5L CBTA, CBUA

Fastener Tightening Specifications

Component	Fastener size	Nm
Bolts and nuts	M6	10
	M7	15
	M8	25
	M10	40
	M12	60

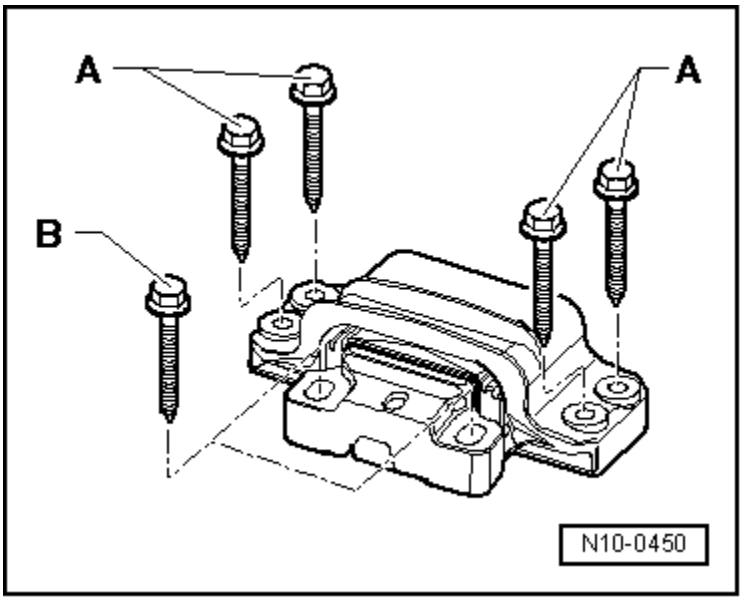
Engine Mount Tightening Specifications



Component	Nm
Bolts 1	40 plus an additional 90° (¼ turn) [1]
Bolts 2	20 plus an additional 90° (¼ turn) [1]
Bolts 3	60 plus an additional 90° (¼ turn) [1]

[1] Replace fastener(s).

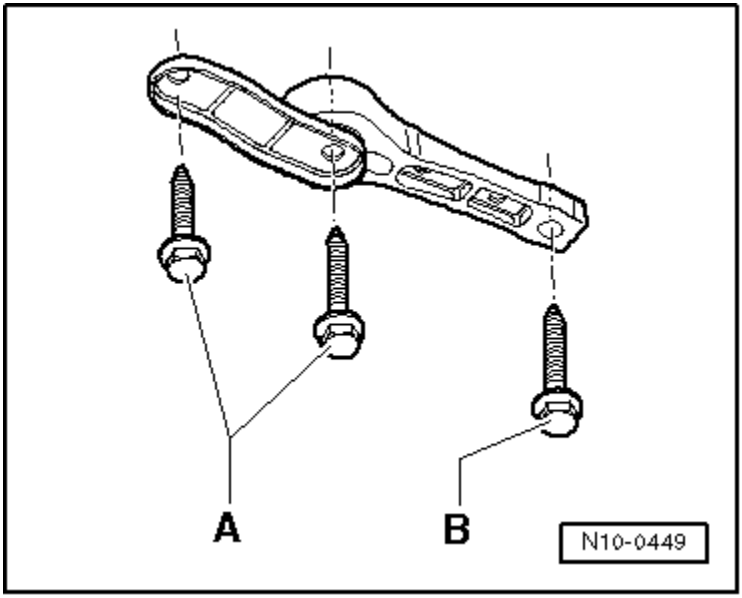
Transmission Mount Tightening Specifications



Component	Nm
Bolts A [1)]	40 plus an additional 90° (¼ turn)
Bolt B [1)]	60 plus an additional 90° (¼ turn)

[1)] Replace fastener(s).

Pendulum Support Tightening Specifications



Secure the pendulum support to the transmission first and then to the subframe. To remove, first remove bolt B, then bolts A.

Component	Fastener size	Nm
Bolts A [1]	8.8	40 plus an additional 90° (¼ turn)
	10.9	50 plus an additional 90° (¼ turn)
Bolt B [1]	-	100 plus an additional 90° (¼ turn)

[1] Replace fastener(s).

Crankshaft, Cylinder Block – 2.5L CBTA, CBUA

Fastener Tightening Specifications

Component	Nm
Accessory bracket-to-cylinder block bolt	25
Air conditioning compressor ribbed belt, idler pulley with bracket-to-accessory bracket bolt	25
Air conditioning compressor-to-accessory bracket bolt	25
Air conditioning compressor ribbed belt, belt tensioner-to-accessory bracket bolt	35
Brake booster vacuum pump-to-control housing cover bolt	10
Connecting rod bearing cap-to-connecting rod bolt [1]	30 plus an additional 90° (¼ turn)
Control housing cover-to-cylinder block bolt	25
Coolant pump-to-cylinder block bolt	10
Cylinder block cover bolt	10
Crankshaft bearing cap-to-cylinder block bolt [1]	40 plus an additional 90° (¼ turn)
Double sprocket-to-cylinder block bolt [1]	60 plus an additional 90° (¼ turn)
Drive plate/flywheel-to-crankshaft bolt [1]	60 plus an additional 90° (¼ turn)
Engine mount-to-accessory bracket bolt [1]	40 plus an additional 90° (¼ turn)
Engine speed sensor-to-control housing cover bolt	5
Exhaust camshaft sprocket-to-camshaft bolt [1]	60 plus an additional 90° (¼ turn)
Generator-to-accessory bracket bolt	25
Generator and coolant pump ribbed belt, idler pulley with bracket-to-accessory bracket bolt	8
Generator and coolant pump ribbed belt, belt tensioner-to-accessory bracket bolt	35
Intake camshaft adjuster-to-camshaft bolt [1]	60 plus an additional 90° (¼ turn)
Intake manifold support-to-cylinder block bolt	25
Knock Sensor (KS)-to-cylinder block bolt [2]	20

Fastener Tightening Specifications *(cont'd)*

Component	Nm
Cylinder block locking bolt	30
Cylinder block mount bolt	10
Oil dipstick guide tube-to-cylinder block bolt	25
Oil filter bracket-to-cylinder block bolt	25
Oil pump sprocket-to-oil pump bolt [1]	20 plus an additional 90° (¼ turn)
Pressure relief valve	27
Sealing flange-to-cylinder block bolt	10
Thermostat housing with coolant pipe-to-cylinder block bolt	10
Threaded pin-to-cylinder block	40
Timing chain tensioner-to-cylinder block bolt	10
Timing chain tensioner-to-cylinder head bolt	10
Transport strap-to-cylinder block bolt	25
Vibration damper-to-crankshaft bolt [1]	50 plus an additional 90° (¼ turn)

[1] Replace fastener(s).
[2] Tightening specifications affect the function of the Knock Sensor (KS).

Crankshaft Dimensions

Honing dimensions in mm	Crankshaft bearing pin diameter		Connecting rod bearing pin diameter	
Basic dimension	58.00	-0.022	47.80	-0.022
		-0.042		-0.042
1st oversize	57.75	-0.02	47.55	-0.022
		-0.042		-0.042
2nd oversize	57.50	-0.022	47.30	-0.022
		-0.042		-0.042
Stage III	57.25	-0.022	47.05	-0.022
		-0.042		-0.042

Piston and Cylinder Dimensions

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

[1] Measurement does not include the graphite coating (thickness = 0.02 mm). The graphite coating wears away.

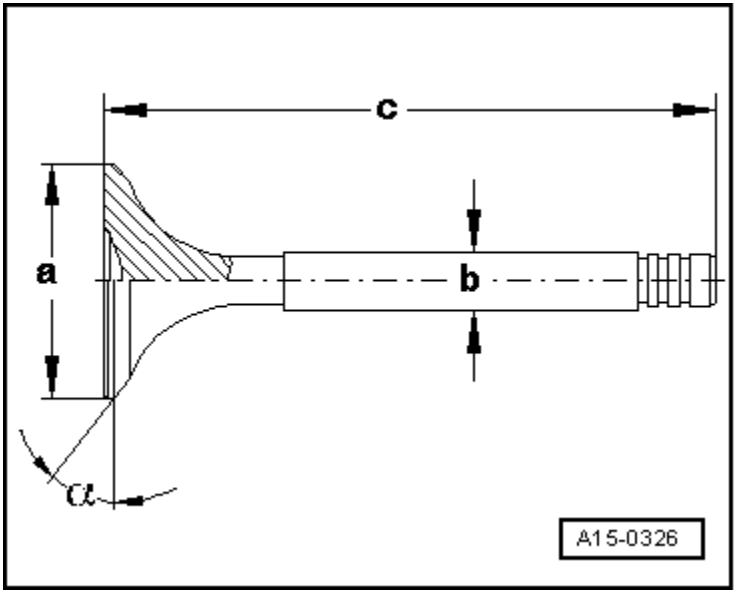
Cylinder Head, Valvetrain – 2.5L CBTA, CBUA

Fastener Tightening Specifications

Component	Nm
Camshaft adjustment valve 1-to-cylinder head bolt	2
Camshaft clamp (T40070)-to-camshaft bolt	20
Camshaft Position (CMP) sensor-to-cylinder head bolt	10
Chain compartment cover-to-cylinder head bolt	10
Coolant thermostat housing-to-chain compartment cover bolt	10
Exhaust camshaft sprocket-to-camshaft bolt [1)]	60 plus an additional 90° (¼ turn)
Intake camshaft adjuster-to-camshaft bolt [1)]	60 plus an additional 90° (¼ turn)
Cylinder block locking bolt	30
Secondary Air Injection (AIR) connecting pipe-to-cylinder head bolt	10
Cylinder block transport strap bolt	25
Wire bracket-to-chain compartment cover bolt	10

1) Replace fastener(s).

Valve Dimensions

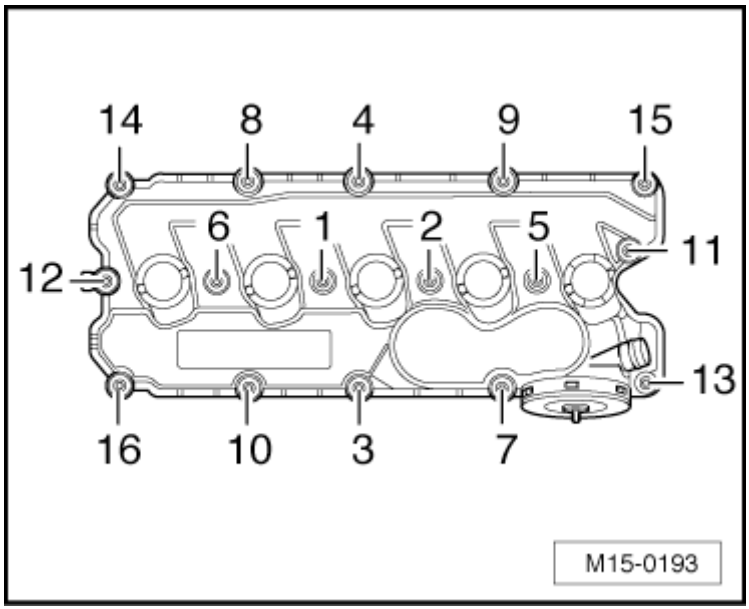


Dimension		Intake valve	Exhaust valve
Diameter a	mm	26.80 to 27.00	29.80 to 30.00
Diameter b	mm	5.95 to 5.97	5.94 to 5.95
c	mm	104.84 to105.34	103.64 to 104.14
α	∠°	45	45

Compression Pressures

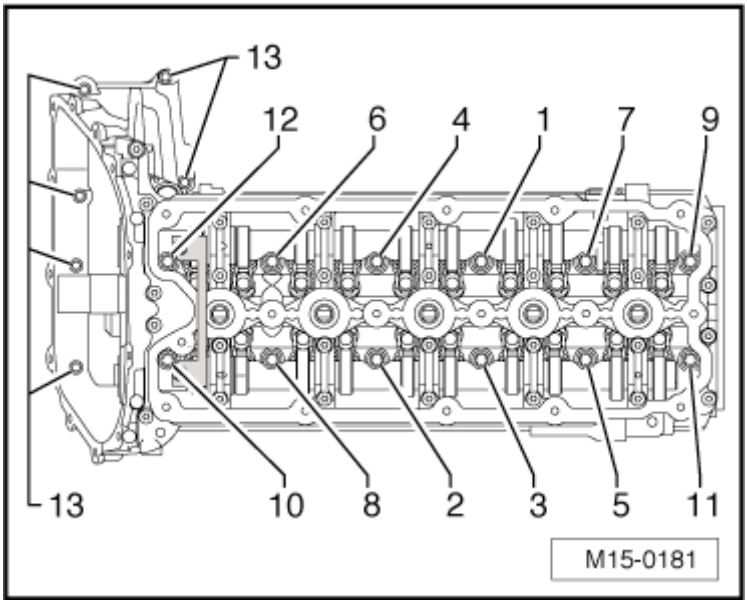
New Bar positive pressure	Wear limit Bar positive pressure	Difference between cylinders Bar positive pressure
9.0 to 13.0	8.0	Maximum 3.0

Cylinder Head Cover Tightening Specification



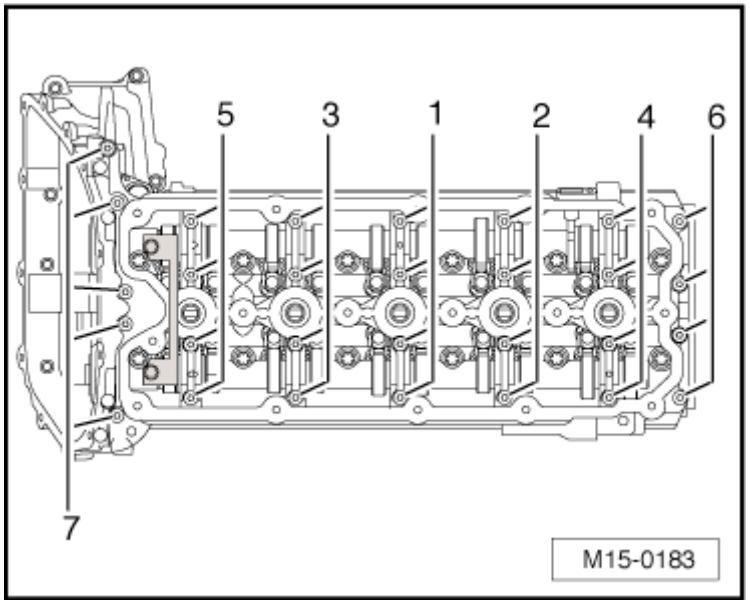
Step	Component	Nm
1	Tighten bolts 1 through 16 in sequence	10

Cylinder Head Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 12 in sequence	40
2	Tighten bolts 1 through 12 in sequence	an additional 90° (¼ turn)
3	Tighten bolts 1 through 12 in sequence	an additional 90° (¼ turn)
4	Tighten bolts 13	10

Guide Frame Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 7 in sequence [1)]	8
2	Tighten bolts 1 through 7 in sequence	an additional 90° (¼ turn)

[1)] Replace fastener(s).

Lubrication – 2.5L CBTA, CBUA

Fastener Tightening Specifications

Component	Nm
Guide tube-to-cylinder block bolt [2]	25
Intake manifold support/guide tube-to-cylinder block bolt [3]	25
Cylinder block locking bolt	30
Lower oil pan-to-upper oil pan bolt	10
Oil cooler-to-oil filter bracket bolt	25
Oil filter bracket-to-cylinder block bolt	25
Oil filter housing-to-oil filter bracket	25
Oil intake pipe-to-oil pump bolt	10
Oil intake pipe-to-upper oil pan bolt	10
Lower oil pan drain plug	30
Oil pressure regulation valve-to-cylinder block bolt [2]	9
Oil pressure switch-to-cylinder block [2]	20
Oil pressure switch-to-oil filter adapter [3]	20
Oil pump align plate (T03005)-to-crankshaft bolt	30
Oil pump-to-cylinder block bolt	25
Reduced oil pressure sensor-to-cylinder block [2]	20
Oil pump sprocket bolt [1]	20 plus an additional 90° (¼ turn)
Upper oil pan-to-cylinder block bolt	25

[1] Replace fastener(s).
[2] Jetta from MY 2011 only.
[3] Jetta from MY 2005 through 2010, Jetta SportWagen (US)/Jetta Wagon (Canada) for MY 2009 and Jetta SportWagen (US)/Golf Wagon (Canada) from MY 2010 only.

Cooling System – 2.5L CBTA, CBUA

Fastener Tightening Specifications

Component	Nm
Air conditioning condenser-to-radiator bolt	5
Cylinder head flange nut	10
Coolant fan shroud nut	5
Coolant line-to-cylinder block bolt/nut	10
Coolant pump-to-cylinder block bolt	10
Coolant thermostat housing-to-cylinder block bolt	25
Expansion tank-to-body bolt	2
Radiator fan shroud bolt	5
Oil filter bracket-to-cylinder block bolt	25
Radiator mount-to-lock carrier bolt	7
Thermostat housing cover-to-thermostat housing bolt	5

Fuel Supply – 2.5L CBTA, CBUA

Fastener Tightening Specifications

Component	Fastener size	Nm
Accelerator pedal module-to-body bolt	-	10
Evaporative emission canister-to-underbody bolt	-	8
Fuel filler pipe-to-body bolt	M6	11
Fuel filter bracket bolt	-	3
Fuel tank tensioning strap-to-body bolt [1)]	M8	26
Fuel tank-to-underbody bolt [1)]	M8	26
Leak Detection Pump (LDP) air filter housing-to-bracket nut [2)]	-	2
Leak Detection Pump (LDP) air filter housing-to-bracket bolt [3)]	-	3
Leak Detection Pump (LDP) bracket-to-body nut [2)]	-	6
Leak Detection Pump (LDP) bracket-to-body nut [3)]	-	9
Leak Detection Pump (LDP) bracket bolt [2)]		3
Leak Detection Pump (LDP) bracket bolt [3)]	-	2
Fuel tank lock ring	-	110

1) Replace fastener(s).
2) Jetta from MY 2011 only.
3) Jetta from MY 2005 through 2010, Jetta SportWagen (US)/Jetta Wagon (Canada) for MY 2009 and Jetta SportWagen (US)/Golf Wagon (Canada) from MY 2010 only.

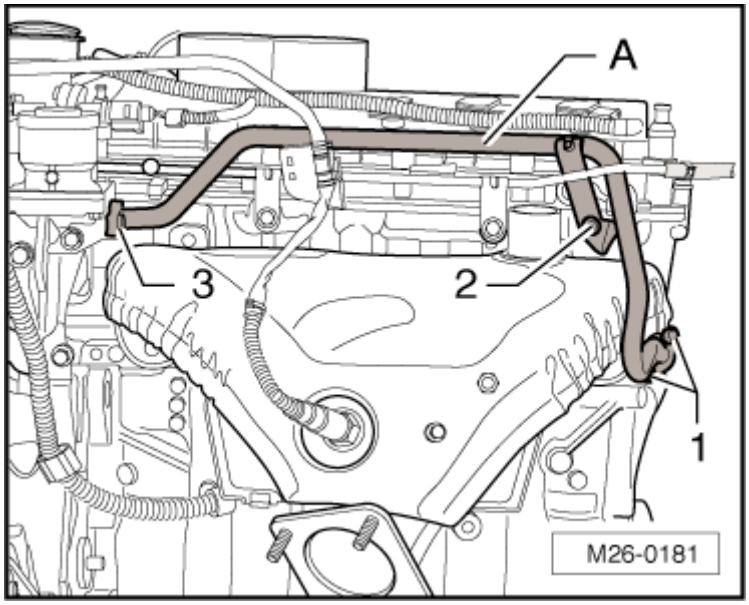
Exhaust System, Emission Controls – 2.5L CBTA, CBUA

Fastener Tightening Specifications

Component	Nm
Catalytic converter heat shield front bolt [2]	10
Catalytic converter heat shield rear bolt [2]	5
Cross member-to-underbody nut	20
Exhaust clamp nut	23
Exhaust manifold-to-cylinder head nut [1]	25
Front exhaust pipe with catalytic converter-to-exhaust manifold nut [1]	23
Front exhaust pipe with catalytic converter suspended mount-to-subframe bolt	23
Heat shield-to-exhaust manifold bolt	10
Intake manifold support-to-cylinder block bolt	25
Muffler suspended mount-to-body/fuel tank bolt	26
Muffler suspended mount-to-body bolt	23
Oxygen Sensor (O2S)	55
Oxygen Sensor (O2S) bracket-to-cylinder block bolt [3]	10
Secondary Air Injection (AIR) pump motor bushing-to-intake manifold support nut	10
Secondary Air Injection (AIR) sensor 1-to-Secondary Air Injection (AIR) pressure pipe bolt	2
Secondary Air Injection (AIR) solenoid valve-to-cylinder head bolt	10

[1] Replace fastener(s).
[2] Engine codes BGP and CBTA only.
[3] Jetta from MY 2011 only.

Secondary Air Injection (AIR) Pipe Tightening Specifications



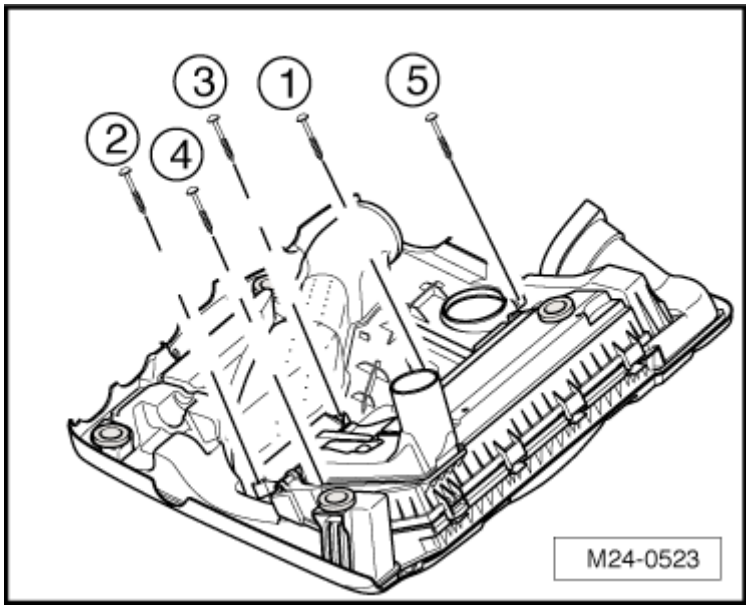
Step	Component	Nm
1	Tighten bolts 1 through 3 in sequence	Hand-tighten
2	Tighten bolts 1 through 3 in sequence	10

Multiport Fuel Injection – 2.5L CBTA, CBUA

Fastener Tightening Specifications

Component	Nm
Fuel rail-to-intake manifold bolt	3.5
Intake air duct-to-air guide bolt	1.5
Intake manifold-to-cylinder head bolt	9
Intake manifold support-to-cylinder block bolt	25
Intake manifold support-to-intake manifold bolt	16
Manifold Absolute Pressure (MAP) sensor-to-intake manifold bolt	3.5
Mass Air Flow (MAF) sensor-to-upper air filter housing/ engine cover bolt	3
Oil dipstick guide tube-to-cylinder block bolt	25
Oxygen Sensor (O2S)	55
Power steering pump intake line and Secondary Air Injection (AIR) pump motor bracket-to-cylinder block bolt	25
Power steering pump intake line and Secondary Air Injection (AIR) pump motor bracket-to-intake manifold bolt	16
Power steering intake line bracket-to-intake manifold bolt	16
Throttle valve control module-to-intake manifold bolt	6.5
Cylinder head transport strap bolt	25

Secondary Air Injection (AIR) Pipe Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	2

Ignition – 2.5L CBTA, CBUA

Fastener Tightening Specifications

Component	Nm
Camshaft Position (CMP) sensor bolt	10
Knock Sensor (KS) bolt [1)]	20
Spark plug	25

[1)] Tightening specifications affect the function of the Knock Sensor (KS).

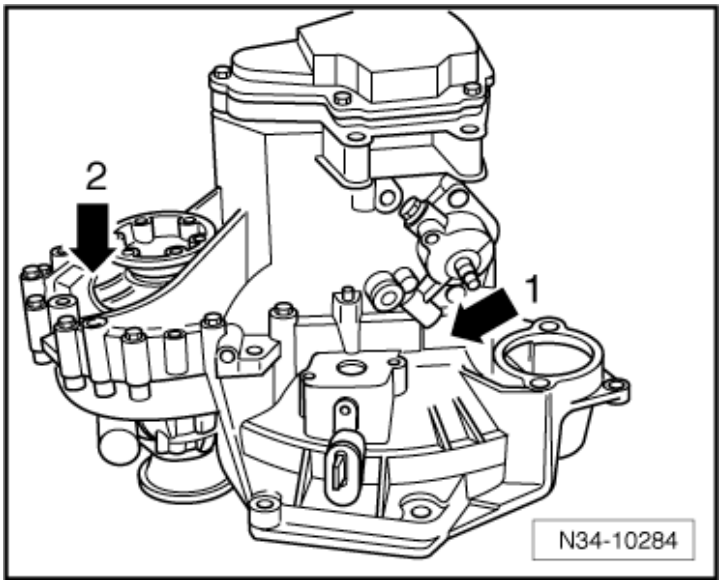
Technical Data

Engine Codes	CBTA and CBUA
Ignition sequence	1-2-4-5-3
Spark plugs	Refer to the Electronic Parts Catalog (ETKA)
Electrode gap	1.0 to 1.1 mm
Tightening specification	25 Nm
Change intervals	Refer to Maintenance Intervals Rep. Gr. 03

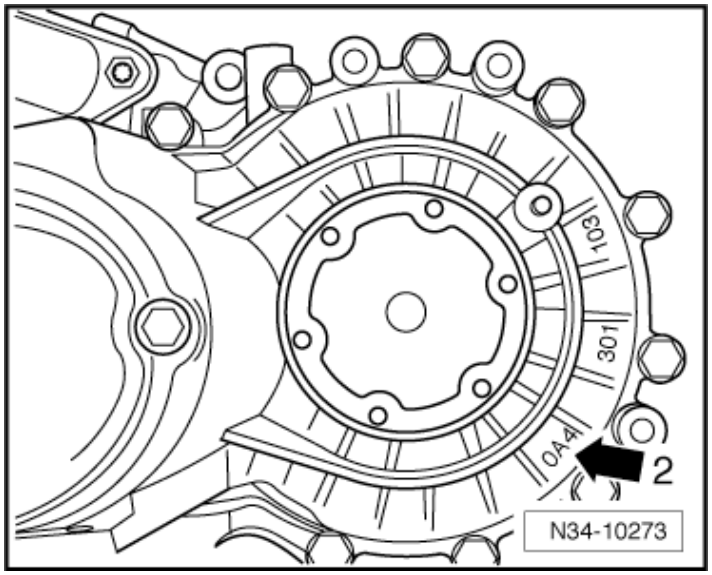
MANUAL TRANSMISSION – 0A4

General Information – 0A4

Transmission Identification

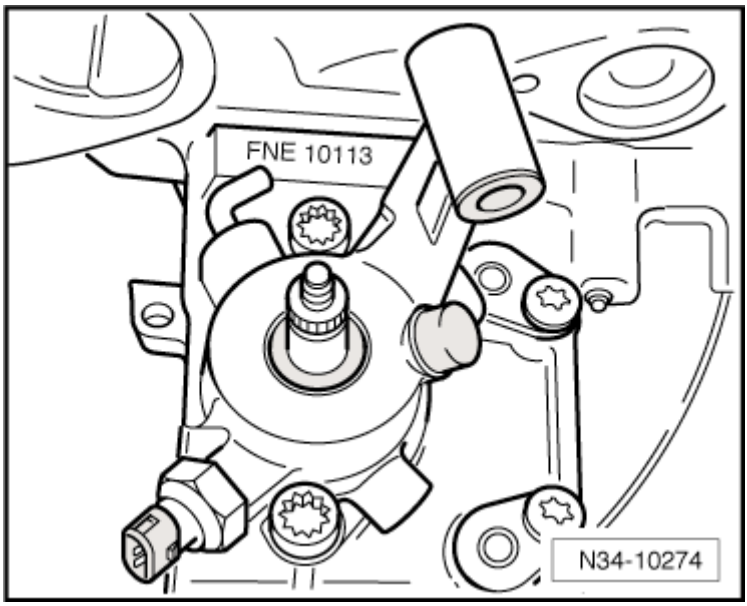


Code letters and build date (1) manual transmission 0A4 (2).



Manual transmission 0A4 (2).

Transmission Identification *(cont'd)*



Transmission code letters and build date.

Example:

FNE	10	11	3
Identification code	Day	Month	Year (2003) of manufacture

NOTE: The transmission code letters are also included on the vehicle data label.

Codes Letters, Transmission Allocation and Capacities

Manual transmission		**5 Speed 0A4**
Identification code		KPF
Manufactured	from	04.10
	through	
Allocation	Type	Jetta from MY 2005 through 2006, Jetta SportWagen (US)/Jetta Wagon (Canada) for MY 2009, Jetta SportWagen (US)/Golf Wagon (Canada) from MY 2010, Jetta from MY 2011
	Engine	2.5L - 125 kW
Ratio: Z_1:Z_2	Final drive	62:17= 3.647
Manual transmission capacity (transmission completely disassembled)		1.9 liters
Man. trans. capacity, refer to ElsaWeb,*Transmission Fluid, Checking & Filling* (trans. partly disassembled)		1.7 liters
Drive axle flange diameter		100 mm

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

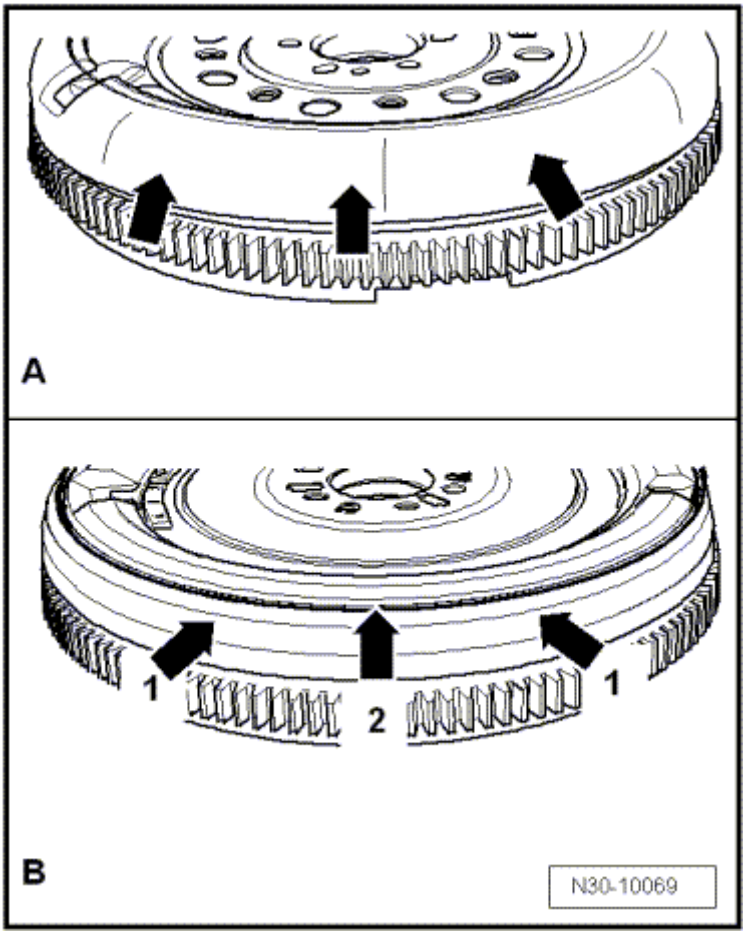
Clutch – 0A4

Fastener Tightening Specifications

Component	**Fastener size**	**Nm**
Ball stud-to-transmission	-	25
Clutch pedal bolt nut [1)]	-	25
Clutch pedal bracket-to-bulkhead nut [1)]	-	25
Clutch slave cylinder-to-transmission bolt	-	20
Guide sleeve-to-transmission bolt	-	20
Hose/line assembly bracket-to-transmission bolt	-	20
Impact bolster support-to-steering column bracket		
- Secured with two bolts	-	10
- Secured with one bolt	-	20
Pressure plate-to-flywheel bolt	M6	13
	M7	20
Transmission support-to-transmission bracket/transmission bolt [1)]	-	20 plus an additional 90° (¼ turn)

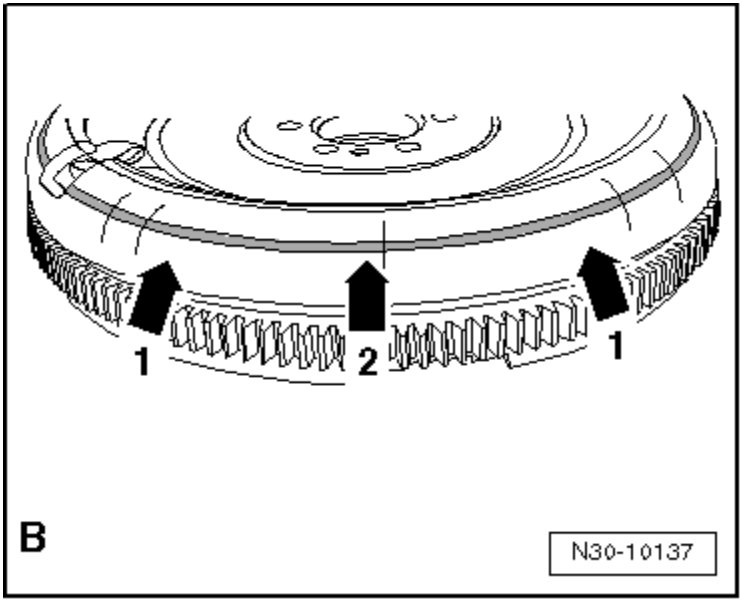
[1)] Replace fastener(s).

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.

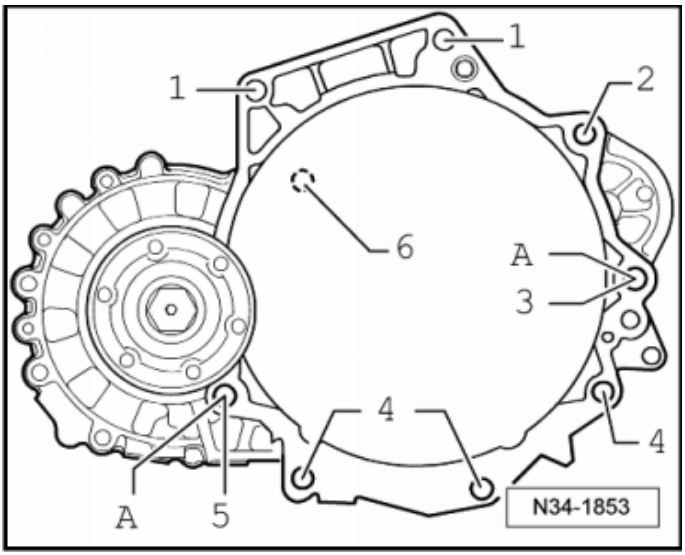
Controls, Housing – 0A4

Fastener Tightening Specifications

Component	Fastener size	Nm
5th gear bolt 1)	-	80 plus an additional 90° (¼ turn)
5th gearshift jaw bolt	-	25
Backup lamp switch-to-shift unit	-	20
Cable bracket support-to-transmission bolt	-	20
Clutch housing-to-transmission housing bolt 1)	-	25 plus an additional 90° (¼ turn)
Flange shaft bolt	-	25
Guide sleeve-to-clutch housing bolt	-	20
Oil drain plug-to-clutch housing	-	35
Oil fill plug-to-transmission housing	-	35
Output shaft-to-clutch housing nut 1)	-	25 plus an additional 90° (¼ turn)
Pivot pin-to-transmission housing bolt	-	25
Reverse gear selector fork-to-clutch housing bolt	-	25
Sealing cap-to-transmission housing bolt	-	25
Shift lever-to-shift unit nut 1)	-	23
Shift unit-to-transmission housing bolt	-	25
Synchronizer hub with gear wheel and 5th gear synchronizer ring bolt 1)	-	80 plus an additional 90° (¼ turn)
Transmission housing cover-to-transmission housing bolt	-	18
Transmission housing-to-reverse shaft support bolt 1)	-	25
	-	30
Transmission mount-to-body bolt 1)	-	60 plus an additional 90° (¼ turn)
Transmission mount bracket-to-transmission bolt 1)	-	40 plus an additional 90° (¼ turn)
Transmission neutral position sensor-to-transmission housing bolt	-	5
Transmission support-to-transmission bracket/transmission bolt 1)	-	20 plus an additional 90° (¼ turn)
Shift housing-to-body nut	M6	8
	M8	25

1) Replace fastener(s).

Transmission to Engine Tightening Specifications



Gas Engine

Item	Fastener	Qty.	Nm
1	M12 x 65	2	80
2	M12 x 150 Also starter to transmission	1	80
3	M12 x 165 Also starter to transmission	1	80
4	M10 x 50	3	40
5	M12 x 85	1	80
6	M6 x 8 Small flywheel cover plate	1	10
A	Alignment bushings for centering		

Determining Shim Thickness

Example	Bearing clearance measured value	Adjustment shim thickness according to the table
	1.21 mm	1.175 mm

Adjustment Shim Table

Bearing play	Adjusting shim
Measured value (mm)	**Thickness (mm)**
0.671 to 0.699 0.700 to 0.724 0.725 to 0.749	0.650 0.675 0.700
0.750 to 0.774 0.775 to 0.799 0.800 to 0.824	0.725 0.750 0.775
0.825 to 0.849 0.850 to 0.874 0.875 to 0.899	0.800 0.825 0.850
0.900 to 0.924 0.925 to 0.949 0.950 to 0.974	0.875 0.900 0.925
0.975 to 0.999 1.000 to 1.024 1.025 to 1.049	0.950 0.975 1.000
1.050 to 1.074 1.075 to 1.099 1.100 to 1.124	1.025 1.050 1.075
1.125 to 1.149 1.150 to 1.174 1.175 to 1.199	1.100 1.125 1.150
1.200 to 1.224 1.225 to 1.249 1.250 to 1.274	1.175 1.200 1.225
1.275 to 1.229 1.300 to 1.324 1.325 to 1.349	1.250 1.275 1.300
1.350 to 1.374 1.375 to 1.399 1.400 to 1.424	1.325 1.350 1.375
1.425 to 1.449 1.450 to 1.474 1.475 to 1.499	1.400 1.425 1.450
1.500 to 1.524 1.525 to 1.549 1.550 to 1.574	1.475 1.500 1.525

Bearing play	Adjusting shim
Measured value (mm)	**Thickness (mm)**
1.575 to 1.599 1.600 to 1.624 1.625 to 1.649	1.550 1.575 1.600
1.650 to 1.674 1.675 to 1.699 1.700 to 1.724	1.625 1.650 1.675

NOTE: Refer to the Electronic Parts Catalog (ETKA) for the correct shims.

Using VW 447 I, remove the input shaft and the outer race/ tapered roller bearing from the transmission housing.

Install the shim with the correct thickness, thickest shim first.

If the measured shim thickness is larger than those listed in the table, then install two shims that add up to the necessary thickness.

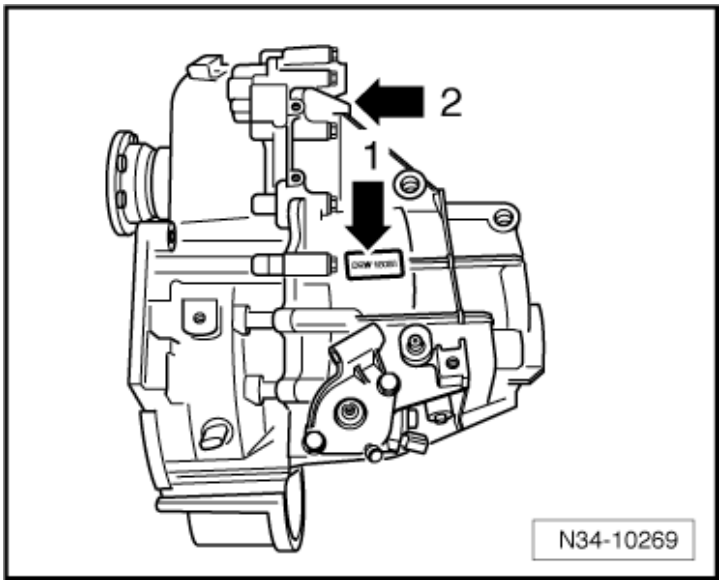
Using VW 510, press the outer race/tapered roller bearing and the selected shim (1.175 mm in the example) into the transmission housing using the.

Assemble the transmission housing and tighten the bolts to 25 Nm plus an additional 90° (¼ turn).

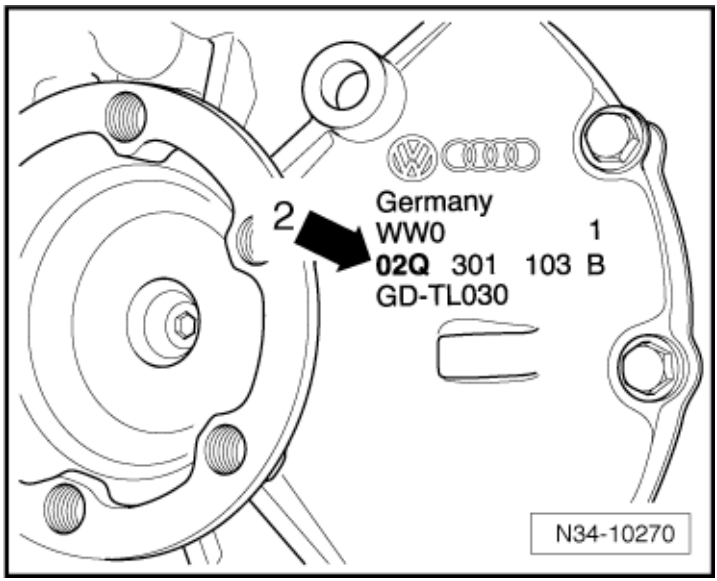
MANUAL TRANSMISSION – 02Q

General Information – 02Q

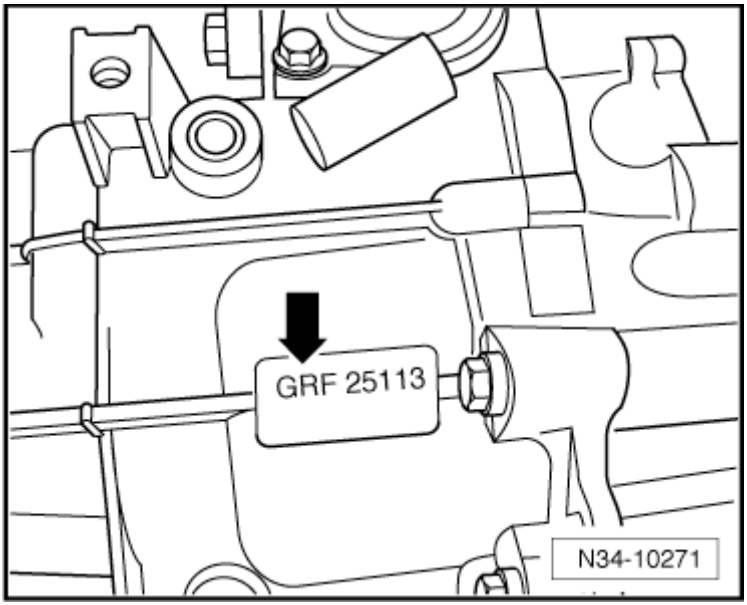
Transmission Identification



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

Transmission		6 Speed 02Q	
Identification Codes		NFP	MDL
Manufactured	from	05.10	11.09
	through		
Allocation	Type	Jetta from MY 2011	Jetta from MY 2011
	Engine	2.0L - 104 kW TDI	2.0L - 147 kW TFSI
Ratio: Z_2: Z_1	Final drive I [1]	69:20 = 3.450	70:19 = 3.684
	Final drive II [2]	69:25 = 2.760	70:24 = 2.917
Capacities		Refer to Fluid Capacity Tables Rep. Gr. 03	Refer to Fluid Capacity Tables Rep. Gr. 03
Drive axle flange diameter		107 mm	107 mm

[1] Final drive for 1st through 4th gear.
[2] Final drive for 5th gear, 6th gear and reverse gear.

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

Clutch – 02Q

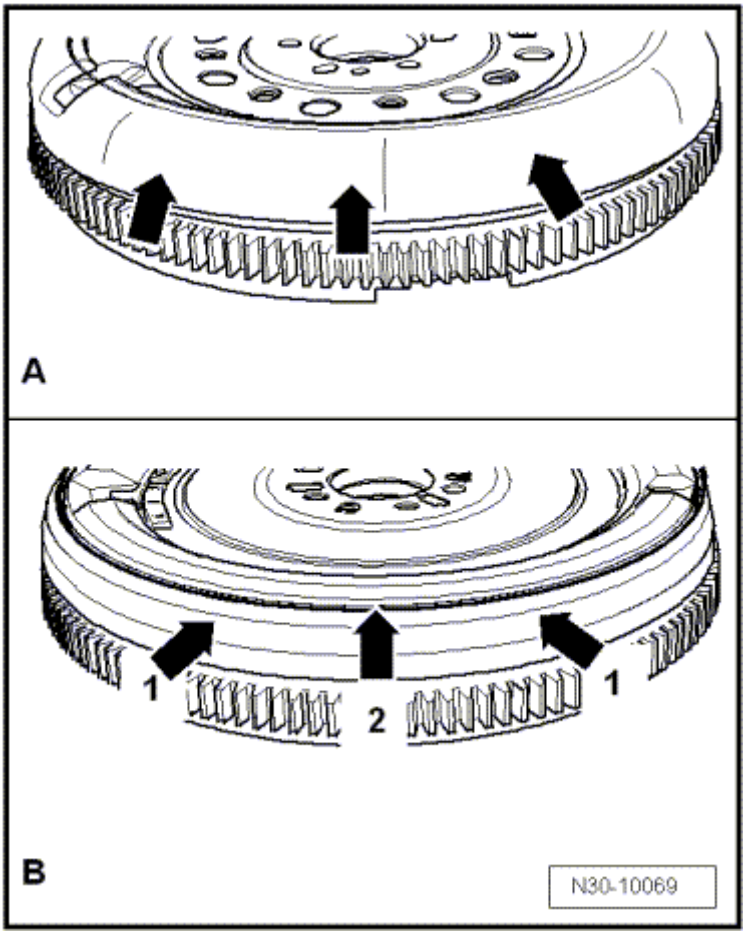
Fastener Tightening Specifications

Component	Fastener size	Nm
Clutch pedal mounting bracket-to-cross panel nut [1]	-	25
Clutch pedal-to-mounting bracket through bolt nut [1]	-	25
Impact support-to-steering column mounting bracket nut	-	10
Pressure plate-to-dual mass flywheel bolt [2]	M6	13
	M7	20
Slave cylinder with release bearing-to-transmission bolt [1]		
- Slave cylinder with metal housing (without locking fluid)	-	12
- Slave cylinder with plastic housing (with locking fluid)	-	15

[1] Replace fastener(s).

[2] Loosen and tighten in small steps and in a diagonal sequence.

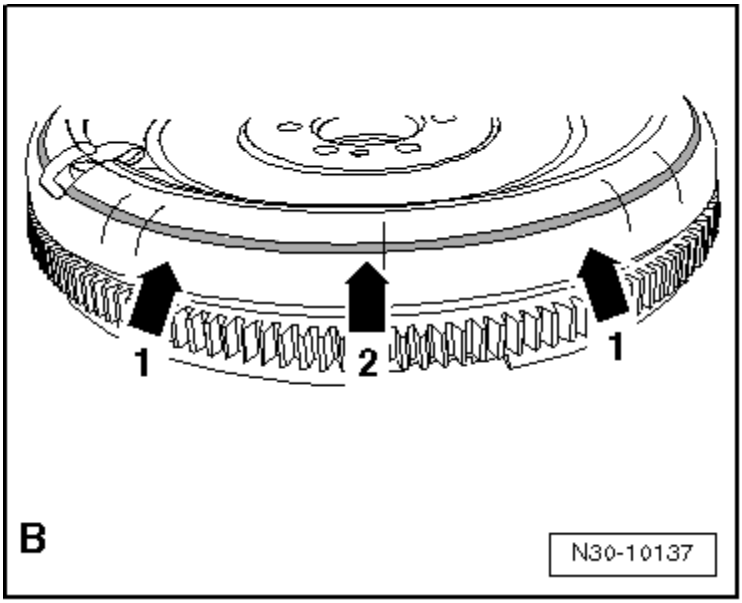
Determining Clutch Manufacturer



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.

Determining Clutch Manufacturer *(cont'd)*



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

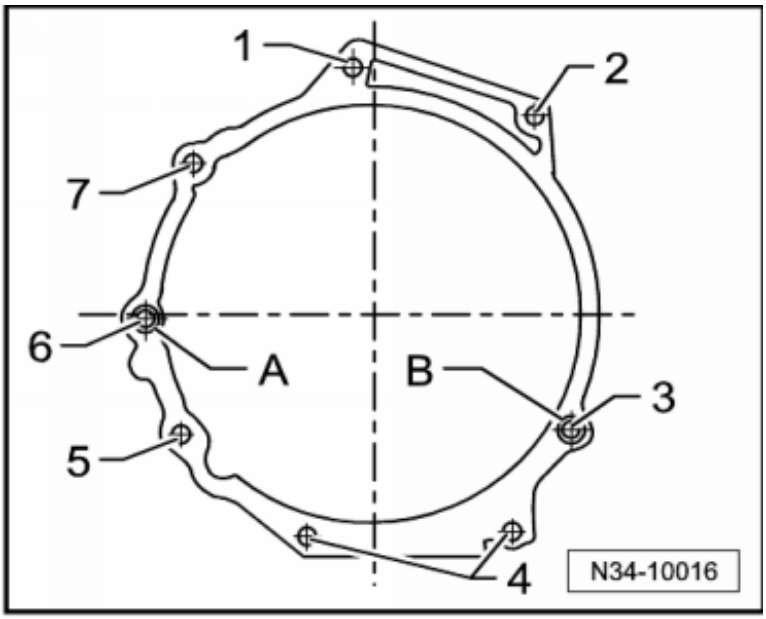
Controls, Housing – 02Q

Fastener Tightening Specifications

Component	Fastener size	Nm
Backup lamp switch to transmission housing	-	20
Cable mounting bracket to transmission bolt/nut	-	20
Flange shaft bolt	-	33
Fluid drain/fill plug		
– With a hex socket head	-	30
– With a multipoint socket head	-	45
Slave cylinder with release bearing-to-clutch housing bolt [1)]		
– With a internal hex round head,	M9	15 + 180°
– With a outer hex head		
Shift housing to body nut	M6	8
	M8	25

1) Replace fastener(s).

Transmission to Engine Tightening Specifications



Item	Fastener	Qty.	Nm
1	M12 x 55 With a short M8 threaded pin	1	80
2	M12 x 55 With a long M8 threaded pin	1	80
3	M12 x 65	1	80
4	M10 x 50	2	40
5	M10 x 105	1	40
6	M12 x 165 With a short M8 threaded pin Also starter to transmission	1	80
7	M12 x 165 With a short M8 threaded pin Also starter to transmission	1	80
-	M6 x 8 Small flywheel cover plate (not present on all engines)	1	10
A and B	Centering alignment sleeves		

Rear Final Drive, Differential – 02Q

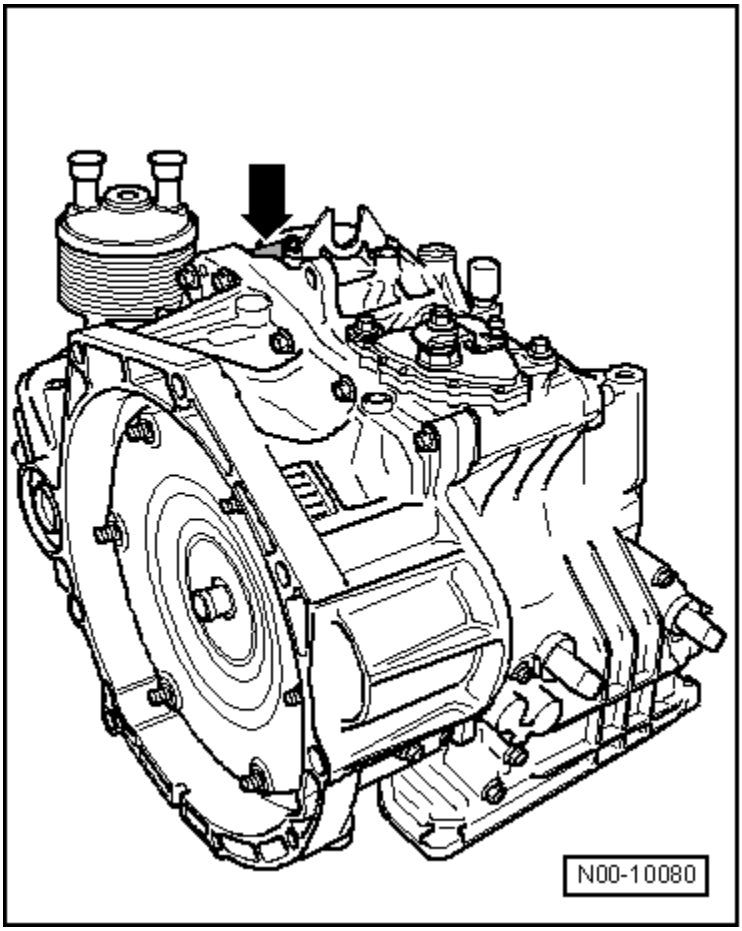
Fastener Tightening Specifications

Component	Fastener size	Nm
Flange shaft bolt	-	33

AUTOMATIC TRANSMISSION – 09G

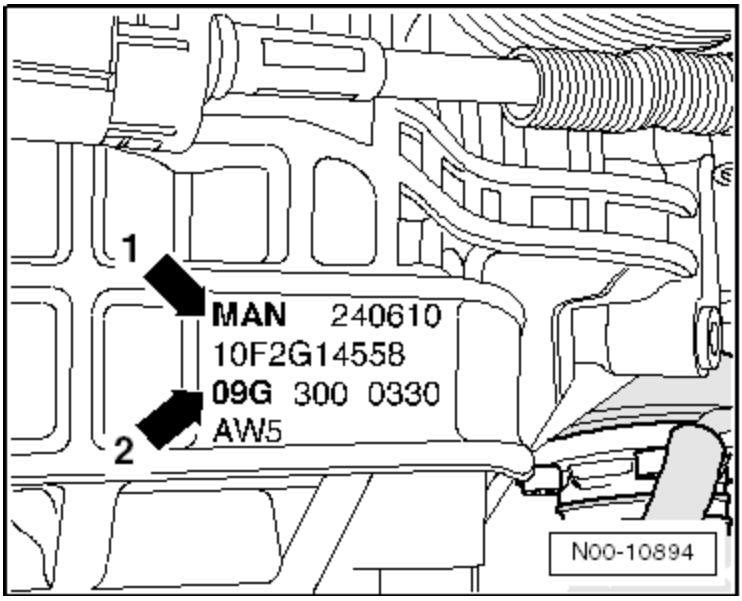
General Information – 09G

Transmission Identification



Code letters (➡).

Transmission Identification *(cont'd)*



Code letter (1) indicates 6-speed automatic transmission 09G (2).

Example:

MAN	24	06	10
Identification codes	Day	Month	Year (2010) of manufacture

The transmission code letters are also included on the vehicle data labels.

Code Letters, Assembly Allocation and Ratios

If original replacement parts are needed for a repair, always pay attention to the transmission codes.

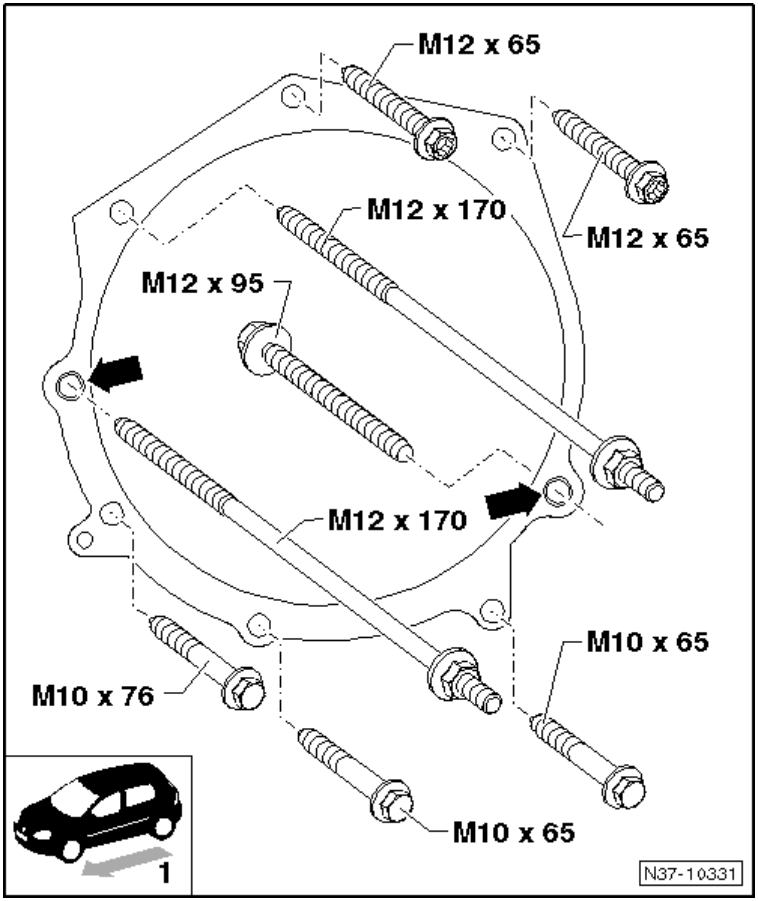
Automatic Transmission 09G			
Identification codes	MAM	HDN, HFU, HRM, JUJ	KGL, KBV, MAN
Engine	2.0L - 85 kW	2.5L - 110 kW	2.5L - 125 kW

Controls, Housing – 09G

Fastener Tightening Specifications

Component	Nm
Automatic transmission fluid cooler-to-transmission bolt	36
Bracket-to-automatc transmission fluid cooler nut	8
Transmission oil pan inspection plug	27
Multifunction transmission range switch-to-transmission bolt	6
Multifunction transmission range switch-to-transmission nut	7
Selector lever cable bracket-to-transmission nut	8
Selector lever-to-selector shaft nut	13
Selector lever and selector mechanism with selector lever cable-to-body screw	8
Shift housing-to-body nut	4

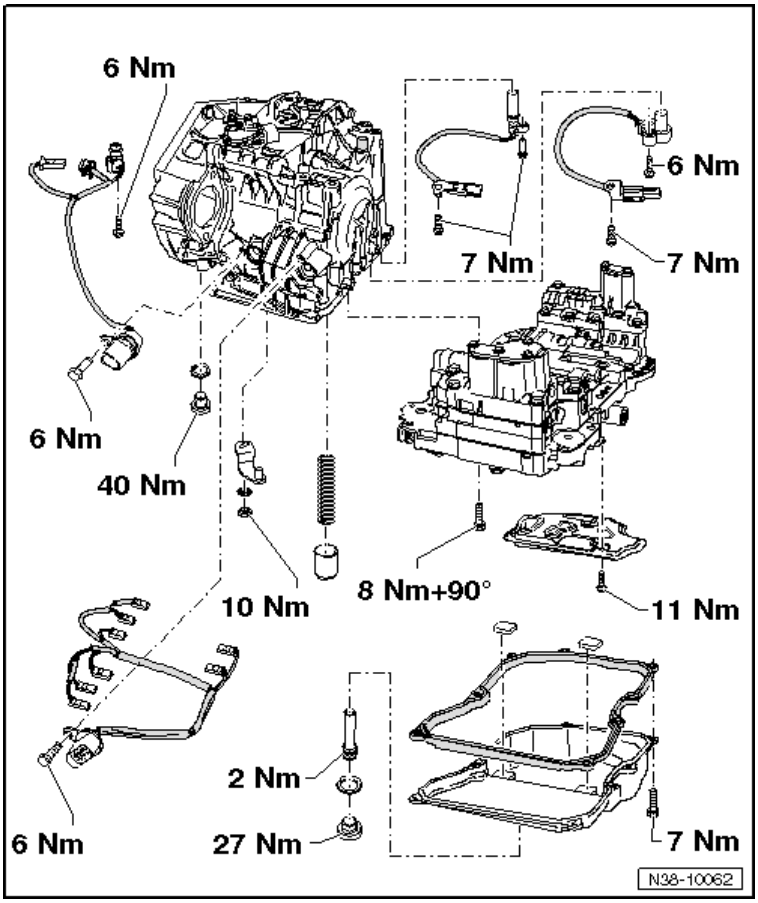
Transmission to Engine Tightening Specifications



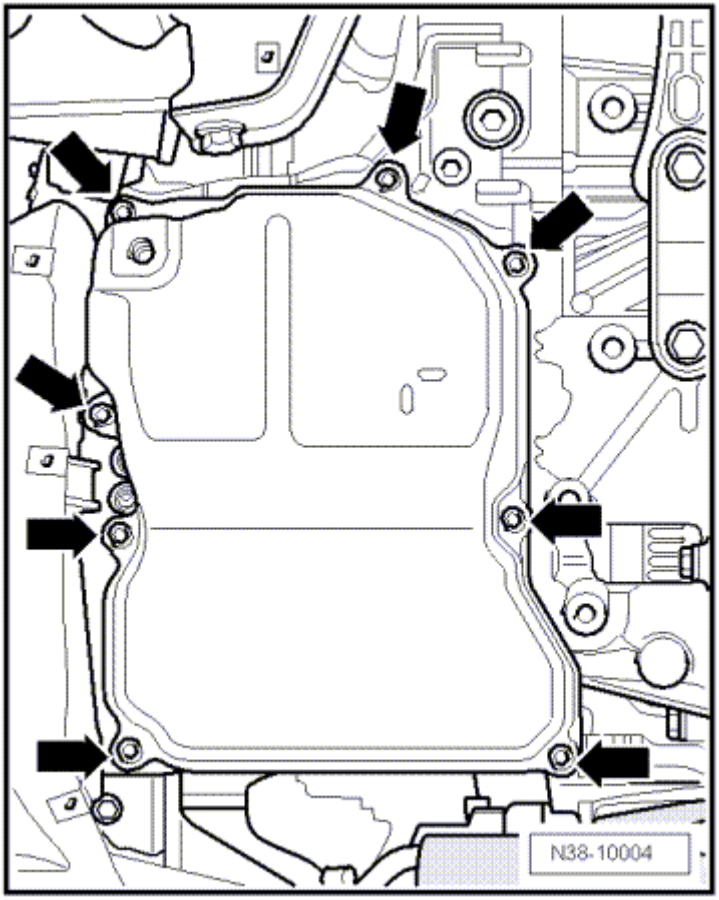
Component	Fastener size	Nm
Drive plate-to-converter	-	60
Bolts	M12	80 or 65, if using T10179
Bolts located in the lower flange	M10	40
Alignment pins (➡) for centering		

Gears, Hydraulic Controls – 09G

Fastener Tightening Specifications



Transmission Fluid Pan Tightening Specification

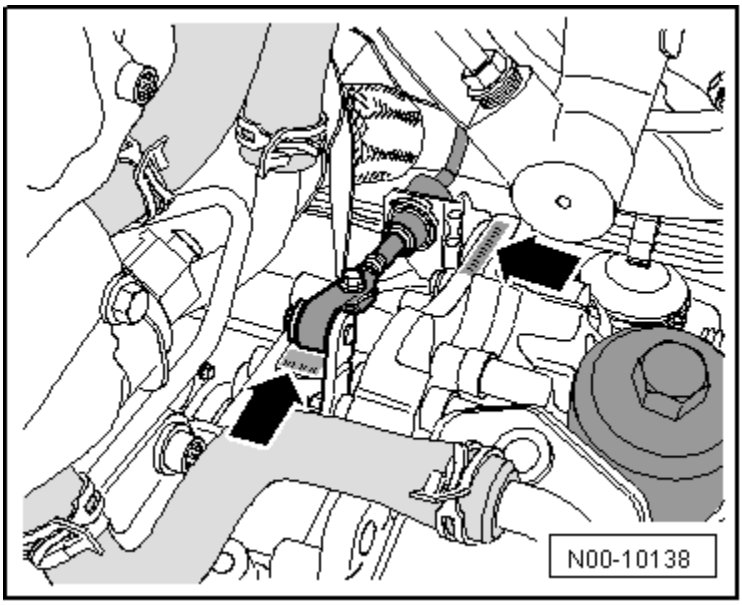


Component	Nm
Tighten the transmission fluid pan bolts (➡) diagonally in several steps	7

DIRECT SHIFT GEARBOX (DSG) TRANSMISSION – 02E

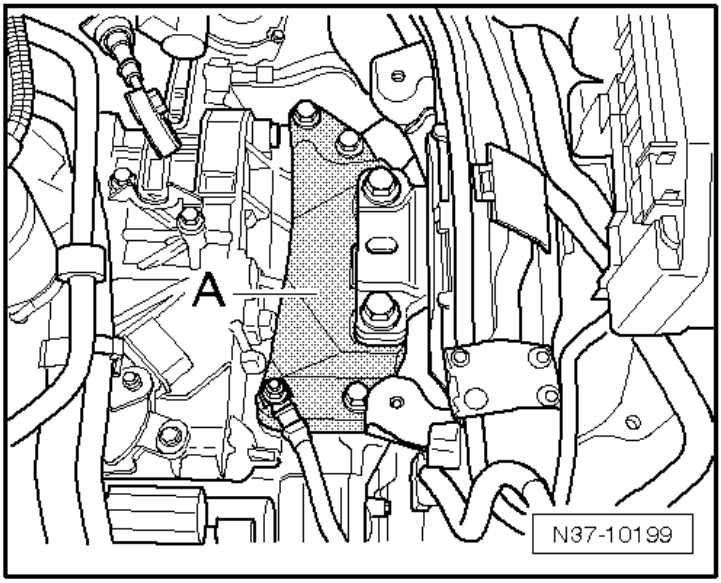
General Information – 02E

Transmission Identification



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

Transmission Identification *(cont'd)*



To read the transmission code letters under the transmission mount bracket, the engine and transmission must be supported and the transmission mount bracket (A) removed. Refer to ElsaWeb for the transmission mount bracket (A) removal procedure.

Transmission Allocation Codes

Direct Shift Gearbox (DSG) 02E		
HLH, HQN, HQH, HXU and JPL	KCU, KMX, KQC, LQV, LTE, MFL, MSV, NJK, MSV and NLP	HBQ, HUT, HXW, JPP, KCZ, KNC, KPV, LQZ, LTL, MSX, NJM and NLQ
1.9L -77 kW TDI	2.0L - 103 kW TDI	2.0L - 147 kW TFSI
Installed in: Jetta from MY 2005 through 2010, Jetta SportWagen (US)/Jetta Wagon (Canada) for MY 2009, Jetta SportWagen (US)/Golf Wagon (Canada) for MY 2010, Jetta from MY 2011 and GLI from MY 2012		

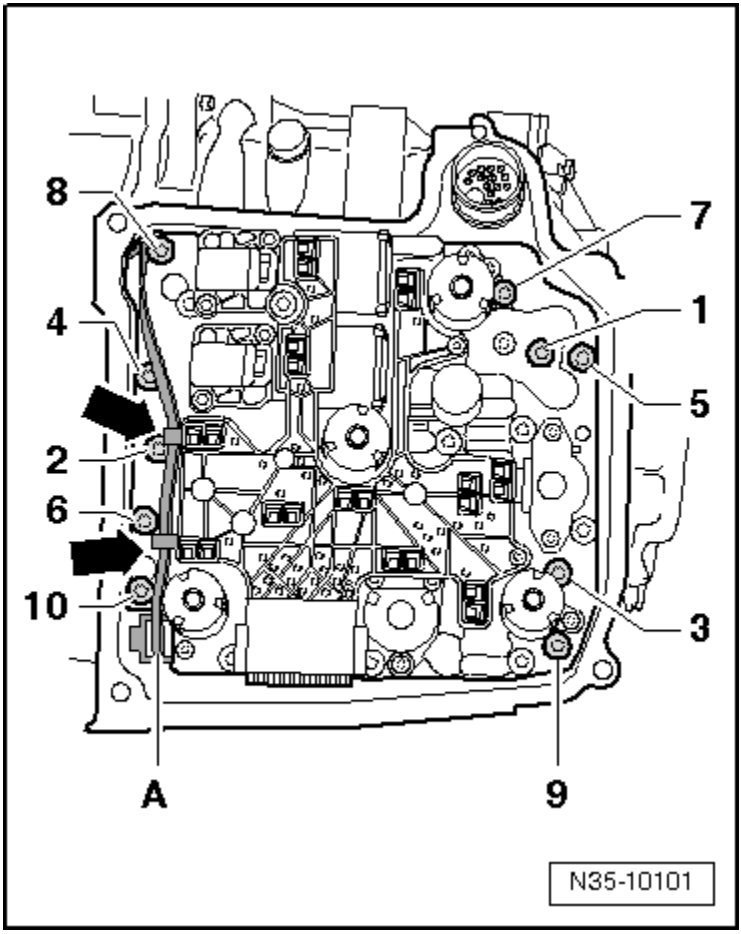
Controls, Housing (DSG) – 02E

Fastener Tightening Specifications

Component	Nm
Transmission drain plug	45
Mechatronic (large) cover bolt [1)]	10
Oil filter housing	20
Oil pump (small) cover bolt [1)]	8
Transmission overflow tube	3
Selector shaft lever nut	20
Transmission fluid cooler-to-transmission bolt	20 plus an additional 90° (¼ turn)
Transmission input speed and clutch oil temperature sensor bolt	10
Wire bracket-to-mechatronic (large) cover nut	10
Selector housing-to-body nut	8
Selector lever cable adjusting bolt	13
Selector mechanism with selector lever and selector lever cable-to-body bolt	8

[1)] Replace fastener(s).

Mechatronic Tightening Specifications

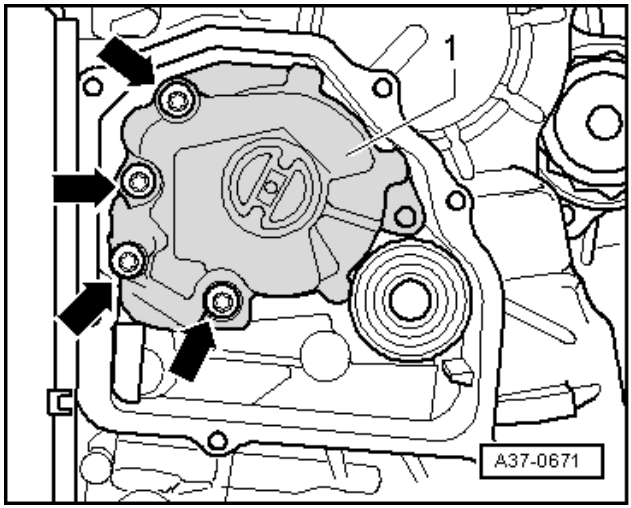


Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence [1)]	Hand-tighten
2	Tighten bolts 1 through 10 in sequence	5
3	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)

[1)] Replace fastener(s).

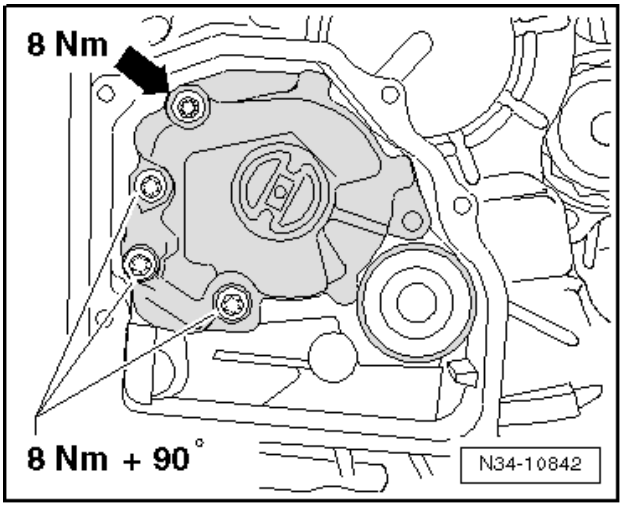
Oil Pump Tightening Specifications

Without Countersunk Bolt



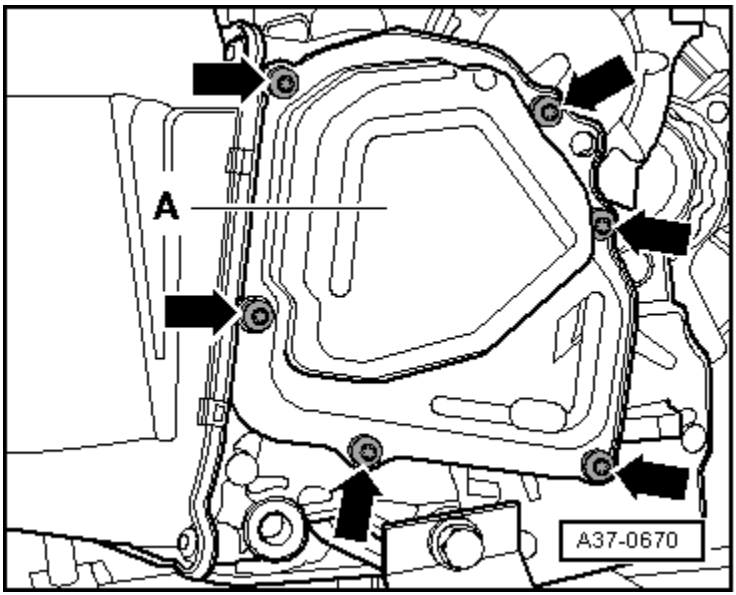
Component	Nm
Oil pump bolts (➡) with flat heads	5 plus an additional 90° (¼ turn)

With Countersunk Bolt



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

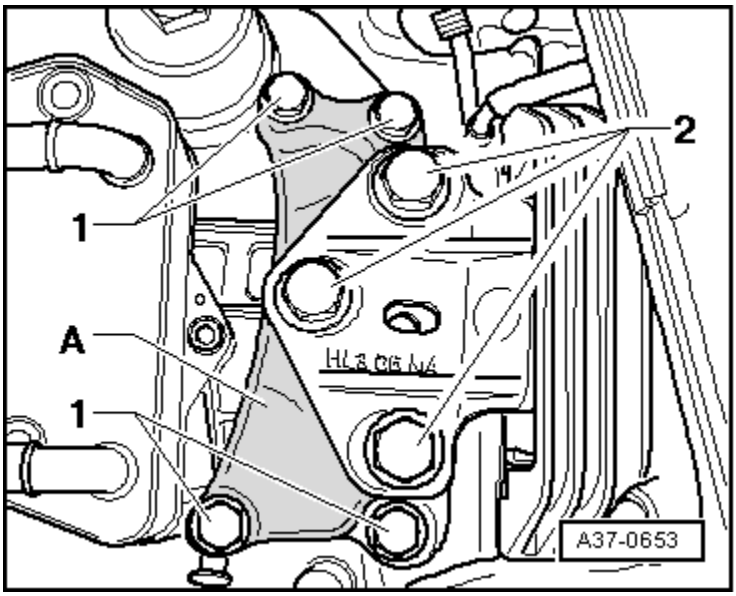
Oil Pump Cover Tightening Specification



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

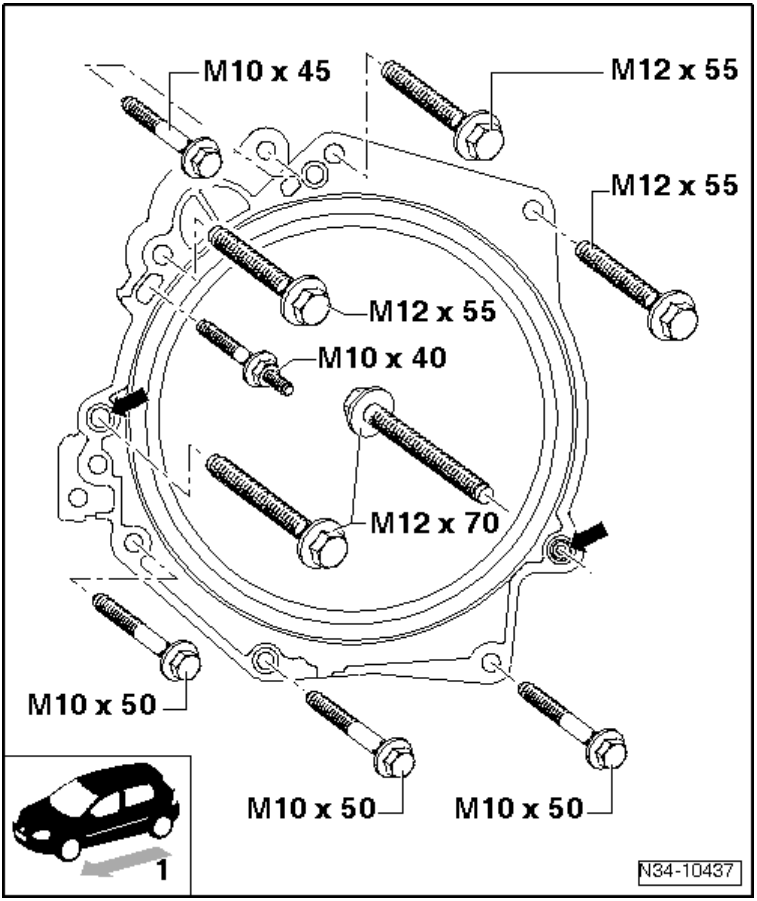
[1] Replace fastener(s).

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
- Steel and aluminum control arm	-	100
Ball joint to wheel bearing housing nut [1]	M12 x 1.5	60
Console-to-Body Bolt [1]	M12 x 1.5 x 90	70 plus an additional 90° (¼ turn)
Control arm mounting bracket-to-body bolt [1]	M12 x 1.5 x 90	70 plus an additional 90° (¼ turn)
Control arm mounting bracketvconsole bolt [1]	-	50 plus an additional 90° (¼ turn)
Control armvsubframe bolt [1] [3]		70 plus an additional 90° (¼ turn)
Coupling rodvstabilizer bar nut [1]		65
Coupling rod-to-strut nut [1]		65
Cover plate-to-wheel bearing housing bolt		10
Drive axle heat shield bolt		25
Drive axle-to-transmission bolt [1]	M8	40
	M10	70
	M10 x 52	70
	M10 x 23	70
Drive axle-to-wheel hub bolt [1]		
- 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-console bolt	-	9
Level control system sensor-to-control arm nut [1]	-	9

Fastener Tightening Specifications *(cont'd)*

Component	Fastener size	Nm
Pendulum Support-to-Subframe Bolt [1) 2)]	M14 x 1.5 x 70	100 plus an additional 90° (¼ turn
Pendulum Support-to-Transmission Bolt [1)]	-	50 plus an additional 90° (¼ turn)
Shield-to-Subframe Bolt	-	6
Stabilizer Bar-to-Subframe Bolt [1)]	-	20 plus an additional 90° (¼ turn)
Strut-to-Suspension Strut Bearing Nut [1)]	-	60
Strut-to-Suspension Strut Dome Bolt [1)]	-	15 plus an additional 90° (¼ turn)
StrutvWheel Bearing Housing Bolt [1)]	-	70 plus an additional 90° (¼ turn)
SubframevBody Bolt [1)]	M12 x 1.5 x 100	70 plus an additional 90° (¼ turn)
SubframevConsole Bolt [1)]	M12 x 1.5 x 75	70 plus an additional 90° (¼ turn)
Tie Rod End-to-Wheel Bearing Housing Nut 1	-	20 plus an additional 90° (¼ turn)
Wheel Hub-to-Wheel Bearing Housing Bolt [1)]	-	70 plus an additional 90° (¼ turn)

1) Always replace after removal.
2) Only tighten when pendulum support is bolted to transmission.
3) Always tighten threaded connections in curb weight position. Refer to ElsaWeb, *Wheel Bearing, Lifting to Curb Weight Position*.
4) Pre-tighten diagonally to 10 Nm, then tighten diagonally again to the tightening specification.

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	M5 x 20	5
Lower transverse link-to-subframe nut [1] [2]	-	95
Lower transverse link-to-wheel bearing housing nut [1] [2]	M12 x 1.5 x 75	90 plus an additional 90° (¼ turn)
Shock absorber-to-body bolt [1]	-	50 plus an additional 90° (¼ turn)
Shock absorber-to-shock absorber mounting nut [1]	M10 x 1.0	25
Shock absorber-to-wheel bearing housing bolt	M14 x 1.5 x 70-	180
Stabilizer bar-to-subframe bolt [1] [2]	-	25 plus an additional 90° (¼ turn)
Subframe-to-body bolt [1]	M12 x 1.5 x 90	90 plus an additional 90° (¼ turn)
Subframe trim angle nut, bluemotion	-	20
Subframe trim panel nut, bluemotion	-	2
Tie rod-to-subframe [1] [2]	M12 x 1.5	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 mounting bracket-to-body bolt [1]	-	50 plus an additional 90° (¼ turn)
Trailing arm-to-mounting bracket bolt [1]	-	90 plus an additional 90° (¼ turn)
Trailing arm-to-wheel bearing housing bolt [1] [3]	-	90 plus an additional 90° (¼ turn)
Upper transverse link-to-subframe nut [1] [2]	-	95
Upper transverse link-to-wheel bearing housing nut [1] [2]	M14 x 1.5	130 plus an additional 90° (¼ turn)
Wheel hub-to-wheel bearing housing bolt [1]	-	180 plus an additional 90° (¼ turn)

[1] Replace fastener(s).
[2] Tighten bolts in curb weight position.
[3] Follow tightening sequence. Refer to ElsaWeb, *Trailing Arm with Mounting Bracket*. Installing

Wheels, Tires

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
Tire pressure sensor union nut	8
Rear lower transverse link to subframe nut 1, 2	95
Rear upper transverse link to subframe nut 1, 2	95
Wheel bolts-to-wheel hub for all vehicles	120

[1] Replace fastener(s).
[2] Always tighten threaded connections in curb weight position. Refer to ElsaWeb, *Rear Axle, Lifting to Curb Weight Position".*

Wheel Alignment Data

Wheel Alignment Specified Values

Front axle	Basic suspension	Sport suspension except 18" wheels
Production Relevant No. (PR. No.)	2UA	2UC
Total toe (wheels not pressed)	10' ± 10′	10' ± 10′
Camber (wheels in straight ahead position)	-30′ ± 30′	-41′ ± 30′
Maximum permissible difference between both sides	Maximum 30′	Maximum 30′
Toe out angle[1)] with steering wheel turned 20° to left and right	1°38′ ± 20′	1°40′ ± 20′
Caster	7° 34′ ± 30′	7° 47′ ± 30′
Maximum permissible difference between both sides	Maximum 30′	Maximum 30′
Standing height	382 ± 10 mm	367 ± 10 mm

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

Front axle	Sport suspension with 18" wheels	Heavy duty suspension
Production Relevant No. (PR. No.)	G02, G05, G07, 2UC	2UB
Total toe (wheels not pressed)	10' ± 10′	10' ± 10′
Camber (wheels in straight ahead position)	-41′ ± 30′	-14′ ± 30′
Maximum permissible difference between both sides	Maximum 30′	Maximum 30′
Toe out angle[1)] with steering wheel turned 20° to left and right	1°40′ ± 20′	1°38′ ± 20′
Caster	7° 47′ ± 30′	7° 17′ ± 30′
Maximum permissible difference between both sides	Maximum 30′	Maximum 30′
Standing height	367 ± 10 mm	402 ± 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)*

Rear axle	Basic suspension	Sport suspension except 18" wheels
Camber	-1° 20′ ± 30′	-1° 20′ ± 30′
Maximum permissible difference between both sides	Maximum 30′	Maximum 30′
Total toe (at prescribed camber)	+10′ ± 12.5′	+10′ ± 12.5′
Maximum permissible deviation from direction of rotation	Maximum 20′	Maximum 20′
Standing height	380 ± 10 mm	365 ± 10 mm

Rear axle	Sport suspension with 18" wheels	Heavy duty suspension
Camber	-1°45' ± 30'	-1° 20′ ± 30′
Maximum permissible difference between both sides	Maximum 30′	Maximum 30′
Total toe (at prescribed camber)	+10′ ± 12.5′	+10′ ± 12.5′
Maximum permissible deviation from direction of rotation	Maximum 20′	Maximum 20′
Standing height	365 ± 10 mm	400 ± 10 mm

Steering

Fastener Tightening Specifications

Component	Nm
Ball joint-to-steel control arm	60
Brake pedal crash brace bolt	20
Steering column bolt	30
Subframe-to-body [1)]	70 plus an additional 90° (¼ turn)
Stabilizer bar-to-subframe [1)]	20 plus an additional 90° (¼ turn)
Stabilizer bar-to-connecting link [1) 2)]	65
Control arm-to-steel control arm [1)]	60
Control arm-to-sheet steel or aluminum control arm [1)]	100
Shield-to-subframe [3)]	6
Steering gear-to-subframe [1)]	50 plus an additional 90° (¼ turn)
Universal joint-to-steering gear [1)]	30
Shield-to-steering gear [3)]	6
Tie rod end-to-wheel bearing housing [1)]	20 plus an additional 90° (¼ turn)
Tie rod-to-steering rack	100
Tie rod end-to-tie rod	70
Tie rod-to-steering gear	100
Tie rod end-to-tie rod	50
Steering column-to-mounting bracket	20
Steering wheel-to-steering column [1)]	30 plus an additional 90° (¼ turn)
Tie rod end-to-wheel bearing housing [1)]	20 plus an additional 90° (¼ turn)

1) Replace fastener(s).
2) Counter hold at joint pin inner multipoint-point fitting.
3) M6 bolt is self-tapping.

BRAKE SYSTEM

General Information

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: Front wheel brakes 1ZM are installed in this vehicle (➡).

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

NOTE: The PR number for the rear wheel brakes is not on the vehicle data plate. Refer to ElsaWeb or the individual vehicle for information regarding each rear wheel brake installed.

Front Brakes

Engine Version	PR Number	Front Wheel Brake
2.5L 125 kW	1ZP	FN 3 (15”)
2.0L 103 kW TDI	1ZD/1LV	FN 3 (16”)
2.0L 147 kW TFSI		

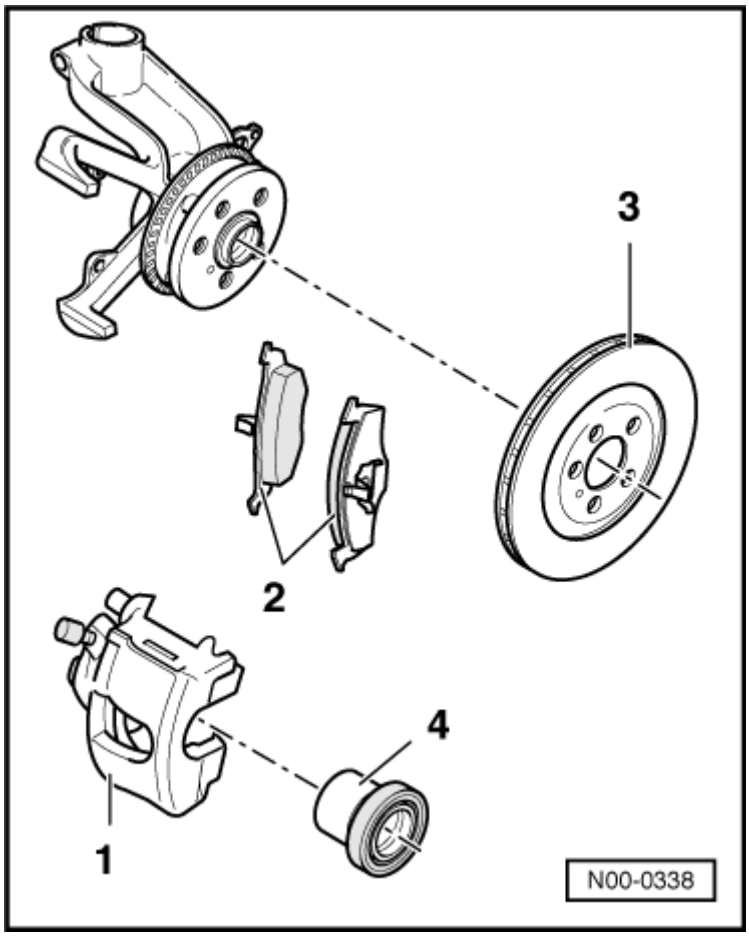
Rear Brakes

Engine Version	PR Number	Rear Wheel Brake
2.5L 125 kW	1KE	CII 41 (15”)
2.0L 103 kW TDI	1KJ	CII 41 (16”)
2.0L 147 kW TFSI		

Brake Master Cylinder and Brake Booster

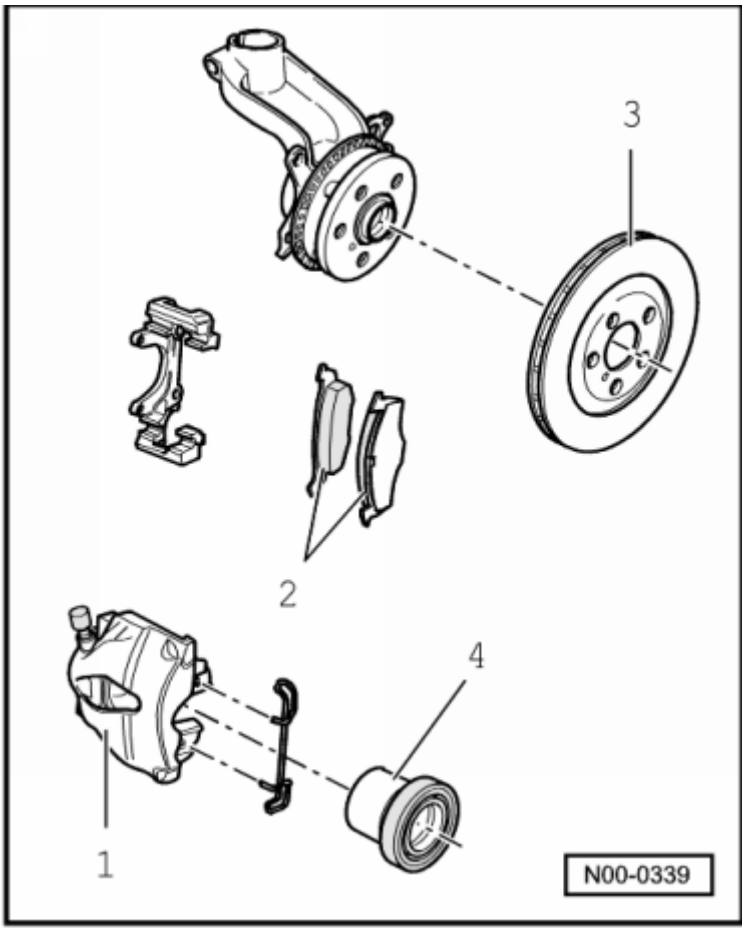
Brake master cylinder	Diameter in mm	23.8
Brake booster	Diameter in inches	10

Front Brakes, FS III



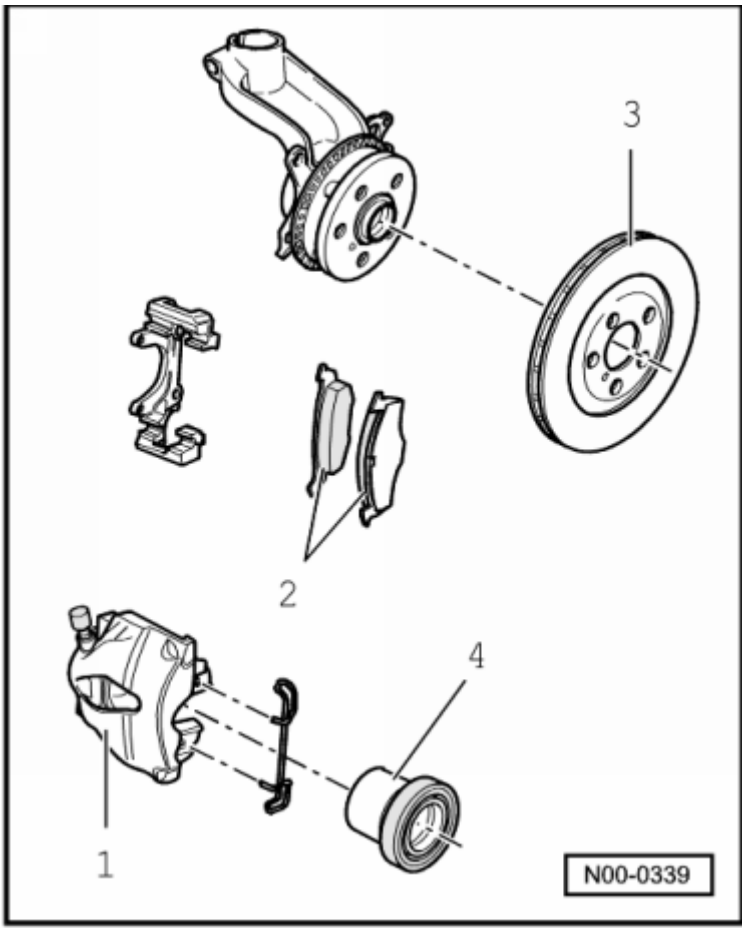
Item	PR Number		1ZM
1	Brake caliper		FS III (15”)
2	Brake pad thickness	mm	14
3	Brake disc	Diameter in mm	280
	Brake disc thickness	mm	22
4	Brake caliper, piston	Diameter in mm	54

Front Brakes, FN 3 (15”)



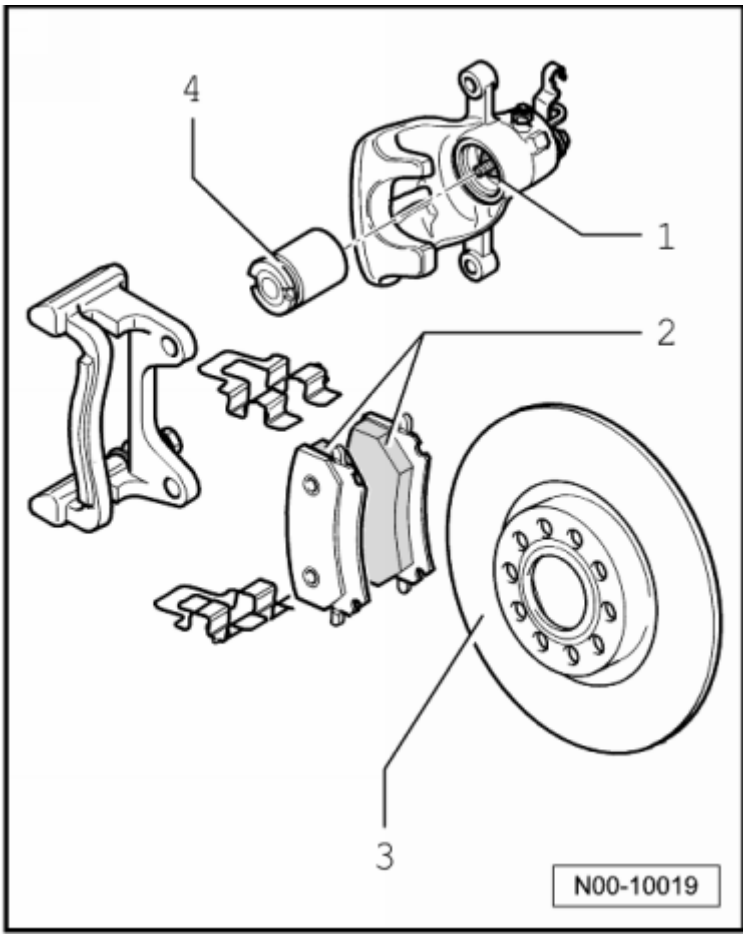
Item	PR Number		1ZE/1ZP
1	Brake caliper		FN 3 (15”)
2	Brake pad thickness	mm	14
3	Brake disc	Diameter in mm	288
	Brake disc thickness	mm	25
4	Brake caliper, piston	Diameter in mm	54

Front Brakes, FN 3 (16”)



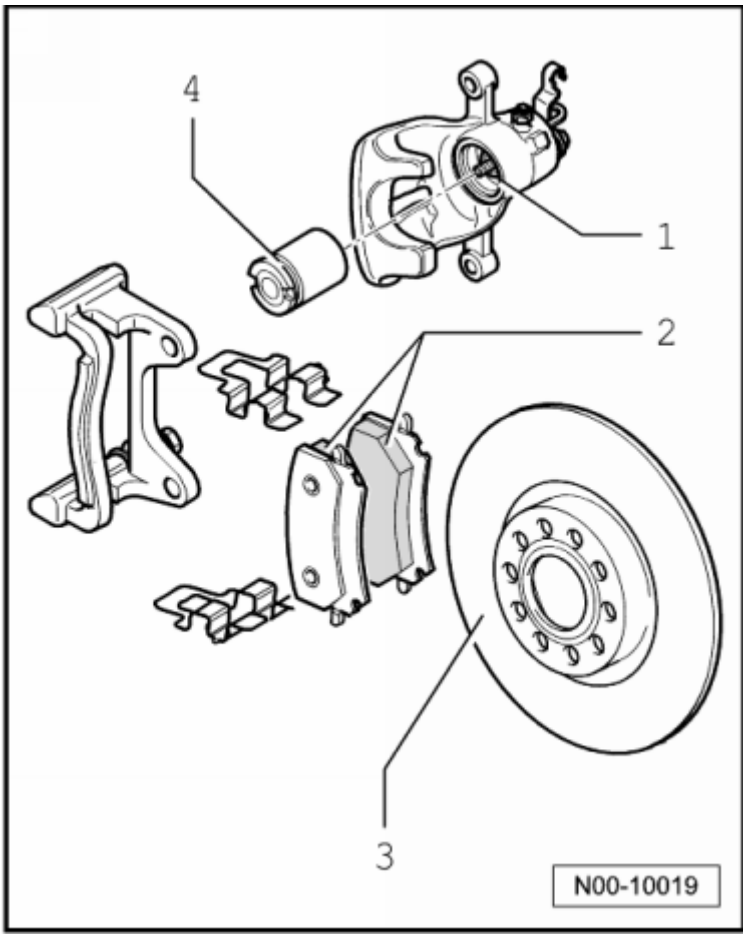
Item	PR Number		1ZD/1LJ/1LV
1	Brake caliper		FN 3 (16”)
2	Brake pad thickness	mm	14
3	Brake disc	Diameter in mm	312
	Brake disc thickness	mm	25
4	Brake caliper, piston	Diameter in mm	54

Rear Brakes, CII 41 (15”)



Item	PR Number		1KE/1KF
1	Brake caliper		CII 41 (15”)
2	Brake pad thickness	mm	11
3	Brake disc	Diameter in mm	256
	Brake disc thickness	mm	12
4	Brake caliper, piston	Diameter in mm	41

Rear Brakes, CII 41 (16")



Item	PR Number		1KJ
1	Brake caliper		CII 41 (16")
2	Brake pad thickness	mm	11
3	Brake disc	Diameter in mm	282
	Brake disc thickness	mm	12
4	Brake caliper, piston	Diameter in mm	41

Anti-lock Brake System (ABS)

Fastener Tightening Specifications

Component	Nm
ABS wheel speed sensor mounting bolt	8
ABS Mark 70 (ABS/ASR) control module-to-hydraulic unit mounting bolt [1)]	5.5
ABS Mark 60 EC (ABS/EDL/ASR/ESP) control module-to-hydraulic unit mounting bolt [1)]	2 plus an additional 0.8
ABS unit brake lines	14
Hydraulic unit mounting bracket bolt	8

1) Replace fastener(s).

Mechanical Components

Fastener Tightening Specifications

Component	Nm
Brake caliper-to-rear brake carrier mounting bolt (FWD) [1)]	35
Brake disk mounting bolt	4
Brake line-to-front brake caliper banjo bolt	35
Brake line-to-rear brake caliper banjo bolt	14
Brake pedal mounting nut	25
Brake pedal mounting bracket nut	25
Front brake carrier-to-wheel bearing housing mounting bolt	190
Front cover plate mounting bolt	12
Front brake carrier mounting bolt guide pin	30
Parking brake lever mounting nut	20
Rear brake carrier-to-wheel bearing housing mounting bolt [1)]	90 plus an additional 90° (¼ turn)
Rear cover plate mounting bolt (FWD)	9
Rear cover plate mounting bolt (AWD)	12

1) Replace fastener(s).

Hydraulic Components

Fastener Tightening Specifications

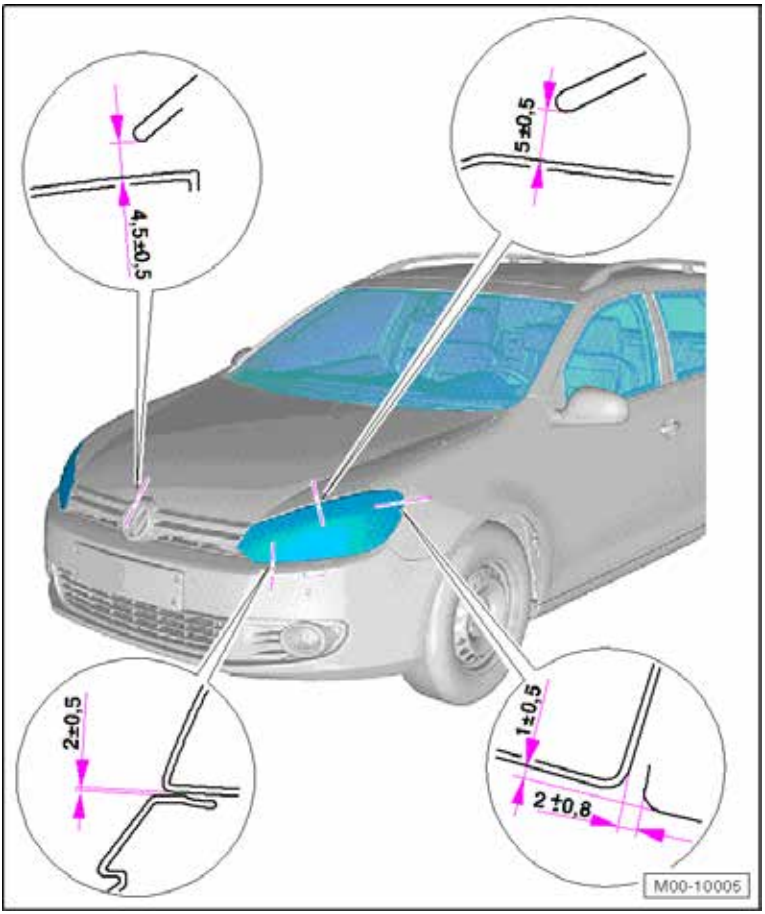
Component	Nm
Battery holder-to-body	20
Bracket-to-automatic transmission	25
Brake caliper bleeder valve	10
Brake caliper guide pins, front caliper	30
Brake caliper-to-rear brake carrier mounting bolt (FWD) [1)]	35
Brake disk mounting bolt	4
Brake light switch to brake master cylinder mounting bolt	5
Brake line-to-front brake caliper banjo bolt	35
Brake line-to-rear brake caliper banjo bolt	14
Brake master cylinder at brake booster nut [1)]	25
Brake pedal mounting nut [1)]	25
Brake pedal mounting bracket nut	25
Brake system vacuum pump-to-bracket	8
Front brake carrier-to-wheel bearing housing mounting bolt	190
Front cover plate mounting bolt	12
Front brake carrier mounting bolt guide pin	30
Parking brake lever mounting nut	20
Rear brake carrier-to-wheel bearing housing mounting bolt [1)]	90 plus an additional 90° (¼ turn)
Rear cover plate mounting bolt (FWD)	9
Rear cover plate mounting bolt (AWD)	12
TORX bolt-to-master cylinder	5

[1)] Replace fastener(s).

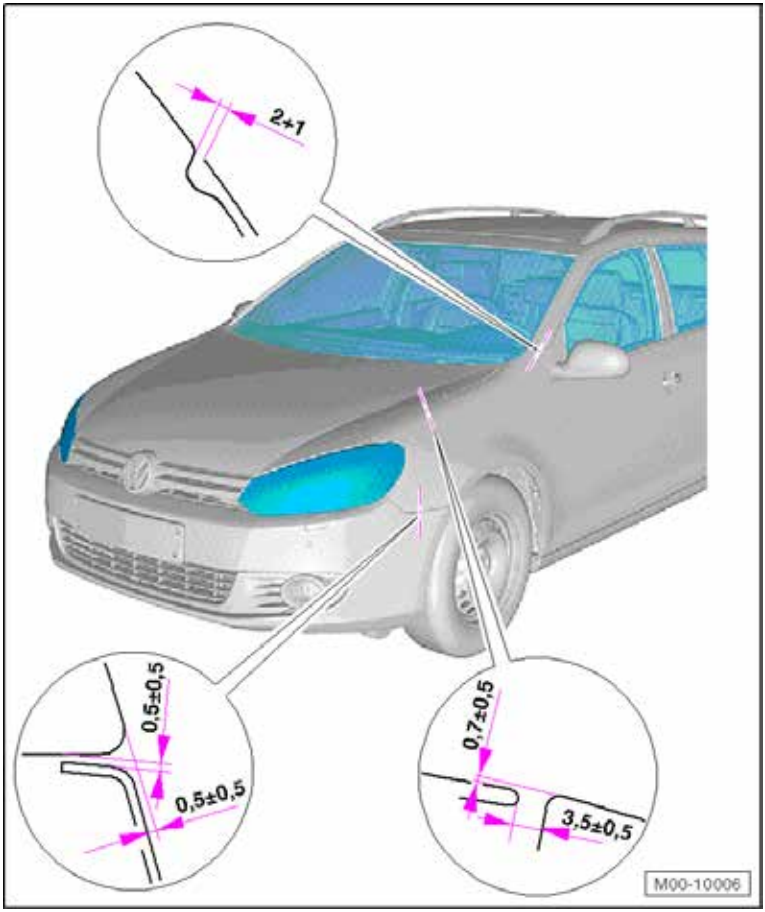
BODY

Air Gap Body Dimensions

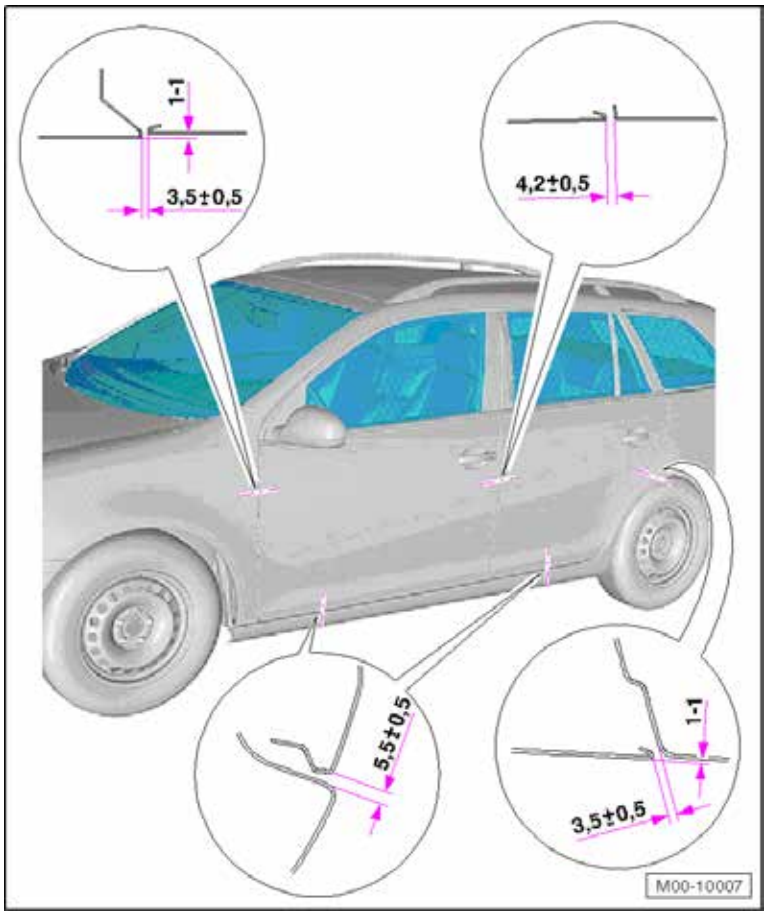
Body, Front



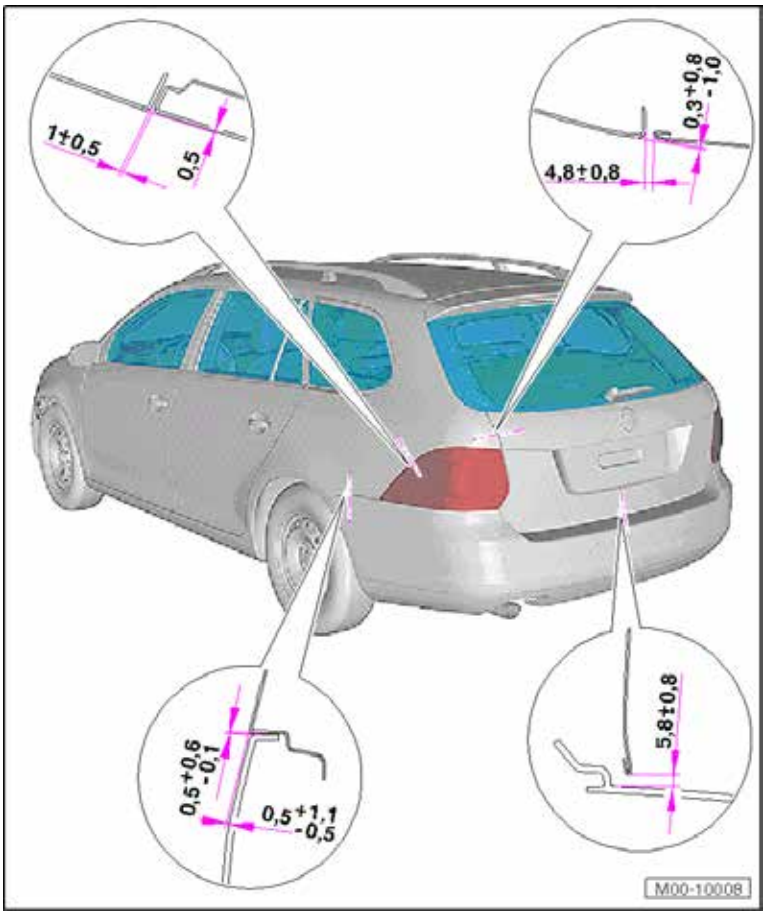
Body, Front *(cont'd)*



Body, Center



Body, Rear



Body Exterior

Lock Carrier Tightening Specifications

Component	Nm
Air guide channel bolts	2
Angle bracket bolts	8
Guide piece bolts	5
Cross member bolts [1)]	8
	60
Lock carrier support bolts	12

1) For bolt tightening clarification, refer to ElsaWeb, *Lock Carrier Attachments Assembly Overview,* items 13 and 14.

Front Fender Tightening Specifications

Component	Nm
Front fender bolts	6
Front fender brace bolts	6
Fender end piece	2.5

Underbody Trim, Noise Insulation Tightening Specifications

Component	Nm
Underbody cover nuts	1.5
Underbody cover bolts	2
Noise insulation upper and lower bolts	2
Noise insulation side bolts	6
Wheel housing liner	2

Front Hood, Plenum Chamber Tightening Specifications

Component	Nm
Hood latch bolts	12
Striker pin bolts	10
Front hood hinge bolt/nut	22
Plenum chamber bulkhead bolt/nut	8

Rear Lid, Fuel Filler Door Tightening Specifications

Component	Nm
Fuel filler door unit	1.5
Rear lid hinge bolts	24
Rear lid striker pin bolts	23
Rear lid gas strut ball head pin	20
Rear lid stop bolt	10
Rear lid latch nut	24

Front and Rear Door Tightening Specifications

Component	Nm
Door hinge bolts [2]	50 [1]
	40 [1]
	38 [1]
	28
	20 plus an additional 45° (⅛ turn) [1]
	10
Door lock bolts	18
Door mounting bracket bolt	4.5
Side impact protection bolts and nuts	20
Door guide bolts	10
Door panel bolts	10
Rear retaining track bolts	14
Front retaining track bolts	14
Window regulator and motor bolts	8

[1] Replace fastener(s).

[2] For bolt tightening clarification, refer to ElsaWeb, *Front or Rear Door Hinge Assembly Overview.*

Sunroof Tightening Specifications

Component	Nm
Sunroof motor screws	3.5
Sunshade motor screws	3.5
Glass panel bolts	5
Cable cover bolts	2

Front Bumper Tightening Specifications

Component	Nm
Bumper cover bolts	2
Bumper carrier bolts [1]	8
	60
Side guide assembly bolts	2 - 5

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

Rear Bumper Tightening Specifications

Component	Nm
Rear bumper cover bolts	2 - 5
Rear bumper guide bolts and nuts	2
Rear bumper carrier bolts	20

Mirror, Roof Rail Tightening Specifications

Component	Nm
Mirror base bolts	8
Adjusting motor screw	1
Roof rail bolts	20

Body Interior

Storage Compartments, Covers and Trim Tightening Specifications

Component	Nm
Storage compartment/ashtray bolts	1.5
Trim screws	1.5
Roof grab handle bracket bolts	2
Screen separator wall mount bolts	8
Screen separator wall mount bracket bolts	4.5
Open beverage holder bolts	1.5
Center console bolts	1.5
Footwell trim bolts	1.5
Center console nuts [1]	2.5
	8
Glove compartment bolts	1.5
Sun visor bolts	2
Wheel housing trim bolts	1.5

[1] For bolt tightening clarification, refer to ElsaWeb, *Center Console and Footwell Trim Mounting Bracket.*

Instrument Panel and Cross Member Tightening Specifications

Component	Nm
Instrument panel bolts [1]	1.5
	3
	9
	10
Instrument panel cross member 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, *Instrument Panel Crossmember.*

Passenger Protection Fastener Tightening Specifications

Component	Nm
Belt anchor bolt	40
Front seat belt relay bolt	40
Front belt guide bolt	4.5
Front belt height adjustment bolt	20
Front belt latch bolt	20
Rear seat belt guide ring bolt	40
Rear seat belt guide bolt	6
Rear center belt latch bolt	40
Rear center automatic belt retractor nut	40
Rear double latch bolt	40
Center 3-point seat belt bolt/nut	40
Center rear lap belt bolt	40
Child seat anchor bolt	20
Knee airbag bolts	9
Knee airbag bracket nuts	1.5
Front passenger airbag bolts	9
Airbag control module nuts	2.5
Side head curtain airbag bolts	4.5
Rear side airbag bolts	9

Interior Trim Fastener Tightening Specifications

Component	Nm
Front door grip shell bolts	1.5
Front door trim bolts	2
A-pillar trim bolts	2
Airbag emblem bolt	4
Lower B-pillar trim bolts	4
C-pillar trim bolts	4
Luggage compartment floor covering bolts	2
Storage compartment cover bolts	2
Coat hook bracket bolt	4.5
Rear lid trim bolts	2

Seat Frames Fastener Tightening Specifications

Component	Nm
Front seat frame bolts	40
Seat drawer mount bolts	2
Seat support bracket bolts	3.5
Seat frame bracket bolts	3.5
Backrest bolts	35
Rear seat center backrest clamp bolt	9
Rear belt buckle bolt	40
Side upholstery bolts	8

HEATING 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
Auxiliary heater heating element screw	1.4
Auxiliary heater heating element connector strip [1)]	9 ±1
Auxiliary heater heating element voltage supply nuts [2)]	6 ±1
Fresh air blower bolt	1
Heat exchanger hose clamps [3)]	2

1) From 1K-7M 119 727
2) Through 1K-7M 119 726
3) Wagon (2009-2011), Sedan through MY 2010

Air Conditioning

Fastener Tightening Specifications

Component	Nm
A/C compressor bolts	25
Climatic	
Heating and A/C unit bracket (item 3) screws [1)]	4
Heating and A/C unit bracket (items 5 and 11) screws [2)]	8
Climatronic	
Heating and A/C unit bracket (item 3) screws [3)]	4
Heating and A/C unit bracket (items 5 and 11) screws [4)]	8
Climatronic control module	1.5 ± 0.2
Condenser attaching screws	5
Expansion valve bolts	5
Fluid reservoir	4.2 ± 0.7
Refrigerant line bolts	12
Compressor refrigerant line bolts	22 ± 1

1) For bolt clarification, refer to ElsaWeb, *Heating and A/C Unit, Climatic*, items 1 and 2.
2) For bolt clarification, refer to ElsaWeb, *Heating and A/C Unit, Climatic,* items 6, 10, and 12.
3) For bolt clarification, refer to ElsaWeb, *Heating and A/C Unit, Climatronic,* items 1 and 2.
4) For bolt clarification, refer to ElsaWeb, *Heating and A/C Unit, Climatronic,* items 6, 10, and 12.

ELECTRICAL SYSTEM

Communication

Fastener Tightening Specifications

Component	Nm
Amplifier-to-body nut	6
Antenna amplifier-to-C-pillar screw	2
FM frequency filter in positive wire-to-C-pillar	2
Frequency crossover	1.5
Front mid-range speaker	1.5
Radio-to-center console screw	1.5
Roof antenna-to-body nut	7
Satellite radio-to-rear shelf	4
Satellite tuner antenna-to-body nut	7
Rear shelf subwoofer	2

Electrical Equipment

Battery, Starter, Generator, Cruise Control Fastener Tightening Specifications

Component	Fastener size	Nm
Accessories bracket-to-engine bolt		
2.5L	-	25
TDI	-	40
Air filter housing-to-body bolt	-	10
B+ wire-to-generator nut	-	20
B+ wire to starter nut		
- Automatic transmission, DSG transmission	-	20
- Manual transmission	-	15
Battery clamping plate bolt	-	35
Battery terminal clamp nut	-	6
Generator-to-accessories bracket bolt		
2.5L	-	25
TDI	-	20
Generator cap screw	-	4.5
Generator cap nut	-	15
Ground cable-to-automatic transmission housing	-	15

Battery, Starter, Generator, Cruise Control Fastener Tightening Specifications *(cont'd)*

Component	Fastener size	Nm
Ribbed belt pulley		
- Without freewheel		65
- With freewheel		80
Ribbed belt tensioner-to-accessories bracket bolt TDI		20
Starter bolt		
- Automatic transmission, manual transmission	-	75
- DSG transmission	M10	40
	M12	75
Voltage regulator-to-generator screw	-	2
Wiring bracket to starter nut, manual transmission	-	23
Wire holder-to-generator nut		3.2

Windshield Wiper/Washer Tightening Specifications

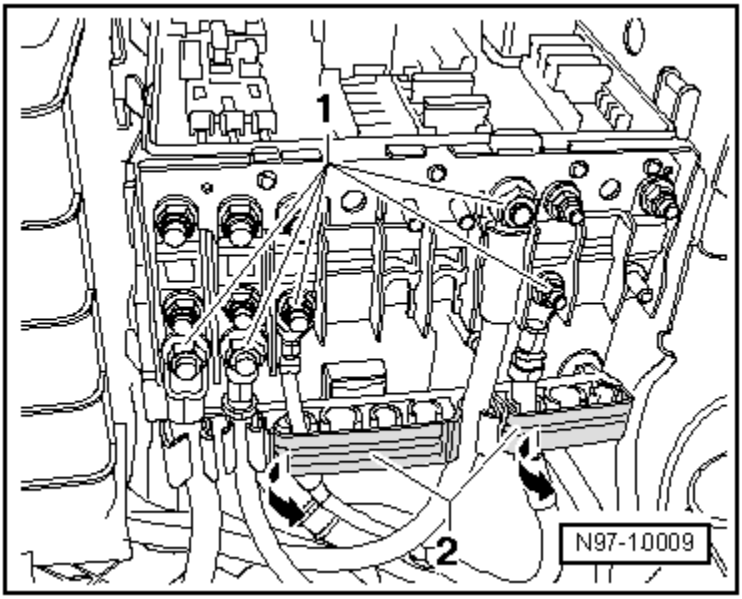
Component	Nm
Lift cylinder for spray jets-to-front bumper cover	4.5
Rear window wiper arm-to-wiper motor nut	12
Rear window wiper motor mounting nut	8
Windshield and headlamp washer fluid reservoir-to-body	8
Windshield wiper arm nut	20
Windshield wiper frame with linkage-to-body	8
Windshield wiper motor-to-frame	8
Windshield wiper motor crank-to-windshield wiper motor shaft	18

Exterior Lights, Switches Tightening Specifications

Component	Nm
Fog lamp housing screw	2
Headlamp mounting repair tabs	1
Halogen or HID headlamp mounting screw	5
Headlamp power output stage screw	1.4
Headlamp range control module screw	1.5
HID headlamp ballast screw	1.4
Parallel parking assistance control module	1.5
Parking aid control module	1.5
Rearview camera	6
Side panel tail lamp-to-body/rear lid nut	3.5

Component	Nm
Steering column electronic systems control module screw	1.5
Steering column switch base carrier shear bolts	15

Left Engine Compartment E-Box Tightening Specifications



Component	Fastener size	Nm
Nuts (1)	M5	4
Nuts (1)	M6	6

Towing Recognition Control Module Tightening Specifications

Component	Nm
Bracket-to-body bolts	2
Towing recognition control module (J345) bolts	2

DTC CHART

Engine Code 2.0L CJAA (TDI)

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000E	Fuel Volume Regulator Control Exceeded Learning Limit	• Number of learning points at adaptation limits ≥ 8 of 64 • Upper limit > 1.2
P00AF	Turbocharger/Supercharger Boost Control “A” Module Performance	Boost pressure actuator stuck < 17% when commanded on or > 17% when commanded off.
P00C6	Fuel Rail Pressure Too Low - Engine Cranking	Fuel rail pressure < 120 to 180 bar
P00D1	O2 (Sensor 1 Bank 1) Heater Performance	Sensor temperature < 720 °C
P00D2	O2 (Sensor 2 Bank 1) Heater Performance	Sensor temperature < 720 °C
P00D5	O2 (Sensor 1 Bank 1) or O2 Sensor 2 Bank 1 correlation	Offset air fuel ratio > 0.05
P0045	Turbocharger/Supercharger Boost Control Solenoid “A” Circuit/Open	Open circuit message from output driver
P0047	Turbocharger/Supercharger Boost Control Solenoid “A” Circuit Low	Short to ground message from output driver
P0048	Turbocharger/Supercharger Boost Control Solenoid “A” Circuit High	Short to voltage message from output driver
P0071	Ambient Air Temperature Sensor Circuit Range/ Performance	Temperature difference to at least 2 other temperature sensors at startup > 45 °Kelvin
P0072	Ambient Air Temperature Sensor Circuit Low	Error signal low sent from Cluster to ECM
P0073	Ambient Air Temperature Sensor Circuit High	Error signal high sent from Cluster to ECM

DTC	Error Message	Malfunction Criteria and Threshold Value
P0087	Fuel Rail/System Pressure - Too Low	• Control deviation > 150 - 200 Bar • Exceeding absolute rail pressure limits < 120 - 125 Bar or > 1950 Bar • Control deviation < -200 to -300 Bar
P0088	Fuel Rail/System Pressure - Too High	• Control deviation > 150 - 200 Bar • Exceeding absolute rail pressure limits < 120 - 125 Bar or > 1950 Bar • Control deviation < -200 to -300 Bar
P0090	Fuel Pressure Regulator 1 Control Circuit	Open circuit diagnostic signal from output driver
P0091	Fuel Pressure Regulator 1 Control Circuit Low	Grounded circuit diagnostic signal from output driver
P0092	Fuel Pressure Regulator 1 Control Circuit High	Over current circuit diagnostic signal from output driver
P0100	Mass or Volume Air Flow Circuit	• Battery voltage < 7.5 V or • Signal range check low, battery voltage < 7.5 V
P0101	Mass or Volume Air Flow Circuit Range/Performance	Ratio of actual mass airflow and modeled air mass > 1.80 or < 0.84
P0102	Mass or Volume Air Flow Circuit Low Input	Range check low: • Calculated PWM signal period time > 666.6 µs (-57 kg/h) or • Raw value PWM signal period time > 900 kg/h
P0103	Mass or Volume Air Flow Circuit High Input	Range check high: • Calculated PWM signal period time > 666.6 µs (-57 kg/h) or Calculated PWM signal period time > 833.35 µs (-157 kg/h)
P0111	Intake Air Temperature (Sensor 1 Bank 1) Circuit Range/Performance	Temperature difference to at least 3 other temperature sensors at startup > 30 °K

DTC	Error Message	Malfunction Criteria and Threshold Value
P0112	Intake Air Temperature Sensor 1 Bank 1 Circuit Low	Boost temperature sensor voltage < 0.04 V
P0113	Intake Air Temperature Sensor 1 Bank 1 Circuit High	Boost temperature sensor voltage > 2.88 V
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	• Time for coolant temp to reach 19.96 °C or increase by 10 °K > 300 Sec. for start temperature <10 °C >120 Sec. for start temp > 10 °C • Temperature difference to at least 3 other temperature sensors at startup > 30 °K
P0117	Engine Coolant Temperature (Sensor 1) Circuit Low	Coolant temperature sensor voltage < 0.15 V
P0118	Engine Coolant Temperature Sensor 1 Circuit High	Coolant temperature sensor voltage > 3.25 V
P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	Measured temperature lower than model temperature < 70 °C and modeled temperature > 80 °C
P013B	O2 Sensor (Bank 1 Sensor 2) Slow Response - Lean to Rich	Time delay between oxygen signals pre and post NOx trap > 0.45 Sec.
P0130	O2 Sensor Circuit (Bank 1 Sensor 1) Malfunction	• Short to battery > 3 V • Nernst voltage > 4 V • Adjustment voltage > 1.5 V or • Short to ground < 2 V • Nernst voltage < 1.75 V • Adjustment voltage < 0.3 V
P0132	O2 Sensor Circuit (Bank 1 Sensor 1) High Voltage	O2 sensor raw signal > 3.2 V
P0133	O2 Sensor Circuit (Bank 1 Sensor 1) Slow Response	• Time to 30% of expected concentration increase > 2.8 Sec or • Time to 60% of expected concentration increase > 4.1 Sec. or • Time to 60% minus time to 30% > 1.3 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P0135	O2 Sensor Heater Circuit (Bank 1 Sensor 1) Malfunction	• Diagnostic signal from output driver sent or • Sensor element temperature < 720 or > 840 °C
P0136	O2 Sensor Circuit (Bank 1 Sensor 2) Malfunction	• LSU internal resistance > 1104 ohms • LSU raw voltage < 1.4 or > 1,6 V • Virtual ground > 3 V • Nernst voltage > 4 V • Adjustment voltage > 1.5 V or • LSU raw voltage < 0.2 or > 3 V • Short to ground < 2 V • Nernst voltage < 1.75 V • Adjustment voltage < 0.3 V
P0138	O2 Sensor Circuit (Bank 1 Sensor 2) High Voltage	O2S raw signal > 3.2 V
P0139	O2 Sensor Circuit (Bank 1 Sensor 2) Slow Response	• Time to 30% of expected concentration increase > 2.8 Sec. or • Time to 60% of expected concentration increase > 4.1 Sec. or • Time to 60% minus time to 30% > 1.3 Sec.
P014D	O2 Sensor (Bank 1 Sensor 1) Slow Response - Lean to Rich	Time delay between oxygen signals pre and post NOx trap > 1.5 Sec.
P0141	O2 Sensor Heater Circuit (Bank 1 Sensor 2) Malfunction	• Sensor element temp < 720 and > 840 °C • Voltage error signal from output driver.
P0181	Fuel Temperature Sensor A Circuit Range/Performance	Temperature difference to at least 2 other temperature sensors at startup > 30 °K
P0182	Fuel Temperature Sensor A Circuit Low Input	Fuel temperature sensor voltage < 0.05 V
P0183	Fuel Temperature Sensor A Circuit High Input	Fuel temperature sensor voltage > 4.70 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0191	Fuel Rail Pressure Sensor “A” Circuit Range/Performance	• Sensor voltage < 428 mV or > 613 mV • Adaptation value out of limit < 83% or > 130%
P0192	Fuel Rail Pressure Sensor “A” Circuit Low Input	Sensor voltage < 200 mV or > 591 mV
P0193	Fuel Rail Pressure Sensor “A” Circuit High Input	Sensor voltage > 4800 mV
P020A	Cylinder 1 Injection Timing	• Control error < limit from MAP f (engine speed and desired torque) -8 °CA to -4 °CA or • Control error < limit from MAP f (engine speed and desired torque) +8 °CA to +4 °CA
P020B	Cylinder 2 Injection Timing	• Control error < limit from MAP f (engine speed and desired torque) -8 °CA to -4 °CA or • Control error < limit from MAP f (engine speed and desired torque) +8 °CA to +4 °CA
P020C	Cylinder 3 Injection Timing	• Control error < limit from MAP f (engine speed and desired torque) -8 °CA to -4 °CA or • Control error < limit from MAP f (engine speed and desired torque) +8 °CA to +4 °CA
P020D	Cylinder 4 Injection Timing	• Control error < limit from MAP f (engine speed and desired torque) -8 °CA to -4 °CA or • Control error < limit from MAP f (engine speed and desired torque) +8 °CA to +4 °CA
P0201	Cylinder 1- Injector Circuit	Open circuit diagnostic signal from output driver
P0202	Cylinder 2- Injector Circuit	Open circuit diagnostic signal from output driver
P0203	Cylinder 3- Injector Circuit	Open circuit diagnostic signal from output driver
P0204	Cylinder 4- Injector Circuit	Open circuit diagnostic signal from output driver

DTC	Error Message	Malfunction Criteria and Threshold Value
P0234	Turbo/Super Charger Overboost Condition	Control deviation > -300 - -800 hPa @ delta engine speed/ injection quantity
P0236	Turbocharger Boost Sensor (A) Circ. Range/Performance	Difference between barometric and boost pressure signal > 150 hPa
P0237	Turbocharger Boost Sensor (A) Circuit Low Input	Boost Pressure Sensor < 0.68 V
P0238	Turbocharger Boost Sensor (A) Circuit High Input	Boost Pressure Sensor > 4.88 V
P026A	Charge Air Cooler Efficiency Below Threshold	Charge air intercooler efficiency < 0.4
P0263	Cylinder 1 Contribution/ Balance	Calibration value of injector energizing time > 217 µs (depending on rail pressure) or < 117 µs
P0266	Cylinder 2 Contribution/ Balance	Calibration value of injector energizing time > 217 - 426 µs (depending on rail pressure) or < 117 - 157 µs
P0269	Cylinder 3 Contribution/ Balance	Calibration value of injector energizing time > 217 - 426 µs (depending on rail pressure) or < 117 - 157 µs
P026A	Charge Air Cooler Efficiency Below Threshold	Efficiency < 0.40
P0272	Cylinder 4 Contribution/ Balance	Calibration value of injector energizing time > 217 - 426 µs (depending on rail pressure) or < 117 - 157 µs
P0299	Turbo/Super Charger Underboost	Deviation of actual and desired boost pressure > 400 - 800 hPa @ delta engine speed/injection quantity
P20D8	Exhaust After Treatment Fuel Supply Control Performance	Control deviation > limit from Map f or < limit from Map f (engine speed, torque)
P2000	NOx Absorber Efficiency Bank 1 Below Threshold	• Oxygen signals post NOx trap < 0.97 • Oxygen signals pre NOx trap < 0.045 • Mass of reductant consumption < 0.40 g

DTC	Error Message	Malfunction Criteria and Threshold Value
P2002	Particulate Trap (Bank 1) Efficiency Below Threshold	• Differential pressure signal < f (exhaust gas volume flow) or • Ratio of filtered temperature dynamic upstream and downstream of the PM trap < 1.2
P2004	Intake Manifold Runner Control (Bank 1) Stuck Open	Flap valve stuck open > 12%
P2006	Intake Manifold Runner Control (Bank 1) Stuck Closed	Flap valve stuck closed < 12%
P2008	Intake Manifold Runner (Bank 1) Control Circuit/Open	Open load diagnostic signal from output driver
P2009	Intake Manifold Runner (Bank 1) Control Circuit Low	Short to ground on output 1 or 2 signal from output driver
P2010	Intake Manifold Runner (Bank 1) Control Circuit High	Short to voltage on output 1 or 2 signal from output driver
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance	• Position sensor signal > 4.61 or < 0.39 V • Closed learning position > 4.61 or < 3.79 V • Open learning position > 1.21 or < 0.39 V
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low	Position sensor signal < 0.25 V
P2017	Intake Manifold Runner Position Sensor/Switch Circuit High	Position sensor signal > 4.75 V
P2031	Exhaust Gas Temperature (Sensor 2), Bank 1 Circuit	Sensor 2 voltage > 1.72 V
P2032	Exhaust Gas Temperature (Sensor 2), Bank 1 Circuit Low	Sensor 2 voltage < 0.45 V
P2080	Exhaust Gas Temperature Sensor Circuit (Bank 1) Range/Performance	• Comparison of upstream turbine exhaust gas temp vs modeled temperature < 85 °C or • Temperature difference to other temp sensors during cold start < 45 °K

DTC	Error Message	Malfunction Criteria and Threshold Value
P2084	Exhaust Gas Temperature Sensor 2 Circuit Range/ Performance	• Comparison of upstream turbine exhaust gas temp vs modeled temperature < 85 °C or • Temperature difference to other temp sensors during cold start < 45 °K
P3081	Engine Temperature Too Low	Difference between ECT and modeled ECT > 10° K

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	• No rise in engine speed after fuel injection Calculated based on values from last two engine revolutions • Error threshold 82% misfire over 440 crankshaft revolutions
P0301	Cylinder 1 Misfire Detected	• No rise in engine speed after fuel injection Calculated based on values from last two engine revolutions • Error threshold 82% misfire over 440 crankshaft revolutions
P0302	Cylinder 2 Misfire Detected	• No rise in engine speed after fuel injection Calculated based on values from last two engine revolutions • Error threshold 82% misfire over 440 crankshaft revolutions
P0303	Cylinder 3 Misfire Detected	• No rise in engine speed after fuel injection Calculated based on values from last two engine revolutions • Error threshold 82% misfire over 440 crankshaft revolutions

DTC	Error Message	Malfunction Criteria and Threshold Value
P0304	Cylinder 4 Misfire Detected	• No rise in engine speed after fuel injection Calculated based on values from last two engine revolutions • Error threshold 82% misfire over 440 crankshaft revolutions
P0321	Ign./Distributor Engine Speed Inp. Circuit Range/ Performance	• Consecutive not plausible signals > 15 • Cam phase signals without plausible engine speed signal > 4 cam rotations.
P0322	Ign./Distributor Eng.Speed Inp.Circuit No Signal	No incremental signal. Internal self test failed.
P0381	Glow Plug/Heater Indicator Circuit	Receipt bit for lamp request not equal with lamp request bit.
P0383	Glow Plug Control Module Control Circuit Low	Diagnostic error signal sent from output driver = 0 V.

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P040B	Exhaust Gas Recirculation Temperature Sensor “A” Circuit Range/Performance	• Sensor temperature < 55 °C or • Temperature difference to other temp sensors during cold start < 45 °K
P040C	Exhaust Gas Recirculation Temperature Sensor “A” Circuit Low	Signal sensor voltage < 0.06 V
P040D	Exhaust Gas Recirculation Temperature Sensor “A” Circuit High	Signal sensor voltage > 3.24 V
P0401	Exhaust Gas Recirc. Flow Insufficient Detected	Control deviation < limit from map f (engine speed, desired airflow)
P0402	Exhaust Gas Recirc. Flow Excessive Detected	Control deviation > limit from map (engine speed, desired airflow)
P0403	Exhaust Gas Recirculation Circuit	Valve stuck open > 17% or stuck closed < 17%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0405	Exhaust Gas Recirculating Sensor A Circuit Low	Position sensor signal range check low.
P0406	Exhaust Gas Recirculating Sensor A Circuit High	Position sensor signal range check high.
P0420	Catalyst System, (Bank 1) Efficiency Below Threshold	HC conversion rate < 0.3
P045A	Exhaust Gas Recirculation “B” Control Circuit	Diagnostic signal from output driver
P045B	Exhaust Gas Recirculation “B” Control Circuit Range/ Performance	Position sensor signal > 1 V or < 0.4 V
P045C	Exhaust Gas Recirculation “B” Control Circuit Low	Diagnostic signal from output driver
P045D	Exhaust Gas Recirculation “B” Control Circuit High	Diagnostic signal from output driver
P045E	Exhaust Gas Recirculation Valve 2 Control Stuck Open	Comparison of actual and desired position signal • Control deviation > 12%
P045F	Exhaust Gas Recirculation “B” Control Stuck Closed	Comparison of actual and desired position signal • Control deviation < -12%
P046C	Exhaust Gas Recirculation Sensor “A” Circuit Range/ Performance	Position sensor signal > 1 V or < 0.4 V
P047C	Exhaust Pressure Sensor “B” Low	Pressure sensor voltage < 0.2 V
P047D	Exhaust Pressure Sensor “B” High	Pressure sensor voltage > 4.9 V
P047F	Exhaust Pressure Control Valve “A” Stuck Open	Control valve stuck open - position sensor < 10% when commanded closed
P0470	Exhaust Pressure Sensor “A”	Sensor voltage > 4.9
P0471	Exhaust Pressure Sensor "A" Range/Performance	Differential of pressure signal < -27 or > 47 hPa
P0472	Exhaust Pressure Sensor “A”Low	Sensor voltage < 0.2 V
P0473	Exhaust Pressure Sensor “A” High	Sensor voltage > 4.9 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0474	Exhaust Pressure Sensor “A” Circuit Intermittent/Erratic	Difference between modeled and actual pressure differential across low pressure EGR > 40 hPa
P0475	Exhaust Pressure Control Valve “A”	Diagnostic signal from output driver
P0477	Exhaust Pressure Control Valve “A” Low	Diagnostic signal from output driver.
P0478	Exhaust Pressure Control Valve “A” High	Short to voltage on Out 1 or Out 2 signal from output driver.
P048A	Exhaust Pressure Control Valve “A” Stuck Closed	Control valve stuck closed - position sensor > 10% when commanded open
P048B	Exhaust Pressure Control Valve Position Sensor/Switch Circuit	Position sensor signal < 0.25 V
P048C	Exhaust Pressure Control Valve Position Sensor/Switch Circuit Range/Performance	Position sensor signal in desired range during closed position learning > 1.1 V or < 0.5 V
P048E	Exhaust Pressure Control Valve Position Sensor/Switch Circuit High	Position sensor signal > 4.85 V
P0486	Exhaust Gas Recirculation Sensor “B” Circuit	Position sensor signal > 4890 or < 210 mV

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor “A” Range/Performance	VSS signal < 6 km/h
P0502	Vehicle Speed Sensor “A” Circuit Low Input	Brake control unit error message sent
P0503	Vehicle Speed Sensor “A” Intermittent/Erratic/High	Vehicle speed > 320 km/h
P0506	Idle Control System RPM Lower than Expected	Control deviation < 10%
P0507	Idle Control System RPM Higher than Expected	Control deviation > 10%
P0534	Vehicle Speed Sensor Intermittent	-

DTC	Error Message	Malfunction Criteria and Threshold Value
P0544	Exhaust Gas Temperature Sensor Circuit (Bank 1)	Signal voltage > 1.72 V
P0545	Exhaust Gas Temperature Sensor Circuit (Bank 1) Low	Signal voltage < 0.45 V
P054E	Idle Control System Fuel Quantity Lower Than Expected	Actual fuel mass < limit from map f(engine speed , engine temperature)
P054F	Idle Control System Fuel Quantity Higher Than Expected	Actual fuel mass > limit from map f(engine speed , engine temperature)
P0562	System Voltage Low Voltage	Internal check failure of voltage supply for ECM off timer

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P06A3	Sensor Reference Voltage “D” Circuit/Open	Sensor supply voltage < 2.97 V or > 3.63 V
P06B9	Cylinder 1 Glow Plug Circuit Range/Performance	• Message from Glow Control Unit = error message • 4 - 14 Sec. after glow start = 1.2 ohm or less
P06BA	Cylinder 2 Glow Plug Circuit Range/Performance	• Message from Glow Control Unit = error message • 4 - 14 Sec. after glow start = 1.2 ohm or less
P06BB	Cylinder 3 Glow Plug Circuit Range/Performance	• Message from Glow Control Unit = error message • 4 - 14 Sec. after glow start = 1.2 ohm or less
P06BC	Cylinder 4 Glow Plug Circuit Range/Performance	• Message from Glow Control Unit = error message • 4 - 14 Sec. after glow start = 1.2 ohm or less
P06C5	Cylinder 1 Glow Plug Incorrect	Message from Glow Control Unit = error message (wrong current slope).
P06C6	Cylinder 2 Glow Plug Incorrect	Message from Glow Control Unit = error message (wrong current slope).

DTC	Error Message	Malfunction Criteria and Threshold Value
P06C7	Cylinder 3 Glow Plug Incorrect	Message from Glow Control Unit = error message (wrong current slope).
P06C8	Cylinder 4 Glow Plug Incorrect	Message from Glow Control Unit = error message (wrong current slope).
P0604	Internal Control Module Random Access Memory (RAM) Error	• Write EEPROM not possible • Checksum error in 3 or more locations
P0605	Internal Control Module ROM Test Error	ECM internal ROM self test failed
P0606	ECM/PCM Processor	ECM internal self test failed
P0607	Control Module Performance	• Low/high supply voltage diagnostic signal from output driver or • Failed signal range check with barometer pressure sensor (located on ECM circuit board)
P0627	Fuel Pump “A” Control Circuit/ Open	Open circuit signal from output driver
P0628	Fuel Pump “A” Control Circuit Low	Grounded circuit signal from output driver
P0629	Fuel Pump “A” Control Circuit High	Over Current signal from output driver
P0634	PCM/ECM/TCM Internal Temperature Too High	Current Over-Temperature diagnostic signal from output driver > 150 °C
P0638	Throttle Actuator Control (Bank 1) Range/Performance	Diagnostic signal from actuator module = defective state
P064C	Glow Plug Control Module	Wrong GCU build = error message
P0641	Sensor Reference Voltage “A” Circuit Open	Sensor supply voltage < 4.8 V or > 5.2 V
P0651	Sensor Reference Voltage “B” Circuit Open	Sensor supply voltage < 4.8 V or > 5.2 V
P066A	Cylinder 1 Glow Plug Control Circuit Low	Over current on circuit > 70 A
P066C	Cylinder 2 Glow Plug Control Circuit Low	Over current on circuit > 70 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P066E	Cylinder 3 Glow Plug Control Circuit Low	Over current on circuit > 70 A
P067A	Cylinder 4 Glow Plug Control Circuit Low	Message from glow control unit = 3.44 V
P0670	Glow Plug Module Control Circuit	Message from glow control unit = 3.44 V
P0671	Cylinder 1 Glow Plug Circuit	Message from Glow Control Unit, (glow current < 2.2 A)
P0672	Cylinder 2 Glow Plug Circuit	Message from Glow Control Unit, (glow current < 2.2 A)
P0673	Cylinder 3 Glow Plug Circuit	Message from Glow Control Unit, (glow current < 2.2 A)
P0674	Cylinder 4 Glow Plug Circuit	Message from Glow Control Unit, (glow current < 2.2 A)
P068A	ECM/PCM Power Relay De-Energized Performance - Too Early	Relay stuck, no change in circuit voltage
P068B	ECM/PCM Power Relay De-Energized Performance - Too Late	Relay stuck, no change in circuit voltage
P0684	Glow Plug Control Module to PCM Comm. Circuit Range/ Performance	Message from glow relay-missing info from Glow Control Unit
P0697	Sensor Reference Voltage “C” Circuit Open	Sensor supply voltage < 3.168 V or > 3.432 V
U0001	High Speed CAN Communication Bus	CAN driver A status Bus Off.
U0002	High Speed CAN Communication Bus Performance	CAN driver A status no communication
U0101	Lost Communication with TCM	No TCM messages received.
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	No messages received from ABS module
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	No messages received from Instrument cluster
U0302	Software Incompatibility with Transmission Control Module	Wrong TCM messages received.
U0402	Invalid Data Received From Transmission Control Module	Data length code transmitted, incorrect

DTC	Error Message	Malfunction Criteria and Threshold Value
U0404	Invalid Data Received From Gear Shift Control Module	Wrong TCM messages received.
U0415	Invalid Data Received From Anti-Lock Brake System Control Module	Implausible ABS messages sent. Veh speed > 320 km/h or missing vehicle speed data.
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	Error message sent from Instrument Panel Cluster to ECU
U1024	Instrument cluster control module Read out DTC	Error message sent from instrument cluster to ECU

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P1004	Torque difference cylinder 1 Limiting value exceeded	• Control error < limit from MAP f (engine speed and desired torque) -50 to -30 Nm or • +50 to +30 Nm
P1005	Torque difference cylinder 2 Limiting value exceeded	• Control error < limit from MAP f (engine speed and desired torque) -50 to -30 Nm or • +50 to +30 Nm
P1006	Torque difference cylinder 3 Limiting value exceeded	• Control error < limit from MAP f (engine speed and desired torque) -50 to -30 Nm or • +50 to +30 Nm
P1007	Torque difference cylinder 4 Limiting value exceeded	• Control error < limit from MAP f (engine speed and desired torque) -50 to -30 Nm or • +50 to +30 Nm
P13CE	Sensor for internal pressure of cylinder 1 Electrical errorn	Cylinder pressure sensor voltage > 3.17 V
P13CF	Sensor for internal pressure of cylinder 1 Short circuit to ground	Cylinder pressure sensor voltage < 0.13 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P13D0	Sensor for internal pressure of cylinder 1 Implausible signal	• Cylinder pressure sensor voltage < 0.33 V or > 3.09 V or • Deviation between min and max cylinder pressure # 1 < 20 bar • Offset out of range < -7 or > 7 bar or • Pressure based measured TDC position sensor out of range or • Difference of calculated cylinder pressure vs. actual measured cylinder pressure out of range < -10 or > 10 Bar
P13D1	Sensor for internal pressure of cylinder 2 Electrical error	Cylinder pressure sensor voltage > 3.17 V
P13D2	Sensor for internal pressure of cylinder 2 Short circuit to ground	Cylinder pressure sensor voltage < 0.13 V
P13D3	Sensor for internal pressure of cylinder 2 Implausible signal	• Cylinder pressure sensor voltage < 0.33 V or > 3.09 V or • Deviation between min and max cylinder pressure # 2 < 20 bar • Offset out of range < -7 or > 7 bar or • Pressure based measured TDC position sensor out of range or • Difference of calculated cylinder pressure vs. actual measured cylinder pressure out of range < -10 or > 10 Bar
P13D4	Sensor for internal pressure of cylinder 3 Electrical error	Cylinder pressure sensor voltage > 3.17 V
P13D5	Sensor for internal pressure of cylinder 3 Short circuit to ground	Cylinder pressure sensor voltage < 0.13 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P13D6	Sensor for internal pressure of cylinder 3 Implausible signal	• Cylinder pressure sensor voltage < 0.33 V or > 3.09 V or • Deviation between min and max cylinder pressure # 3 < 20 bar • Offset out of range < -7 or > 7 bar or • Pressure based measured TDC position sensor out of range or • Difference of calculated cylinder pressure vs. actual measured cylinder pressure out of range < -10 or > 10 Bar
P13D7	Sensor for internal pressure of cylinder 4 Electrical error	Cylinder pressure sensor voltage > 3.17 V
P13D8	Sensor for internal pressure of cylinder 4 Short circuit to ground	Cylinder pressure sensor voltage < 0.13 V
P13D9	Sensor for internal pressure of cylinder 4 Implausible signal	• Cylinder pressure sensor voltage < 0.33 V or > 3.09 V or • Deviation between min and max cylinder pressure # 4 < 20 bar • Offset out of range < -7 or > 7 bar or • Pressure based measured TDC position sensor out of range or • Difference of calculated cylinder pressure vs. actual measured cylinder pressure out of range < -10 or > 10 Bar
P13E0	Sensor for internal pressure of cylinder 1 Malfunction	Pressure based measured TDC vs. crank position sensor for cyl. 1 out of range < 1.8 CA or > 1.8 CA

DTC	Error Message	Malfunction Criteria and Threshold Value
P13E1	Sensor for internal pressure of cylinder 2 Malfunction	Pressure based measured TDC vs. crank position sensor for cyl. 2 out of range < 1.8 CA or > 1.8 CA
P13E2	Sensor for internal pressure of cylinder 3 Malfunction	Pressure based measured TDC vs. crank position sensor for cyl. 3 out of range < 1.8 CA or > 1.8 CA
P13E3	Sensor for internal pressure of cylinder 4 Malfunction	Pressure based measured TDC vs. crank position sensor for cyl. 4 out of range < 1.8 CA or > 1.8 CA
P140C	EGR (Sensor 2 Bank 1) Signal too low	Position sensor signal > 4850 mV
P140E	EGR sensor 2 bank 1 Signal too high	Position sensor signal < 150 mV
P169A	Loading mode active	Transport mode active
P2100	Throttle Actuator Control Motor Circuit/Open	Open circuit diagnostic signal sent from output driver
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	Missing diagnostic signal from actuator module
P2102	Throttle Actuator Control Motor Circuit Low	Grounded circuit diagnostic signal sent from output driver
P2103	Throttle Actuator “A” Control Motor Circuit High	Circuit short to voltage diagnostic signal sent from output driver
P2122	Throttle/Pedal Pos. Sens./ Switch D Circuit Low Input	Sensor 1 voltage < 0.61 V
P2123	Throttle/Pedal Pos. Sens./ Switch D Circuit High Input	Sensor 1 voltage > 4.79 V
P2127	Throttle/Pedal Pos. Sens./ Switch E Circuit Low Input	Sensor 2 voltage < 0.27 V
P2128	Throttle/Pedal Pos. Sens./ Switch E Circuit High Input	Sensor 2 voltage > 2.43 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Voltage drift monitoring: • Throttle Position Sensor 1 voltage and APP Sensor 2 voltage = 13 - 20%
P2146	Fuel Injector Group “A” Supply Voltage Circuit Open	Diagnostic signal from output driver = error pattern

DTC	Error Message	Malfunction Criteria and Threshold Value
P2149	Fuel Injector Group “B” Supply Voltage Circuit Open	Diagnostic signal from output driver = error pattern
P2183	Engine Coolant Temperature (Sensor 2) Circuit Range/ Performance	Temperature difference to at least 2 other temperature sensors at startup > 20 °K
P2184	Engine Coolant Temperature (Sensor 2) Circuit Low	ECT signal voltage < 0.15 V
P2185	Engine Coolant Temperature (Sensor 2) Circuit High	Deviation to oxygen concentration > 0.046
P2195	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 1)	Deviation to oxygen concentration > 0.046
P2196	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 1)	Deviation to oxygen concentration < 0.063
P2237	O2 Sensor Positive Current Control Circuit (Bank 1 Sensor 1) Open	• Measured oxygen concentration < 0.005
P2243	O2 Sensor Reference Voltage Circuit (Bank 1 Sensor 1) Open	• O2S internal resistance > 1104Ω • Oxygen sensor raw signal > 3 V
P2251	O2 Sensor Negative Current Control Circuit (Bank 1 Sensor 1) open	• O2S internal resistance > 1104 Ω • Oxygen sensor raw signal < 1.4 V or > 1.6 V
P2270	O2 Sensor Signal Stuck Lean; (Bank 1 Sensor 2)	Deviation to oxygen concentration during fuel cutoff > 0.046 OR deviation between measured and modeled oxygen concentration > 4.8% vol.
P2271	O2 Sensor Signal Stuck Rich; (Bank 1 Sensor 2)	Deviation to oxygen concentration during fuel cutoff < -0.063
P2279	Intake Air System Leak	Deviation between actual airflow and modeled mass air flow < 0.7
P2294	Fuel Pressure Regulator 2 Control Circuit	Open circuit diagnostic signal from output driver
P2295	Fuel Pressure Regulator 2 Control Circuit Low	Grounded circuit diagnostic signal from output driver
P2296	Fuel Pressure Regulator 2 Control Circuit High	Over current circuit diagnostic signal from output driver

DTC	Error Message	Malfunction Criteria and Threshold Value
P320B	O2 (Sensor 2 Bank 1) Heater Performance Masking	Sensor temperature < 720 °C
P320C	O2 (Sensor 1/2 Bank 1) lean correlation	Offset air fuel ratio > 0.5

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P240F	Exhaust Gas Recirculation Slow Response	Calculated characteristic value > 20 at positive or negative air mass change
P2413	Exhaust Gas Recirculation System Performance	• Number of learning points at fuel mass adaptation limit > or = to 4 • At upper limit = 6 mg/stroke • At lower limit = -6 mg/stroke
P242A	Exhaust Gas Temperature Sensor Circuit (Bank 1 Sensor 3)	Sensor signal voltage > 1.72 V
P242B	Exhaust Gas Temperature Sensor Circuit (Bank 1 Sensor 3) Range/Performance	• Comparison of upstream turbine exhaust gas temp vs modeled temperature < 250 °C or • Temperature difference to other temp sensors during cold start < 45 °K
P242C	Exhaust Gas Temperature Sensor Circuit Low (Bank 1 Sensor 3)	Sensor signal voltage < 0.45 V
P244C	Exhaust Temperature Too Low For Particulate Filter Regeneration (Bank 1)	Time to activate control loop > 45 to 60 Sec.
P2452	Diesel Particulate Filter Differential Pressure Sensor Circuit	Sensor voltage > 4.9 V
P2453	Diesel Particulate Filter Differential Pressure Sensor Circuit Range/Performance	Differential pressure signal < -83 hPa to > 80 hPa
P2454	Diesel Particulate Filter Differential Pressure Sensor Circuit Low	Sensor voltage < 0.2

DTC	Error Message	Malfunction Criteria and Threshold Value
P2456	Diesel Particulate Filter Pressure Sensor “A” Circuit Intermittent/Erratic	Inverse change of differential pressure per time > 10 hPa or < 10 hPa
P2457	Exhaust Gas Recirculation Cooler Efficiency Below Threshold	Sensor temperature above threshold 40 °K
P2458	Diesel Particulate Filter Regeneration Duration	Regeneration time > 5400 Sec.
P2459	Diesel Particulate Filter Regeneration Frequency	PM trap loading > dynamically rising threshold f(simulated engine emissions)
P246E	Exhaust Gas Temperature Sensor Circuit (Bank 1 Sensor 4)	Sensor signal voltage > 1.72 V
P246F	Exhaust Gas Temperature Sensor Circuit (Bank 1 Sensor 4) Range/Performance	• Sensor temperature < 230 °C or • Temperature difference to other temp sensors during cold start < 45 °K
P2463	Diesel Particulate Filter - Soot Accumulation	Calculated particulate matter trap loading > 40 g
P247A	Exhaust Gas Temperature Out of Range (Bank 1 Sensor 3)	Control deviation > limit from Map f or < limit from Map f (engine speed, torque)
P2470	Exhaust Gas Temperature Sensor Circuit Low (Bank 1 Sensor 4)	Sensor signal voltage < 0.45 V
P2478	Exhaust Gas Temperature Out of Range (Bank 1 Sensor 1)	Control deviation > limit from Map f or < limit from Map f (engine speed, torque)
P2563	Turbocharger Boost Control Position Sensor Circuit Range/Performance	• Position sensor signal voltage < 0.3 or > 4.5 V or • Position sensor signal > 1.72 or < 0.3 V
P2564	Turbocharger Boost Control Position Sensor Circuit Low	Position sensor signal voltage < 0.15 V
P2565	Turbocharger Boost Control Position Sensor Circuit High	Sensor signal voltage > 4.85 V
P2610	ECM/PCM Internal Engine Off Timer Performance	Quantity time over threshold < 7.52 or > 8.48 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P2632	Fuel Pump “B” Control Circuit Open	Open circuit diagnostic signal from output driver
P2633	Fuel Pump “B” Control Circuit Low	Grounded circuit diagnostic signal from output driver
P2634	Fuel Pump “B” Control Circuit High	Over current circuit diagnostic signal from output driver
P268A	Fuel Injector Calibration Not Learned/Programmed	Accumulated global release time of zero fuel calibration but disabled by rail pressure deviation.

DTC CHART

Engine Code 2.5L CBTA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	“A” Camshaft Position Slow Response (Bank 1)	• Difference between target and actual > 8° CRK for > 1.8 to 2.5 Sec. • Adjustment angle < 3° CRK rotation
P0010	“A” Camshaft Position Actuator Circuit/Open (Bank 1)	Signal voltage > 4.70 - 5.40 V
P0011	Camshaft Position (Bank 1) Timing over-advanced or System Performance	• Difference between target and actual > 8° CRK rotation • Adjustment angle < 3° CRK rotation
P0016	Crankshaft Position-Camshaft Position Correlation (Bank 1 Sensor A)	Permissible deviation < -13.49 or >13.49 CRK deg.
P0030	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1)	• O2S signal rear not oscillating at reference < 598 mV and enrichment after stuck lean 20% or • Heater voltage 4.70 to 5.40 V
P0031	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1) Low	• O2S signal rear not oscillating at reference < 598 mV and enrichment after stuck lean 20% or • Heater voltage 0 to 3.26 V
P0032	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1) High	Heater current > 5.50 A
P0036	HO2S Heater Control Circuit (Bank 1, Sensor 2) Open Circuit	Heater voltage 2.34 to 3.59 V
P0037	O2 Sensor Heater Control Circuit(Bank 1 (1) Sensor 2) Low	Heater voltage < 2.34 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0038	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 2) High	Heater voltage > 3.59 A
P0042	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 3)	Heater voltage 2.34 to 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 (Bank 1 (1) Sensor 3) High	Heater voltage > 3.59 V
P0070	Ambient Air Temperature Sensor Circuit	Ambient air temp < -50 °C
P0071	Ambient Air Temperature Sensor Circuit Range/ Performance	Difference of ECT vs. IAT or IAT vs. AAT at start > 25 K (kelvin) or AAT vs. ECT at start < 25 K
P0072	Ambient Air Temperature Sensor Circuit Low	Ambient air temp > 87 °C
P0106	Manifold Absolute Pressure/ BARO Pressure Range/ Performance	• Difference manifold pressure - lower threshold model < 0. Model range 45 to 845 hPa • Difference manifold pressure - upper threshold model > 0. Model range 640 - 1055 • Difference altitude sensor signal vs. manifold pressure signal at engine start > 60 hPa
P0107	Manifold Absolute Pressure or BARO Pressure Low Input	Signal voltage < 0.20 V
P0108	Manifold Absolute Pressure or BARO Pressure High Input	Signal voltage > 4.86 V
P0111	Intake Air Temperature Sensor 1 Bank 1 Circuit Range/ Performance	• Difference of ECT vs. IAT or IAT vs. AAT at start > 25 K (kelvin) or AAT vs. ECT at start < 25 K
P0112	Intake Air Temperature (Sensor 1 Bank 1) Circuit Low	IAT > 130.0 °C
P0113	Intake Air Temperature (Sensor 1 Bank 1) Circuit High	IAT < -46 °C
P0116	Engine Coolant Temperature (Sensor 1) Circuit Range/ Performance	• No change on signal 2 °K • ECT signal stuck in range 75 - 105 °C and no change in signal 2 °K

DTC	Error Message	Malfunction Criteria and Threshold Value
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
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	• TPS 1 - TPS 2 > 5.10 to 6.30% • TPS 1 calc. 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
P013A	O2 Sensor (Bank 1 Sensor 2) Slow Response - Rich to Lean	EWMA filtered max differential transient time at fuel cutoff >= 0.5 Sec. and number of checks >= 3
P0130	O2 Sensor Circuit Bank 1 Sensor 1) Malfunction	O2S ceramic temperature < 640°C
P0131	O2 Sensor Circuit (Bank 1, Sensor 1) Low Voltage	Virtual mass < 1.75V
		Nernst voltage < 1.50 V
		Adjustment voltage < 0.30 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass > 3.25 V
		Nernst voltage > 4.40 V
		Adjustment voltage > 7 V
P0133	O2 Sensor Circuit (Bank 1 Sensor 1) Slow Response	• Difference between R2L and L2R area ratio -0.40 to 0.40 • Counter cycles completed >/= 4 times • Gradient ratio >= 0.25 or <= 0.40 and lower value of both ratios < 0.25
P0135	O2 Sensor Heater Circuit (Bank 1 Sensor 1) Malfunction	• Heater duty cycle > 90% • O2S ceramic temperature, < 720 °C or • O2S ceramic temp < 715 °C • Time after O2 heater on, 35 Sec.
P0136	O2 Sensor Circuit (Bank 1 Sensor 2) Malfunction	• Delta O2S rear signal > 2.00 V • Number of checks = 6

DTC	Error Message	Malfunction Criteria and Threshold Value
P0137	O2 Sensor Circuit (Bank 1 Sensor 2) Low Voltage	• Cold condition: Signal voltage < 0.06 V for > 3 Sec • Difference of sensor voltage with and without load pulse < 0.01 V
P0138	O2 Sensor Circuit (Bank 1 Sensor 2) High Voltage	Signal voltage > 1.08 V for > 5 Sec.
P0139	O2 Sensor Circuit (Bank 1, Sensor 2) Slow Response	• EWMA filtered transient time at fuel cut off > 0.6 Sec. • O2 voltage between 201 - 401 mV • O2S rear signal > 0.16 V during fuel cut off active
P0140	O2 Sensor Circuit (Bank 1, Sensor 2) No Activity Detected	• Signal voltage .40 to .60 V for > 3 Sec. • Voltage difference between load pulse and no load pulse >= 2.80 V • Internal resistance > 40 k and exhaust temp > 670 °C
P0141	O2 Sensor Heater Circuit (Bank 1, Sensor 2) Malfunction	• Difference of sensor voltage with and without load pulse < 0.01 V • Internal heater resistance 1200 - 32400 Ω
P0142	O2 Sensor Circuit (Bank 1 Sensor 3)	• Delta voltage 1 step at heater switching > 2.00 V • Heater coupling >= 6 times
P0143	O2 Sensor Circuit (Bank 1 Sensor 3) Low Voltage	• Signal voltage .40 to .60 V for > 3 Sec. • Voltage difference between load pulse and no load pulse >= 2.80 V • Internal resistance > 40 k and exhaust temp > 670 °C
P0144	O2 Sensor Circuit (Bank 1 Sensor 3) High Voltage	Signal voltage > 1.08 V for > 5 Sec.
P0145	O2 Sensor Circuit (Bank 1 Sensor 3) Slow Response	• EWMA filtered transient time at fuel cut off > 1.5 Sec. • O2 voltage between 201 - 401 mV

DTC	Error Message	Malfunction Criteria and Threshold Value
P0146	O2 Sensor Circuit (Bank 1 Sensor 3) No Activity Detected	• Signal voltage .40 to .60 V for > 3 Sec. • Voltage difference between load pulse and no load pulse >= 2.80 V • Internal resistance > 40 k and exhaust temp > 670 °C
P0147	O2 Sensor Heater Circuit (Bank 1 Sensor 3)	Internal heater resistance 1200 - 32400 Ω
P0169	Incorrect Fuel Composition	Fuel quantity out of limit or incorrect
P0201	Cylinder 1 - Injector Circuit	Low side signal voltage 4.50 - 5.50 V
P0202	Cylinder 2 - Injector Circuit	Low side signal voltage 4.50 - 5.50 V
P0203	Cylinder 3 - Injector Circuit	Low side signal voltage 4.50 - 5.50 V
P0204	Cylinder 4 - Injector Circuit	Low side signal voltage 4.50 - 5.50 V
P0205	Cylinder 5 - Injector Circuit	Low side signal voltage 4.50 - 5.50 V
P0221	Throttle/Pedal Position Sensor/Switch B Range/ Performance	• TPS 1 to TPS 2, > 5.10 to 6.3% • TPS 2 – calc position > 9 %
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
P0261	Cylinder 1 Injector Circuit Low	Signal voltage < 3.00 V
P0262	Cylinder 1 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0264	Cylinder 2 Injector Circuit Low	Signal voltage < 3.00 V
P0265	Cylinder 2 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0267	Cylinder 3 Injector Circuit Low	Signal voltage < 3.00 V
P0268	Cylinder 3 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0270	Cylinder 4 Injector Circuit Low	Signal voltage < 3.00 V
P0271	Cylinder 4 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0273	Cylinder 5 Injector Circuit Low	Signal voltage < 3.00 V
P0274	Cylinder 5 Injector Circuit High	Signal current < 2.20 - 4.00 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P2088	"A" Camshaft Position Actuator Control Circuit Low (Bank 1)	Signal voltage 0.0 to 3.25 V
P2089	"A" Camshaft Position Actuator Control Circuit High (Bank 1)	Signal current, > 2.2 A
P2096	Post Catalyst Fuel Trim System (Bank 1) Too Lean	Deviation lambda control < -0.03%
P2097	Post Catalyst Fuel Trim System (Bank 1) Too Rich	Deviation lambda control > 0.03%
P3081	Engine temperature too low	Difference between ECT and modeled ECT > 11 K

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%
P0301	Cylinder 1 Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%
P0302	Cylinder 2 Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%
P0303	Cylinder 3 Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0304	Cylinder 4 Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%
P0305	Cylinder 5 Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%
P0321	Ignition/Distributor Engine Speed Input Circuit Range/ Performance	• Comparison of counted teeth and number of teeth +/- 1 tooth • Loss of reference gap during normal operation • No reference gap during engine start
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	• No engine speed signal but CMP signals > 5 cam shaft revs • Engine speed = no signal
P0324	Knock Control System Error	• Signal fault counter (combustion) > 30 or Signal fault counter measuring window > 2
P0327	Knock Sensor 1 Circuit Low Input	• Lower threshold < - 0.70 V • Signal range check < 0.55 to 5.60 V
P0328	Knock Sensor 1 Circuit High Input	• Upper threshold > 1.00 V • Signal range check > 16.50 to 92 V
P0332	Knock Sensor 2 Circuit Low Input	• Lower threshold < - 0.70 V • Signal range check < 0.55 to 5.60 V
P0333	Knock Sensor 2 Circuit High Input	• Upper threshold > 1 V • Signal range check > 16.50 to 92 V
P0341	Camshaft Position Sensor Circuit Range/Performance	• Signal pattern incorrect • Defect counter = 8
P0342	Camshaft Position Sensor Circuit Low Input	• Signal voltage permanently low • Crankshaft signals = 8

DTC	Error Message	Malfunction Criteria and Threshold Value
P0343	Camshaft Position Sensor Circuit High Input	• Signal voltage permanently 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
P0355	Ignition Coil E 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	Deviation SAI pressure > 50 hPa
P0413	Secondary Air Injection System Switching Valve A Circuit Open	Signal voltage 4.70 to 5.40 V
P0414	Secondary Air Injection System Switching Valve A Circuit Shorted	• Signal voltage 0 to 3.25 V or • Signal current > 2.20 A
P0418	Secondary Air Injection System Relay A Circuit	Signal voltage 4.70 to 5.40 V
P0420	Catalyst System (Bank 1) Efficiency Below Threshold	Oxygen storage capacity (OSC) vs OSC value of borderline catalyst < 1.00
P043E	Evaporative Emission System Leak Detection Reference Orifice Low Flow	EVAP pump current during reference measurement > 40 mA
P043F	Evaporative Emission System Leak Detection Reference Orifice High Flow	EVAP pump current during reference measurement < 15 mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P0441	EVAP Emission Control System Incorrect Purge Flow	Actual EVAP pump current vs. difference from last reading > 1.70
P0442	EVAP Emission Control System (Small Leak) Leak Detected	Current pump pressure vs. modeled pump pressure < 9 hPa.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage 4.70 - 5.40 V
P0447	Evaporative Emission System Vent Control Circuit Open	Signal voltage > 4.70 - 5.40 V
P0448	Evaporative Emission System Vent Control Circuit Shorted	• Signal current > 2.2 to 4 A or • Signal voltage < 2.74 to 3.26 V
P0455	EVAP Emission Control System (Gross Leak) Leak Detected	Time for pressure drop < 0.95 Sec.
P0456	EVAP Emission Control System (very small Leak) Leak Detected	EVAP system leakage area calculated from pump current curve > 0.17 mm squared.
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 0 to 3.26 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current, > 2.2 A
P0491	Secondary Air Injection System (Bank 1) insufficient flow	• SAI pressure vs. modeled SAI < 50 - 72% or • Absolute deviation of raw pressure signal from filtered signal mean value < 8.98 hPa

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor “A” Range/Performance	Vehicle speed < 4 km/h
P0503	Vehicle Speed Sensor “A” Intermittend/Erratic/High	Vehicle speed > 325 km/h

DTC	Error Message	Malfunction Criteria and Threshold Value
P0506	Idle Control System RPM Lower than Expected	• Engine speed deviation > 100 RPM • RPM controller torque value ≥ calculated max value.
P0507	Idle Control System RPM Higher than Expected	• Engine speed deviation < -100 RPM • RPM controller torque value ≤ calculated min. value.
P050A	Cold Start Idle Air Control System Performance	• Engine speed deviation > 100 RPM • RPM controller torque value >= calculated max. value or • Engine speed deviation < -100 RPM • RPM controller torque value <= calculated min. value.
P050B	Cold Start Ignition Timing Performance	Difference between commanded spark timing vs. actual value > 20%
P052A	Cold Start “A” Camshaft Position Timing Over-Advanced	Difference between actual and target position > 10° CRK rev.

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	ECM/PCM Processor	• Internal hardware/voltage check - failed • Communication CPU - Sensor IC - failed • EEPROM Check failed
P0627	Fuel Pump “A” Control Circuit/ Open	• Signal voltage 4.50 to 5.50 V (open circuit) • Signal voltage < 3.00 V (grounded circuit)
P0629	Fuel Pump “A” Control Circuit High	Signal current 0.60 to 1.20 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0638	Throttle Actuator Control (Bank 1) Range/Performance	• Time to close to reference point > 0.6 Sec. and reference point = 2.88% or • TPS 1 signal voltage, not 0.40 - 0.80 V • TPS 2 signal voltage, not (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
P0697	Sensor Reference Voltage “C” Circuit Open	Signal voltage deviation > +/- 0.3 V
U0001	High Speed CAN Communication Bus	CAN message = no feedback
U0002	High Speed CAN Communication Bus Performance	Global time out, no messages received
U0101	Lost Communication with TCM	Time out, no message received
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	No CAN messages received
U0146	Lost Communication With Gateway “A”	No CAN messages received
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	No CAN messages received
U0302	Software Incompatibility with Transmission Control Module	Manual transmission coded ECM but automatic transmission messages received from TCM
U0402	Invalid Data Received From Transmission Control Module	Implausible data message received
U0415	Invalid Data Received From Anti-Lock Brake System Control Module	• Sensor signal failure • None, or implausible information • CAN 1 VSS signal incorrect > 327.08 km/h
U0422	Invalid Data Received From Body Control Module	Ambient temperature value initialization = 00h

DTC	Error Message	Malfunction Criteria and Threshold Value
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	AAT sensor reading from cluster to ECM implausible or no message
U0447	Invalid Data Received From Gateway “A”	CAN message incorrect

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P117A	Bank 1, oxygen sensor correction center sensor Control limit reached	I - portion of 3rd lambda control loop > 0.03)
P150A	Engine Off Timer Performance	Comparison of engine off time from Instrument Cluster control unit with ECM engine after run timer < -12 or > 12 Sec.
P1609	Crash shut-off was triggered	Airbags activated
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	• Pressure control activity > 0.25 MPa and • Fuel trim activity < 0.85
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Pressure control activity > 0.25 MPa and • Fuel trim activity < 0.85
P12A4	Fuel Rail Pump Control Valve Stuck Closed	• Fuel trim activity 0.85 to 1.15 and • Pressure control activity < 6.0 mPa
P13EA	Ignition Timing Monitor	Difference between commanded spark timing and actual value > 0.60%
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	• Duty cycle >80% • Deviation throttle value angles vs calculated value 4 to 50% • ECM driver = no fault
P2106	Throttle Actuator Control System Forced Limited Power	Internal check failure
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 sensor 1 vs. 2 > 0.17 to 0.70 V
P2177	System too lean off idle, (Bank 1)	• Adaptive value > 28%
P2178	System too rich off idle, (Bank 1)	• Adaptive value < 20%
P2181	Cooling System Performance	ECT too low after sufficient mass air flow interval = 75 °C
P2184	Engine Coolant Temperature (Sensor 2) Circuit Low	ECT outlet > 140 °C
P2185	Engine Coolant Temperature (Sensor 2) Circuit High	ECT outlet < -40 °C
P2187	System too lean at idle, (Bank 1)	• Adaptive value > 5.02%
P2188	System too rich at idle, (Bank 1)	• Adaptive value < -5.02%
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 to 1.51 V • Fuel cutoff > 3 Sec. • Delta lambda controller > 0.10
P2243	O2 Sensor Reference Voltage Circuit (Bank 1 Sensor 1) Open	• O2S signal front > 4.70 V and Internal resistance > 950 Ω • O2S signal front < 0.20 V And Internal resistance > 950 Ω
P2251	O2 Sensor Negative Current Control Circuit (Bank 1 Sensor 1) open	O2S signal front 1.47 to 1.53 V and > 950 Ω

DTC	Error Message	Malfunction Criteria and Threshold Value
P2257	Secondary Air Injection System Control “A” Circuit low	Signal voltage 0 to 3.26 V
P2258	Secondary air injection System Control “A” Circuit High	Signal current .60 to 2.40 A
P2270	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 2)	O2S signal rear not oscillating at reference < 598 mV and enrichment after stuck lean 20%
P2271	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 2)	O2S signal rear not oscillating at reference > 598 mV and enrichment after stuck rich 15%
P2274	O2 Sensor Signal Stuck Lean; (Bank 1 Sensor 3)	O2S rear not oscillating at reference < 0.64 to 0.65 V and enrichment after stuck lean 20%
P2275	O2 Sensor Signal Stuck Rich; (Bank 1 Sensor 3)	• O2S rear not oscillating at reference > 0.64 to 0.65 V and enrichment after stuck rich 15% or • Sensor voltage of >= 0.15 V after oxygen mass flow (after fuel cutoff) > 3500 mg with >= 1 check
P2279	Intake Air System Leak	Offset value throttle mass flow > 13 kg/h

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
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

DTC	Error Message	Malfunction Criteria and Threshold Value
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
P2312	Ignition Coil E Primary Control Circuit Low	Signal current > 24.0 mA
P2313	Ignition Coil E Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P240A	Evaporative Emission System Leak Detection Pump Heater Control Circuit/Open	Signal voltage > 4.7 to 5.4 V
P240B	Evaporative Emission System Leak Detection Pump Heater Control Circuit Low	Signal voltage < 2.74 to 3.26 V
P240C	Evaporative Emission System Leak Detection Pump Heater Control Circuit High	Signal current > 2.2 to 4 A
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.70 to 5.40 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.74 to 3.26 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal voltage > 4.00 or >1.80 V
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > .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 > 10 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P2407	Evaporative Emission System Leak Detection Pump Sense Circuit Intermittent/Erratic	• Fluctuation of EVAP pump current during reference measurement > 1 mA • Fluctuation of EVAP pump current during reference measurement > 1 mA
P2414	02 Sensor Exhaust Sample Error, (Bank 1 Sensor 1)	• Threshold 1 - Signal voltage 3.1 - 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 NOT -60 to 60 hPa
P2432	Secondary Air Injection System Air Flow/Pressure Bank 1 Sensor Circuit Low	Signal voltage < 0.5 V
P2433	Secondary Air Injection System Air Flow/Pressure Bank 1 Sensor Circuit High	Signal voltage > 4.5 V
P2440	Secondary Air Injection System Switching Valve Stuck Open (Bank 1)	SAI pressure sensor measured with SAI pressure vs. modeled while SAI valve closed < 64.8%
P2450	Evaporative Emission System Switching Valve Performance/ Stuck Open	EVAP pump current difference between reference measurement to idle < 3 mA
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 4.77 V (lean)

DTC CHART

Engine Code 2.5L CBUA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	“A” Camshaft Position Slow Response (Bank 1)	• Difference between target and actual > 8° CRK for > 1.8 to 2.5 Sec. • Adjustment angle < 3° CRK rotation
P0010	“A” Camshaft Position Actuator Circuit/Open (Bank 1)	Signal voltage > 4.70 - 5.40 V
P0011	Camshaft Position (Bank 1) Timing over-advanced or System Performance	• Difference between target and actual > 8° CRK rotation • Adjustment angle < 3° CRK rotation
P0016	Crankshaft Position-Camshaft Position Correlation (Bank 1 Sensor A)	Permissible deviation < -13.49 or >13.49 CRK deg.
P0030	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1)	• O2S signal rear not oscillating at reference < 598 mV and enrichment after stuck lean 20% or • Heater voltage 4.70 to 5.40 V
P0031	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1) Low	• O2S signal rear not oscillating at reference < 598 mV and enrichment after stuck lean 20% or • Heater voltage 0 to 3.26 V
P0032	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1) High	Heater current > 5.50 A
P0036	HO2S Heater Control Circuit (Bank 1, Sensor 2) Open Circuit	Heater voltage 2.34 to 3.59 V
P0037	O2 Sensor Heater Control Circuit(Bank 1 (1) Sensor 2) Low	Heater voltage < 2.34 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0038	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 2) High	Heater voltage > 3.59 A
P0042	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 3)	Heater voltage 2.34 to 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 (Bank 1 (1) Sensor 3) High	Heater voltage > 3.59 V
P0070	Ambient Air Temperature Sensor Circuit	Ambient air temp < -50 °C
P0071	Ambient Air Temperature Sensor Circuit Range/ Performance	Difference of ECT vs. IAT or IAT vs. AAT at start > 25 K (kelvin) or AAT vs. ECT at start < 25 K
P0072	Ambient Air Temperature Sensor Circuit Low	Ambient air temp > 87 °C
P0106	Manifold Absolute Pressure/ BARO Pressure Range/ Performance	• Difference manifold pressure - lower threshold model < 0. Model range 45 to 845 hPa • Difference manifold pressure - upper threshold model > 0. Model range 640 - 1055 • Difference altitude sensor signal vs. manifold pressure signal at engine start > 60 hPa
P0107	Manifold Absolute Pressure or BARO Pressure Low Input	Signal voltage < 0.20 V
P0108	Manifold Absolute Pressure or BARO Pressure High Input	Signal voltage > 4.86 V
P0111	Intake Air Temperature Sensor 1 Bank 1 Circuit Range/ Performance	• Difference of ECT vs. IAT or IAT vs. AAT at start > 25 K (kelvin) or AAT vs. ECT at start < 25 K
P0112	Intake Air Temperature (Sensor 1 Bank 1) Circuit Low	IAT > 130.0 °C
P0113	Intake Air Temperature (Sensor 1 Bank 1) Circuit High	IAT < -46 °C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0116	Engine Coolant Temperature (Sensor 1) Circuit Range/ Performance	• No change on signal 2 °K • ECT signal stuck in range 75 - 105 °C and no change in signal 2 °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
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	• TPS 1 - TPS 2 > 5.10 to 6.30% • TPS 1 calc. 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
P013A	O2 Sensor (Bank 1 Sensor 2) Slow Response - Rich to Lean	EWMA filtered max differential transient time at fuel cutoff >= 0.5 Sec. and number of checks >= 3
P0130	O2 Sensor Circuit Bank 1 Sensor 1) Malfunction	O2S ceramic temperature < 640°C
P0131	O2 Sensor Circuit (Bank 1, Sensor 1) Low Voltage	Virtual mass < 1.75V
		Nernst voltage < 1.50 V
		Adjustment voltage < 0.30 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass > 3.25 V
		Nernst voltage > 4.40 V
		Adjustment voltage > 7 V
P0133	O2 Sensor Circuit (Bank 1 Sensor 1) Slow Response	• Difference between R2L and L2R area ratio -0.40 to 0.40 • Counter cycles completed >/= 4 times • Gradient ratio >= 0.25 or <= 0.40 and lower value of both ratios < 0.25
P0135	O2 Sensor Heater Circuit (Bank 1 Sensor 1) Malfunction	• Heater duty cycle > 90% • O2S ceramic temperature, < 720 °C or • O2S ceramic temp < 715 °C • Time after O2 heater on, 35 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P0136	O2 Sensor Circuit (Bank 1 Sensor 2) Malfunction	• Delta O2S rear signal > 2.00 V • Number of checks = 6
P0137	O2 Sensor Circuit (Bank 1 Sensor 2) Low Voltage	• Cold condition: Signal voltage < 0.06 V for > 3 Sec • Difference of sensor voltage with and without load pulse < 0.01 V
P0138	O2 Sensor Circuit (Bank 1 Sensor 2) High Voltage	Signal voltage > 1.08 V for > 5 Sec.
P0139	O2 Sensor Circuit (Bank 1, Sensor 2) Slow Response	• EWMA filtered transient time at fuel cut off > 0.6 Sec. • O2 voltage between 201 - 401 mV • O2S rear signal > 0.16 V during fuel cut off active
P0140	O2 Sensor Circuit (Bank 1, Sensor 2) No Activity Detected	• Signal voltage .40 to .60 V for > 3 Sec. • Voltage difference between load pulse and no load pulse >= 2.80 V • Internal resistance > 40 k and exhaust temp > 670 °C
P0141	O2 Sensor Heater Circuit (Bank 1, Sensor 2) Malfunction	• Difference of sensor voltage with and without load pulse < 0.01 V • Internal heater resistance 1200 - 32400 Ω
P0142	O2 Sensor Circuit (Bank 1 Sensor 3)	• Delta voltage 1 step at heater switching > 2.00 V • Heater coupling >= 6 times
P0143	O2 Sensor Circuit (Bank 1 Sensor 3) Low Voltage	• Signal voltage .40 to .60 V for > 3 Sec. • Voltage difference between load pulse and no load pulse >= 2.80 V • Internal resistance > 40 k and exhaust temp > 670 °C
P0144	O2 Sensor Circuit (Bank 1 Sensor 3) High Voltage	Signal voltage > 1.08 V for > 5 Sec.
P0145	O2 Sensor Circuit (Bank 1 Sensor 3) Slow Response	• EWMA filtered transient time at fuel cut off > 1.5 Sec. • O2 voltage between 201 - 401 mV

DTC	Error Message	Malfunction Criteria and Threshold Value
P0146	O2 Sensor Circuit (Bank 1 Sensor 3) No Activity Detected	• Signal voltage .40 to .60 V for > 3 Sec. • Voltage difference between load pulse and no load pulse >= 2.80 V • Internal resistance > 40 k and exhaust temp > 670 °C
P0147	O2 Sensor Heater Circuit (Bank 1 Sensor 3)	Internal heater resistance 1200 - 32400 Ω
P0169	Incorrect Fuel Composition	Fuel quantity out of limit or incorrect
P0201	Cylinder 1 - Injector Circuit	Low side signal voltage 4.50 - 5.50 V
P0202	Cylinder 2 - Injector Circuit	Low side signal voltage 4.50 - 5.50 V
P0203	Cylinder 3 - Injector Circuit	Low side signal voltage 4.50 - 5.50 V
P0204	Cylinder 4 - Injector Circuit	Low side signal voltage 4.50 - 5.50 V
P0205	Cylinder 5 - Injector Circuit	Low side signal voltage 4.50 - 5.50 V
P0221	Throttle/Pedal Position Sensor/Switch B Range/ Performance	• TPS 1 to TPS 2, > 5.10 to 6.3% • TPS 2 – calc position > 9 %
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
P0261	Cylinder 1 Injector Circuit Low	Signal voltage < 3.00 V
P0262	Cylinder 1 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0264	Cylinder 2 Injector Circuit Low	Signal voltage < 3.00 V
P0265	Cylinder 2 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0267	Cylinder 3 Injector Circuit Low	Signal voltage < 3.00 V
P0268	Cylinder 3 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0270	Cylinder 4 Injector Circuit Low	Signal voltage < 3.00 V
P0271	Cylinder 4 Injector Circuit High	Signal current < 2.20 - 4.00 A
P0273	Cylinder 5 Injector Circuit Low	Signal voltage < 3.00 V
P0274	Cylinder 5 Injector Circuit High	Signal current < 2.20 - 4.00 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P2088	"A" Camshaft Position Actuator Control Circuit Low (Bank 1)	Signal voltage 0.0 to 3.25 V
P2089	"A" Camshaft Position Actuator Control Circuit High (Bank 1)	Signal current, > 2.2 A
P2096	Post Catalyst Fuel Trim System (Bank 1) Too Lean	Deviation lambda control < -0.03%
P2097	Post Catalyst Fuel Trim System (Bank 1) Too Rich	Deviation lambda control > 0.03%
P3081	Engine temperature too low	Difference between ECT and modeled ECT > 11 K

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%
P0301	Cylinder 1 Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%
P0302	Cylinder 2 Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%
P0303	Cylinder 3 Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0304	Cylinder 4 Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%
P0305	Cylinder 5 Misfire Detected	• Emission threshold 1st interval misfire rate (200 rev Misfire Rate) > 2.5% • Emission threshold misfire rate (1000 rev Misfire Rate), > 2.5 to 24%
P0321	Ignition/Distributor Engine Speed Input Circuit Range/ Performance	• Comparison of counted teeth and number of teeth +/- 1 tooth • Loss of reference gap during normal operation • No reference gap during engine start
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	• No engine speed signal but CMP signals > 5 cam shaft revs • Engine speed = no signal
P0324	Knock Control System Error	• Signal fault counter (combustion) > 30 or Signal fault counter measuring window > 2
P0327	Knock Sensor 1 Circuit Low Input	• Lower threshold < - 0.70 V • Signal range check < 0.55 to 5.60 V
P0328	Knock Sensor 1 Circuit High Input	• Upper threshold > 1.00 V • Signal range check > 16.50 to 92 V
P0332	Knock Sensor 2 Circuit Low Input	• Lower threshold < - 0.70 V • Signal range check < 0.55 to 5.60 V
P0333	Knock Sensor 2 Circuit High Input	• Upper threshold > 1 V • Signal range check > 16.50 to 92 V
P0341	Camshaft Position Sensor Circuit Range/Performance	• Signal pattern incorrect • Defect counter = 8
P0342	Camshaft Position Sensor Circuit Low Input	• Signal voltage permanently low • Crankshaft signals = 8

DTC	Error Message	Malfunction Criteria and Threshold Value
P0343	Camshaft Position Sensor Circuit High Input	• Signal voltage permanently 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
P0355	Ignition Coil E 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	Deviation SAI pressure > 50 hPa
P0413	Secondary Air Injection System Switching Valve A Circuit Open	Signal voltage 4.70 to 5.40 V
P0414	Secondary Air Injection System Switching Valve A Circuit Shorted	• Signal voltage 0 to 3.25 V or • Signal current > 2.20 A
P0418	Secondary Air Injection System Relay A Circuit	Signal voltage 4.70 to 5.40 V
P0420	Catalyst System (Bank 1) Efficiency Below Threshold	Oxygen storage capacity (OSC) vs OSC value of borderline catalyst < 1.00
P043E	Evaporative Emission System Leak Detection Reference Orifice Low Flow	EVAP pump current during reference measurement > 40 mA
P043F	Evaporative Emission System Leak Detection Reference Orifice High Flow	EVAP pump current during reference measurement < 15 mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P0441	EVAP Emission Control System Incorrect Purge Flow	Actual EVAP pump current vs. difference from last reading > 1.70
P0442	EVAP Emission Control System (Small Leak) Leak Detected	Current pump pressure vs. modeled pump pressure < 9 hPa.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage 4.70 - 5.40 V
P0447	Evaporative Emission System Vent Control Circuit Open	Signal voltage > 4.70 - 5.40 V
P0448	Evaporative Emission System Vent Control Circuit Shorted	• Signal current > 2.2 to 4 A or • Signal voltage < 2.74 to 3.26 V
P0455	EVAP Emission Control System (Gross Leak) Leak Detected	Time for pressure drop < 0.95 Sec.
P0456	EVAP Emission Control System (very small Leak) Leak Detected	EVAP system leakage area calculated from pump current curve > 0.17 mm squared.
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 0 to 3.26 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current, > 2.2 A
P0491	Secondary Air Injection System (Bank 1) insufficient flow	• SAI pressure vs. modeled SAI < 50 - 72% or • Absolute deviation of raw pressure signal from filtered signal mean value < 8.98 hPa

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor “A” Range/Performance	Vehicle speed < 4 km/h
P0503	Vehicle Speed Sensor “A” Intermittend/Erratic/High	Vehicle speed > 325 km/h

DTC	Error Message	Malfunction Criteria and Threshold Value
P0506	Idle Control System RPM Lower than Expected	• Engine speed deviation > 100 RPM • RPM controller torque value ≥ calculated max value.
P0507	Idle Control System RPM Higher than Expected	• Engine speed deviation < -100 RPM • RPM controller torque value ≤ calculated min. value.
P050A	Cold Start Idle Air Control System Performance	• Engine speed deviation > 100 RPM • RPM controller torque value >= calculated max. value or • Engine speed deviation < -100 RPM • RPM controller torque value <= calculated min. value.
P050B	Cold Start Ignition Timing Performance	Difference between commanded spark timing vs. actual value > 20%
P052A	Cold Start “A” Camshaft Position Timing Over-Advanced	Difference between actual and target position > 10° CRK rev.

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	ECM/PCM Processor	• Internal hardware/voltage check - failed • Communication CPU - Sensor IC - failed • EEPROM Check failed
P0627	Fuel Pump “A” Control Circuit/ Open	• Signal voltage 4.50 to 5.50 V (open circuit) • Signal voltage < 3.00 V (grounded circuit)
P0629	Fuel Pump “A” Control Circuit High	Signal current 0.60 to 1.20 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0638	Throttle Actuator Control (Bank 1) Range/Performance	• Time to close to reference point > 0.6 Sec. and reference point = 2.88% or • TPS 1 signal voltage, not 0.40 - 0.80 V • TPS 2 signal voltage, not (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
P0697	Sensor Reference Voltage “C” Circuit Open	Signal voltage deviation > +/- 0.3 V
U0001	High Speed CAN Communication Bus	CAN message = no feedback
U0002	High Speed CAN Communication Bus Performance	Global time out, no messages received
U0101	Lost Communication with TCM	Time out, no message received
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	No CAN messages received
U0146	Lost Communication With Gateway “A”	No CAN messages received
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	No CAN messages received
U0302	Software Incompatibility with Transmission Control Module	Manual transmission coded ECM but automatic transmission messages received from TCM
U0402	Invalid Data Received From Transmission Control Module	Implausible data message received
U0415	Invalid Data Received From Anti-Lock Brake System Control Module	• Sensor signal failure • None, or implausible information • CAN 1 VSS signal incorrect > 327.08 km/h
U0422	Invalid Data Received From Body Control Module	Ambient temperature value initialization = 00h

DTC	Error Message	Malfunction Criteria and Threshold Value
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	AAT sensor reading from cluster to ECM implausible or no message
U0447	Invalid Data Received From Gateway “A”	CAN message incorrect

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P117A	Bank 1, oxygen sensor correction center sensor Control limit reached	I - portion of 3rd lambda control loop > 0.03)
P150A	Engine Off Timer Performance	Comparison of engine off time from Instrument Cluster control unit with ECM engine after run timer < -12 or > 12 Sec.
P1609	Crash shut-off was triggered	Airbags activated
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	• Pressure control activity > 0.25 MPa and • Fuel trim activity < 0.85
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Pressure control activity > 0.25 MPa and • Fuel trim activity < 0.85
P12A4	Fuel Rail Pump Control Valve Stuck Closed	• Fuel trim activity 0.85 to 1.15 and • Pressure control activity < 6.0 mPa
P13EA	Ignition Timing Monitor	Difference between commanded spark timing and actual value > 0.60%
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	• Duty cycle >80% • Deviation throttle value angles vs calculated value 4 to 50% • ECM driver = no fault
P2106	Throttle Actuator Control System Forced Limited Power	Internal check failure
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 sensor 1 vs. 2 > 0.17 to 0.70 V
P2177	System too lean off idle, (Bank 1)	• Adaptive value > 28%
P2178	System too rich off idle, (Bank 1)	• Adaptive value < 20%
P2181	Cooling System Performance	ECT too low after sufficient mass air flow interval = 75 °C
P2184	Engine Coolant Temperature (Sensor 2) Circuit Low	ECT outlet > 140 °C
P2185	Engine Coolant Temperature (Sensor 2) Circuit High	ECT outlet < -40 °C
P2187	System too lean at idle, (Bank 1)	• Adaptive value > 5.02%
P2188	System too rich at idle, (Bank 1)	• Adaptive value < -5.02%
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 to 1.51 V • Fuel cutoff > 3 Sec. • Delta lambda controller > 0.10
P2243	O2 Sensor Reference Voltage Circuit (Bank 1 Sensor 1) Open	• O2S signal front > 4.70 V and Internal resistance > 950 Ω • O2S signal front < 0.20 V And Internal resistance > 950 Ω
P2251	O2 Sensor Negative Current Control Circuit (Bank 1 Sensor 1) open	O2S signal front 1.47 to 1.53 V and > 950 Ω
P2257	Secondary Air Injection System Control “A” Circuit low	Signal voltage 0 to 3.26 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2258	Secondary air injection System Control “A” Circuit High	Signal current .60 to 2.40 A
P2270	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 2)	O2S signal rear not oscillating at reference < 598 mV and enrichment after stuck lean 20%
P2271	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 2)	O2S signal rear not oscillating at reference > 598 mV and enrichment after stuck rich 15%
P2274	O2 Sensor Signal Stuck Lean; (Bank 1 Sensor 3)	O2S rear not oscillating at reference < 0.64 to 0.65 V and enrichment after stuck lean 20%
P2275	O2 Sensor Signal Stuck Rich; (Bank 1 Sensor 3)	• O2S rear not oscillating at reference > 0.64 to 0.65 V and enrichment after stuck rich 15% or • Sensor voltage of >= 0.15 V after oxygen mass flow (after fuel cutoff) > 3500 mg with >= 1 check
P2279	Intake Air System Leak	Offset value throttle mass flow > 13 kg/h

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
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

DTC	Error Message	Malfunction Criteria and Threshold Value
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
P2312	Ignition Coil E Primary Control Circuit Low	Signal current > 24.0 mA
P2313	Ignition Coil E Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P240A	Evaporative Emission System Leak Detection Pump Heater Control Circuit/Open	Signal voltage > 4.7 to 5.4 V
P240B	Evaporative Emission System Leak Detection Pump Heater Control Circuit Low	Signal voltage < 2.74 to 3.26 V
P240C	Evaporative Emission System Leak Detection Pump Heater Control Circuit High	Signal current > 2.2 to 4 A
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.70 to 5.40 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.74 to 3.26 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal voltage > 4.00 or >1.80 V
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > .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 > 10 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P2407	Evaporative Emission System Leak Detection Pump Sense Circuit Intermittent/Erratic	• Fluctuation of EVAP pump current during reference measurement > 1 mA • Fluctuation of EVAP pump current during reference measurement > 1 mA
P2414	02 Sensor Exhaust Sample Error, (Bank 1 Sensor 1)	• Threshold 1 - Signal voltage 3.1 - 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 NOT -60 to 60 hPa
P2432	Secondary Air Injection System Air Flow/Pressure Bank 1 Sensor Circuit Low	Signal voltage < 0.5 V
P2433	Secondary Air Injection System Air Flow/Pressure Bank 1 Sensor Circuit High	Signal voltage > 4.5 V
P2440	Secondary Air Injection System Switching Valve Stuck Open (Bank 1)	SAI pressure sensor measured with SAI pressure vs. modeled while SAI valve closed < 64.8%
P2450	Evaporative Emission System Switching Valve Performance/ Stuck Open	EVAP pump current difference between reference measurement to idle < 3 mA
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 4.77 V (lean)

Printed in the United States of America

JETSWQUSPEC2013