2013

TT

Quick Reference Specification Book

Audi
Truth in Engineering

2013 Audi TT
Quick Reference Specification Book
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TRANSMISSIONS

CHASSIS

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.

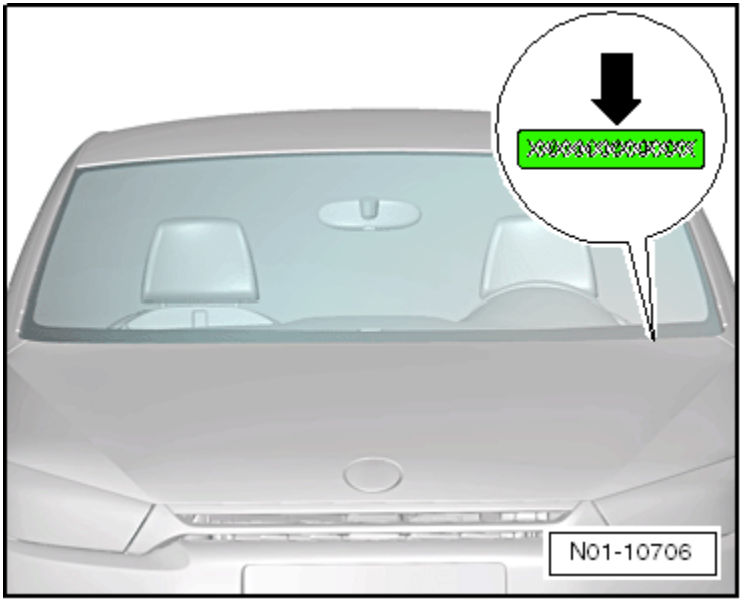
(CAUTIONS cont'd on next page)

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.

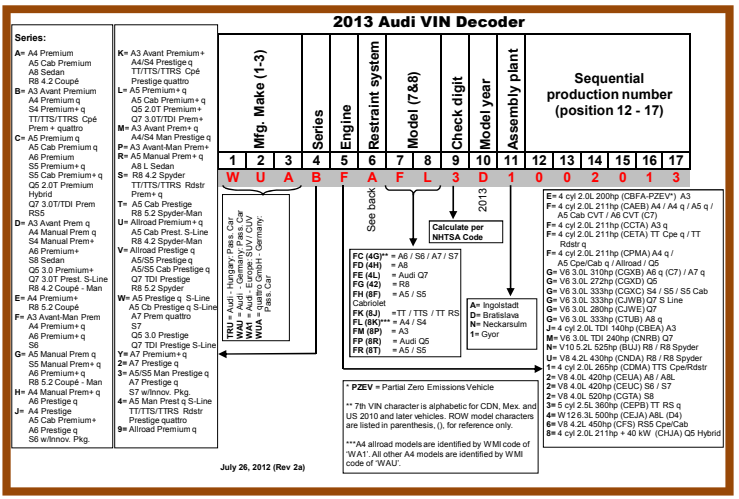
VEHICLE IDENTIFICATION

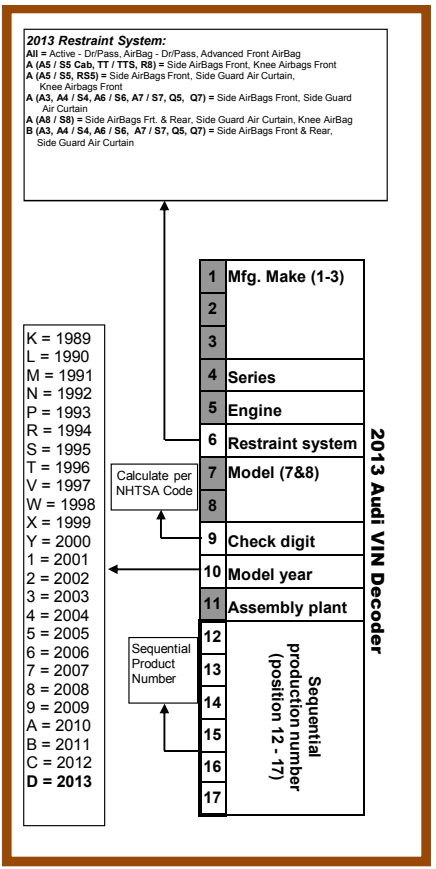
Vehicle Identification Number (VIN) Location



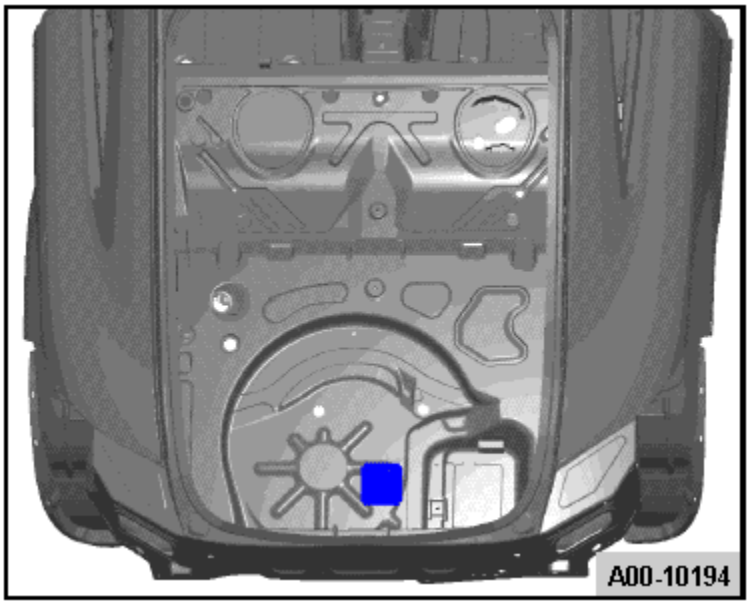
The VIN (➡) is on the left side of the vehicle in the area of the windshield wiper mount. It is visible from the outside (typical illustration shown).

VIN Decoder


2013 Audi VIN Decoder
Series:
A= A4 Premium
A5 Cab Premium
A8 Sedan
R8 4.2 Coupé
B= A3 Avant Premium
A4 Premium q
S4 Premium+ q
TT/TTS/TTRS Cpé
Prem + quattro
C= A5 Premium q
A5 Cab Premium q
A6 Premium
S5 Premium+ q
S5 Cab Premium+ q
Q5 2.0T Premium
Hybrid
Q7 3.0T/TDI Prem
RS5
D= A3 Avant Prem q
A4 Manual Prem q
S4 Manual Prem+
A6 Premium+
S8 Sedan
Q5 3.0 Premium+
Q7 3.0T Prest. S-Line
R8 4.2 Coupé - Man
E= A4 Premium+
R8 5.2 Coupé
F= A3 Avant-Man Prem
A4 Premium+ q
A6 Premium+ q
S6
G= A5 Manual Prem q
S5 Manual Prem+ q
A6 Premium+ q
R8 5.2 Coupé - Man
H= A4 Manual Prem+ q
A8 Prestige q
J= A4 Prestige
A5 Cab Premium+
A6 Prestige q
S6 w/Innov. Pkg.
K= A3 Avant Premium+
A4/S4 Prestige q
TT/TTS/TTRS Cpé
Prestige quattro
L= A5 Premium+ q
A5 Cab Premium+ q
Q5 2.0T Premium+
Q7 3.0T/TDI Prem+
M= A3 Avant Prem+ q
A4/S4 Man Prestige q
P= A3 Avant-Man Prem+
R= A5 Manual Prem+ q
A8 L Sedan
S= R8 4.2 Spyder
TT/TTS/TTRS Rdstr
Prem+ q
T= A5 Cab Prestige
R8 5.2 Spyder-Man
U= Allroad Premium + q
A5 Cab Prest. S-Line
R8 4.2 Spyder-Man
V= Allroad Prestige q
A5/S5 Prestige q
A5/S5 Cab Prestige q
Q7 TDI Prestige
R8 5.2 Spyder
W= A5 Prestige q S-Line
A5 Cb Prestige q S-Line
A7 Prem quattro
S7
Q5 3.0 Prestige
Q7 TDI Prestige S-Line
Y= A7 Premium+ q
2= A7 Prestige q
3= A5/S5 Man Prestige q
A7 Prestige q
S7 w/Innov. Pkg.
4= A5 Man Prest q S-Line
TT/TTS/TTRS Rdstr
Prestige quattro
9= Allroad Premium q
Mfg. Make (1-3)
Series
Engine
Restraint system
Model (7&8)
Check digit
Model year
Assembly plant
Sequential production number (position 12 - 17)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
W U A B F A F L 3 D 1 0 0 2 0 1 3
TRU = Audi - Hungary: Pass. Car
WAU = Audi - Germany: Pass. Car
WUA = quattro GmbH - Germany: Pass. Car
See back
Calculate per NHTSA Code
2013
FC (4G)** = A6 / S6 / A7 / S7
FD (4H) = A8
FE (4L) = Audi Q7
FG (42) = R8
FH (8F) = A5 / S5 Cabriolet
FK (8J) = TT / TTS / TT RS
FL (8K)*** = A4 / S4
FM (8P) = A3
FP (8R) = Audi Q5
FR (8T) = A5 / S5
A= Ingolstadt
D= Bratislava
N= Neckarsulm
1= Gyor
E= 4 cyl 2.0L 200hp (CBFA-PZEV*) A3
F= 4 cyl 2.0L 211hp (CAEB) A4 / A4 q / A5 q / A5 Cab CVT / A6 CVT (C7)
F= 4 cyl 2.0L 211hp (CCTA) A3 q
F= 4 cyl 2.0L 211hp (CETA) TT Cpe q / TT Rdstr q
F= 4 cyl 2.0L 211hp (CPMA) A4 q / A5 Cpe/Cab q / Allroad / Q5
G= V6 3.0L 310hp (CGXB) A6 q (C7) / A7 q
G= V6 3.0L 272hp (CGXD) Q5
G= V6 3.0L 333hp (CGXC) S4 / S5 / S5 Cab
G= V6 3.0L 333hp (CJWB) Q7 S Line
G= V6 3.0L 280hp (CJWE) Q7
G= V6 3.0L 333hp (CTUB) A8 q
J= 4 cyl 2.0L TDI 140hp (CBEA) A3
M= V6 3.0L TDI 240hp (CNRB) Q7
N= V10 5.2L 525hp (BUJ) R8 / R8 Spyder
U= V8 4.2L 430hp (CNDA) R8 / R8 Spyder
1= 4 cyl 2.0L 265hp (CDMA) TTS Cpe/Rdstr
2= V8 4.0L 420hp (CEUA) A8 / A8L
2= V8 4.0L 420hp (CEUC) S8 / S7
2= V8 4.0L 520hp (CGTA) S8
3= 5 cyl 2.5L 360hp (CEPB) TT RS q
4= W12 6.3L 500hp (CEJA) A8L (D4)
6= V8 4.2L 450hp (CFS) RS5 Cpe/Cab
8= 4 cyl 2.0L 211hp + 40 kW (CHJA) Q5 Hybrid
* PZEV = Partial Zero Emissions Vehicle
** 7th VIN character is alphabetic for CDN, Mex. and US 2010 and later vehicles. ROW model characters are listed in parenthesis, (), for reference only.
***A4 allroad models are identified by WMI code of 'WA1'. All other A4 models are identified by WMI code of 'WAU'.
July 26, 2012 (Rev 2a)


2013 Restraint System:
All = Active - Dr/Pass, AirBag - Dr/Pass, Advanced Front AirBag
A (A5 / S5 Cab, TT / TTS, R8) = Side AirBags Front, Knee Airbags Front
A (A5 / S5, RS5) = Side AirBags Front, Side Guard Air Curtain, Knee Airbags Front
A (A3, A4 / S4, A6 / S6, A7 / S7, Q5, Q7) = Side AirBags Front, Side Guard Air Curtain
A (A8 / S8) = Side AirBags Frt. & Rear, Side Guard Air Curtain, Knee AirBag
B (A3, A4 / S4, A6 / S6, A7 / S7, Q5, Q7) = Side AirBags Front & Rear, Side Guard Air Curtain
K = 1989
L = 1990
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 Mfg. Make (1-3)
2
3
4 Series
5 Engine
6 Restraint system
7 Model (7&8)
8
9 Check digit
10 Model year
11 Assembly plant
12
13
14
15
16
17
Sequential production number (position 12 - 17)
2013 Audi VIN Decoder

Vehicle Data Label



The vehicle data label is located in the spare wheel well.

SALES CODES

Engine Codes

CETA	2.0L 4-cylinder
CDMA	2.0L 4-cylinder
CEPB	2.5L 5-cylinder

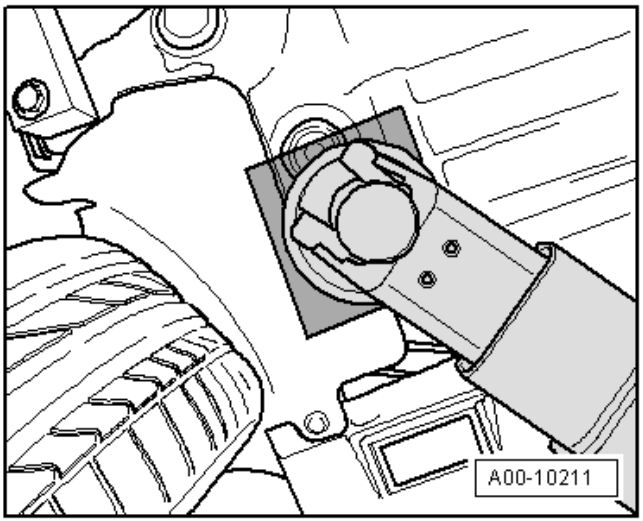
Transmission Codes

0A6	6-speed manual transmission
02E	Direct Shift Gearbox (DSG) transmission

VEHICLE LIFTING

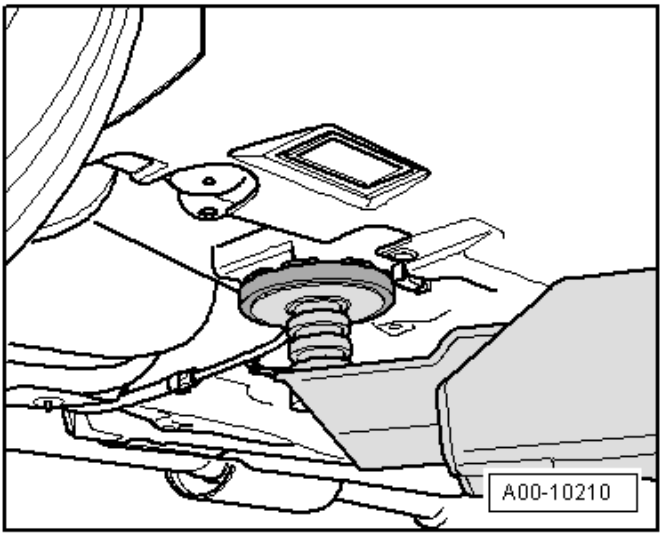
Hoist and Floor Jack Lifting Points

Front



The lift points are located on the floor longitudinal reinforcement, in the area of the marking.

Rear



The lift points are located on the aluminum case part in front of the rear axle mounting point.

ENGINE MECHANICAL – 2.0L CETA

General, Technical Data

Engine Number Location

The engine number (engine code and serial number) is located at the front of the engine/transmission joint. The engine code and serial number is also on a label found on the toothed belt guard and data plates.

Engine Data

Code letters		**CETA**
Displacement	liter	1.984
Output	kW at RPM	155 @ 6000
Torque	Nm at RPM	350 @ 1500
Bore	Diameter in mm	82.5
Stroke	mm	92.8
Compression ratio		9.6
RON		95 [1)]
Injection system/ignition system		FSI
Ignition sequence		1-3-4-2
Knock control		Yes
Turbocharger, Supercharger		Yes
Exhaust Gas Recirculation (EGR)		No
Variable intake manifold		No
Variable valve timing		Yes
Secondary Air Injection (AIR)		No

[1)] Unleaded RON 91 is also permitted but performance is reduced.

Engine Assembly – 2.0L CETA

Fastener Tightening Specifications

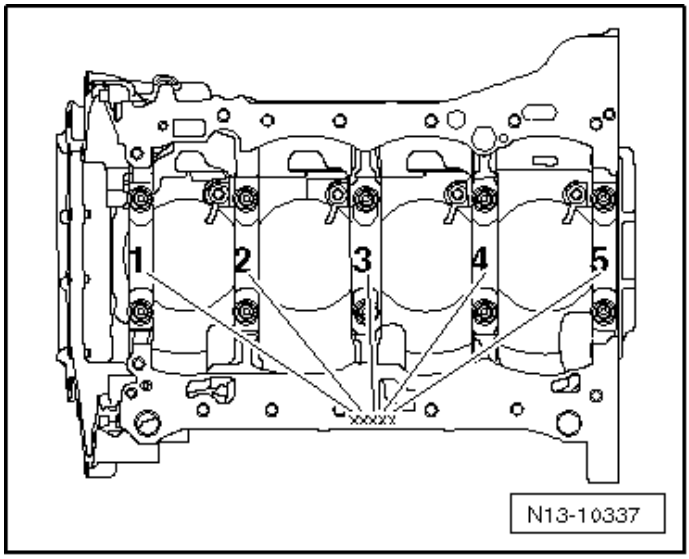
Component	Fastener size	Nm
Bolts/nuts	M6	10
	M7	15
	M8	22
	M10	40
	M12	65
Bracket-to-body [1]	-	20 plus an additional 90° (¼ turn)
Bracket-to-engine mount [1]	-	20 plus an additional 90° (¼ turn)
Engine mount with support arm [1] [2]	-	40 plus an additional 90° (¼ turn)
	-	60 plus an additional 90° (¼ turn)
Engine support with support arm [1]	-	40 plus an additional 180° (½ turn)

[1] Replace fastener(s).

[2] For bolt tightening clarification, refer to ElsaWeb, *Subframe Assembly Overview,* items 6, 10 and 11.

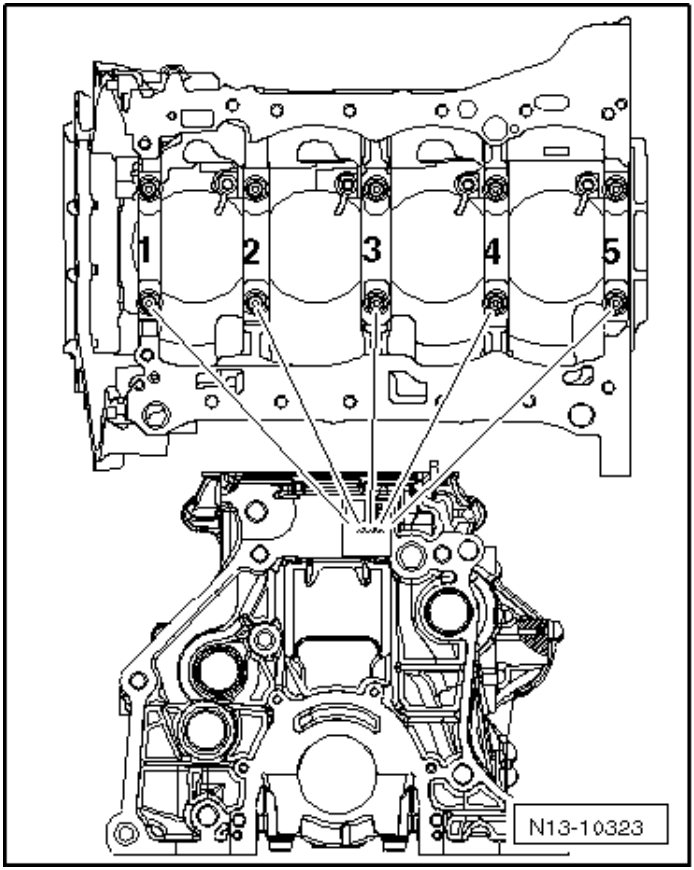
Crankshaft, Cylinder Block – 2.0L CETA

Cylinder Block Bearing Shell Identification



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

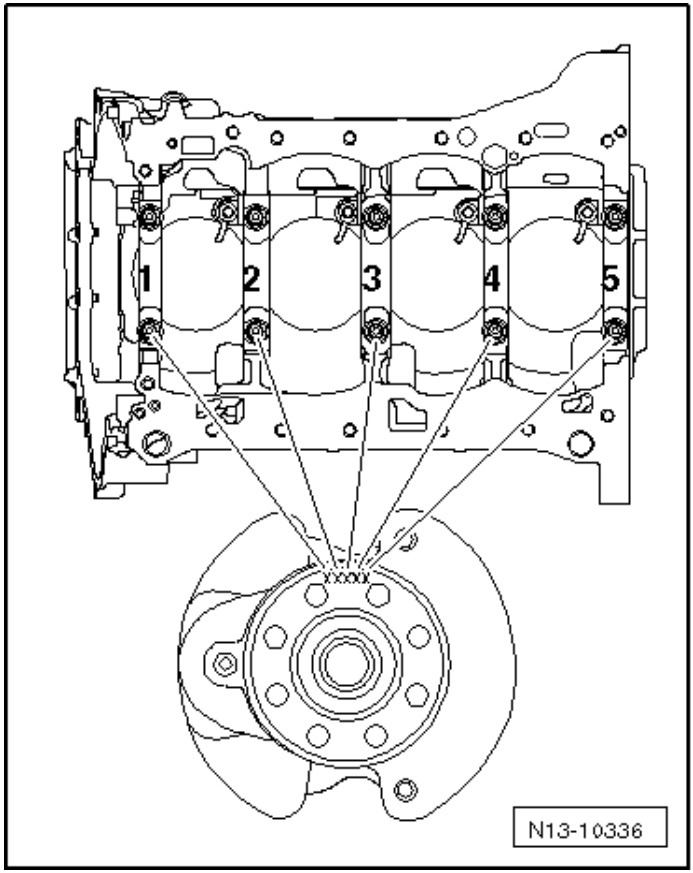
Cylinder Block Bearing Shell Identification



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

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

Bearing Cap Bearing Shell Identification



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

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

Fastener Tightening Specifications

Component	Nm
A/C compressor	25
Accessory bracket [3]	10
Connecting rod bolt [1]	45 plus an additional 90° (¼ turn)
Dual mass flywheel [1]	60 plus an additional 90° (¼ turn)
Pressure relief valve	27
Sensor wheel [1]	10 plus an additional 90° (¼ turn)
Vibration damper [1] [2]	150 plus an additional 90° (¼ turn)

[1] Replace fastener(s).
[2] Coat the O-ring with oil.
[3] For bolt tightening clarification, refer to ElsaWeb, *Ribbed Belt Drive Overview,* items 7 and 10.

Crankshaft Dimensions

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

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

Piston Ring End Gaps

Piston ring dimensions in mm	New	Wear limit
Compression ring	0.20 to 0.40	0.80
Oil scraping ring	0.25 to 0.50	0.80

Piston Ring Clearance

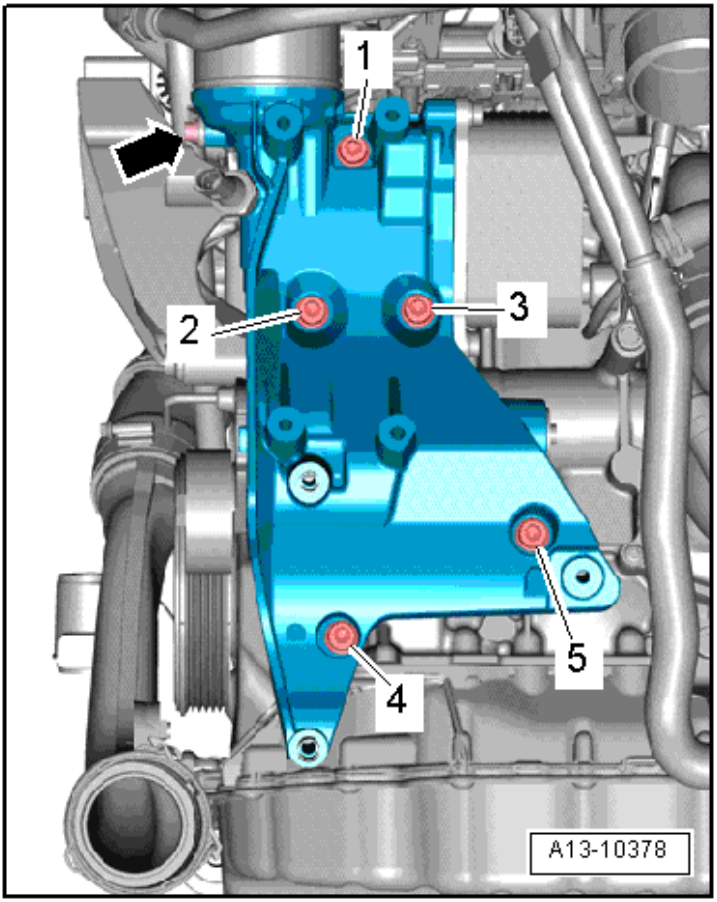
Piston ring dimensions in mm	New	Wear limit
1st compression ring	0.06 to 0.09	0.20
2nd compression ring	0.03 to 0.06	0.15
Oil scraping rings	Cannot be measured	

Piston and Cylinder Dimensions

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

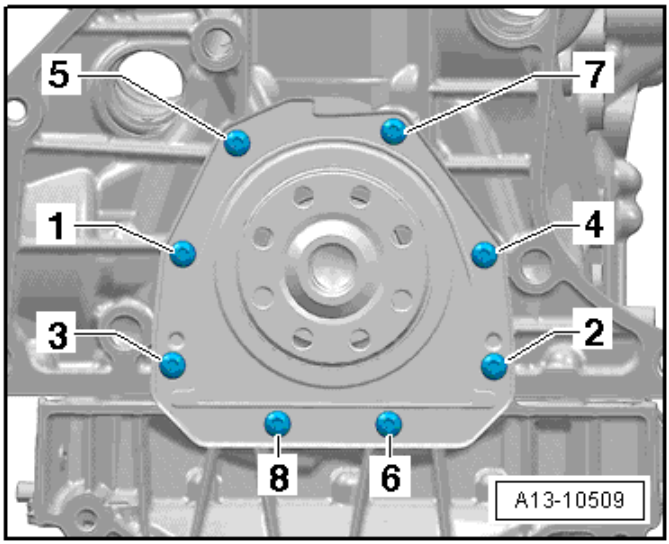
[1)] Measurements without graphite coating (thickness = 0.02 mm). The graphite coating wears off.

Accessory Assembly Bracket Tightening Specifications



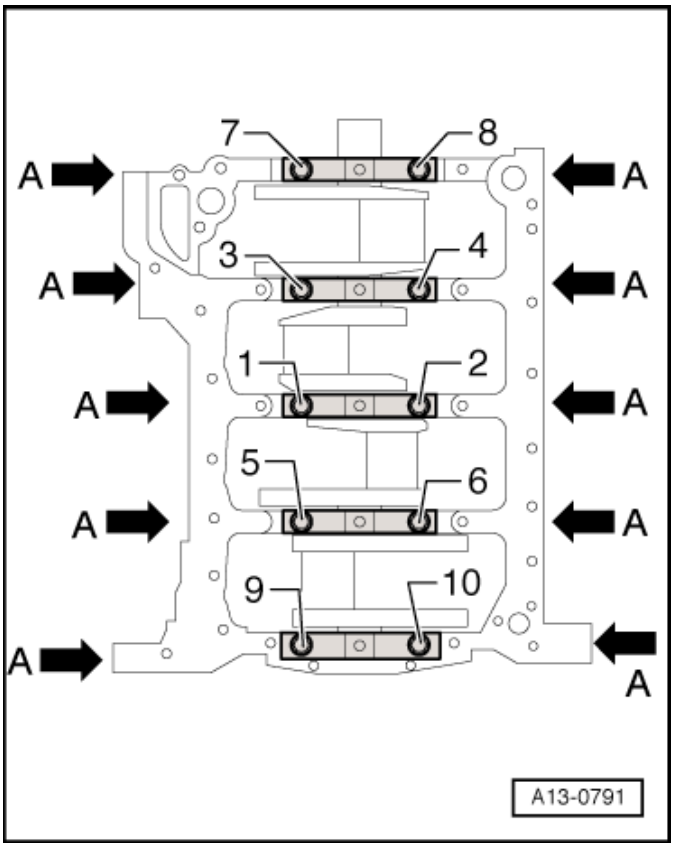
Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	Hand-tighten
2	Tighten bolts 1 through 5 in sequence	20
3	Tighten bolts 1 through 5 in sequence	an additional 90° (¼ turn)

Sealing Flange Tightening Specifications



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

Crankshaft Assembly Tightening Specifications



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

Cylinder Head, Valvetrain – 2.0L CETA

Fastener Tightening Specifications

Component	Fastener size	Nm
Balance shaft [1]	-	9
Bearing bracket [1] [2]	-	9
	M6	8 plus an additional 90° (¼ turn)
	M8	20 plus an additional 90° (¼ turn)
Camshaft adjuster actuator	-	5
Camshaft Position (CMP) sensor	-	9
Camshaft timing chain guide rail guide pins	-	20
Chain tensioner [4]	-	9
Chain tensioner [3]	-	65
Control valve	-	35
Engine lifting eye	-	25
Guide rail for timing chain, guide bolts		20
Heat shield [5] [6]	-	9
	-	20
Mounting plate	-	9
Oil dipstick guide tube	-	9
Retaining plate	-	9
Sealing plugs	-	5
Tensioning rail for timing chain, guide bolts		20
Timing chain tensioning rail guide bolts	-	20

[1] Replace fastener(s).

[2] For bolt tightening clarification, refer to ElsaWeb, *Camshaft Timing Chain Overview,* items 5 and 7.

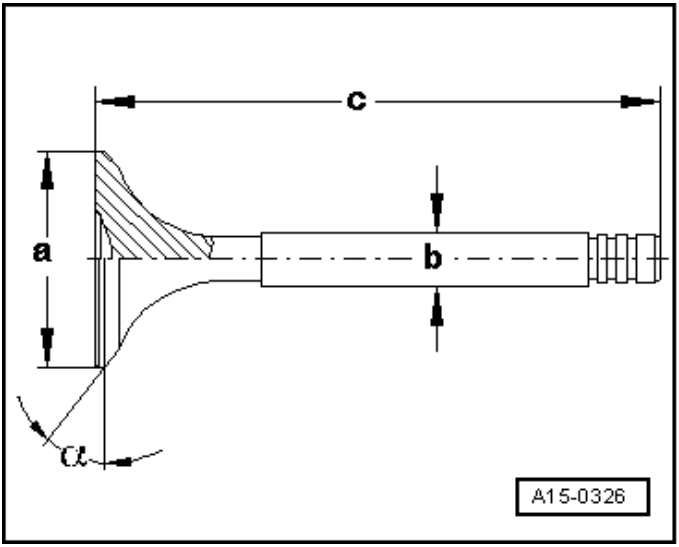
[3] For bolt tightening clarification, refer to ElsaWeb, *Balance Shaft Timing Chain Overview,* item 4.

[4] For bolt tightening clarification, refer to ElsaWeb, *Camshaft Timing Chain Overview*, item 2.

[5] For bolt tightening clarification, refer to ElsaWeb, *Cylinder Head Overview*, items 13, 15 and 16.

[6] For bolt tightening clarification, refer to ElsaWeb, *Cylinder Head Overview with AVS*, items 16, 18 and 19.

Valve Dimensions



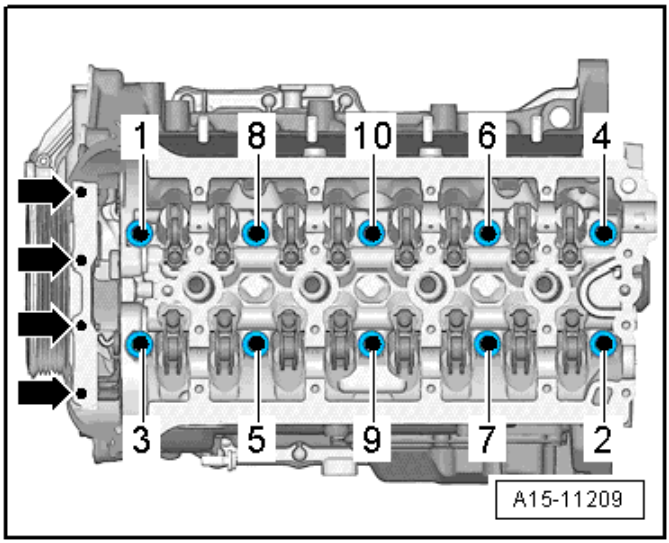
Dimension		Intake valve	Exhaust valve
Diameter a	mm	33.85 ± 0.10	28.0 ± 0.1
Diameter b	mm	5.98 ± 0.01	5.96 ± 0.01
c	mm	104.0 ± 0.2	101.9 ± 0.2
α	∠°	45	45

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

Compression Pressures

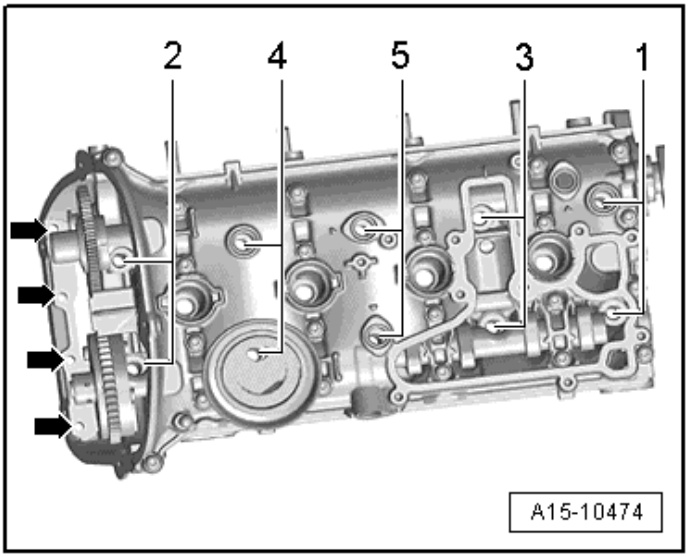
New Bar positive pressure	Wear limit Bar positive pressure	Difference between cylinders Bar positive pressure
11.0 to 14.0	7.0	Maximum 3.0

Cylinder Head Removal Specifications (with AVS)



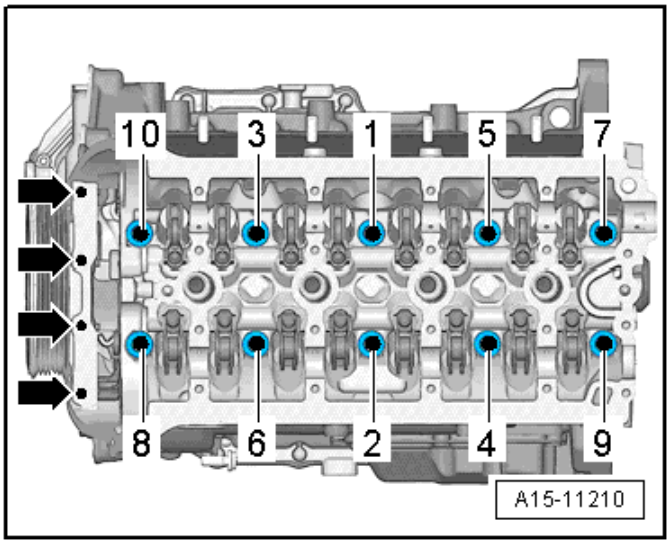
Remove cylinder head bolts (➡) and 1 through 10 in sequence.

Cylinder Head Removal Specifications (without AVS)



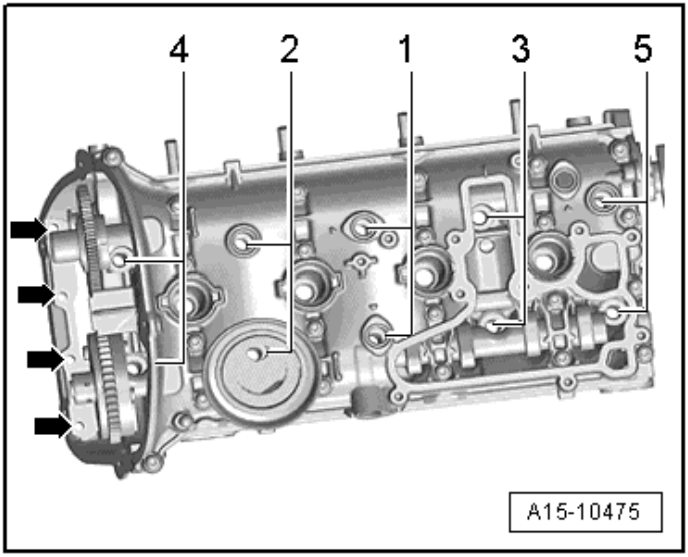
Remove cylinder head bolts (➡) and 1 through 5 in sequence.

Cylinder Head Tightening Specifications (with AVS)



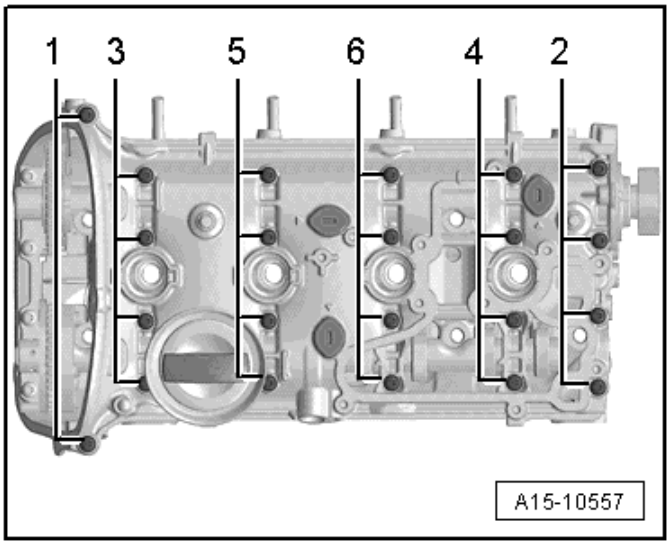
Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	40
2	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)
3	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)
4	Tighten bolts (➡)	8
5	Tighten bolts (➡)	an additional 90° (¼ turn)

Cylinder Head Tightening Specifications (without AVS)



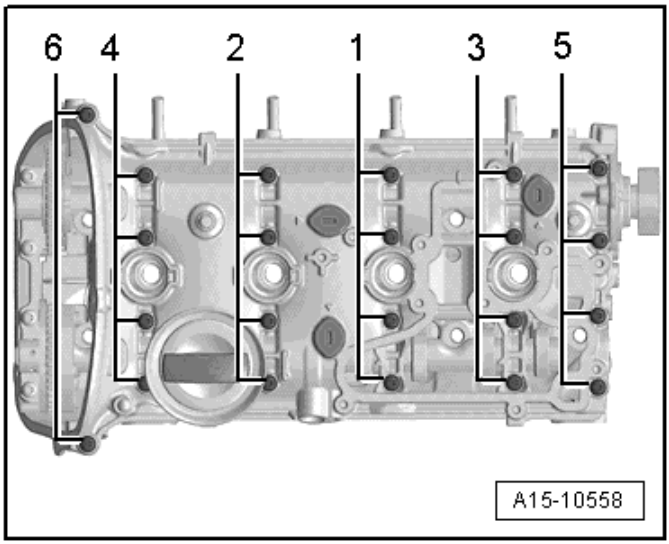
Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	40
2	Tighten bolts 1 through 5 in sequence	an additional 90° (¼ turn)
3	Tighten bolts 1 through 5 in sequence	an additional 90° (¼ turn)
4	Tighten bolts (➡)	8
5	Tighten bolts (➡)	an additional 90° (¼ turn)

Cylinder Head Cover Removal Specifications



Loosen cylinder head cover bolts 1 through 6 in sequence.

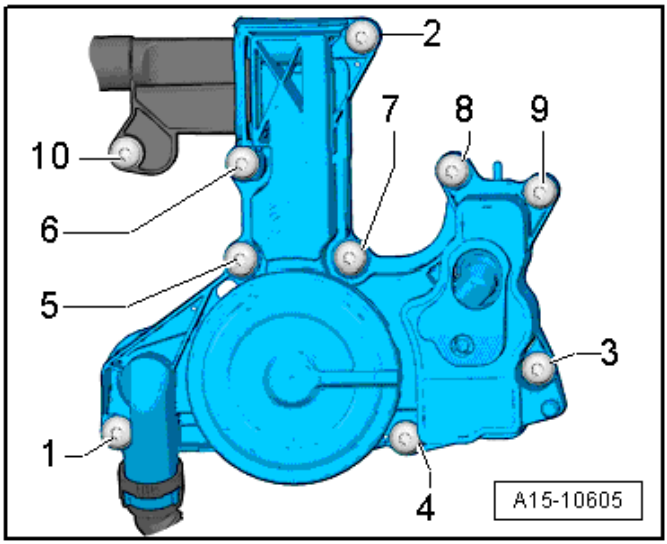
Cylinder Head Cover Tightening Specifications



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

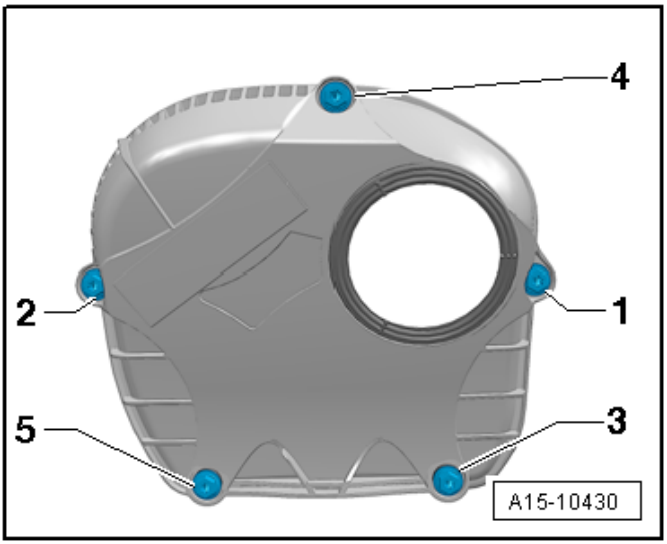
[1)] Replace fastener(s).

Crankcase Ventilation Tightening Specification



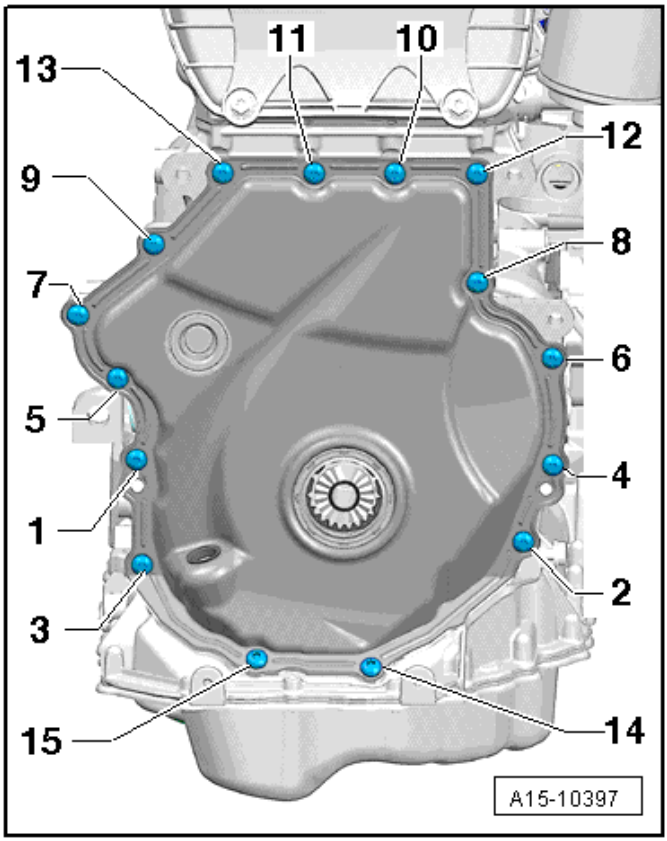
Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	11

Upper Timing Chain Cover Tightening Specification



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

Lower Timing Chain Cover Tightening Specifications



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

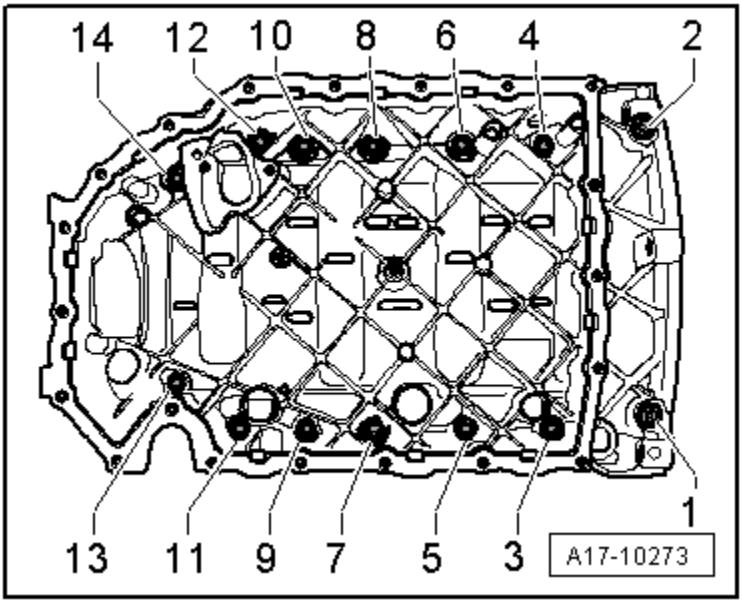
Lubrication – 2.0L CETA

Fastener Tightening Specifications

Component	Bolt Size	Nm
Chain tensioner	-	9
Engine oil cooler	-	23
Oil baffle	-	9
Oil drain plug [1)]	-	30
Oil level thermal sensor nut	-	9
Oil pressure regulation valve	-	9
Oil pressure switch	-	20
Oil pump		
	M6	9
	M8	20
Reduced oil pressure switch	-	20
Suction line	-	9

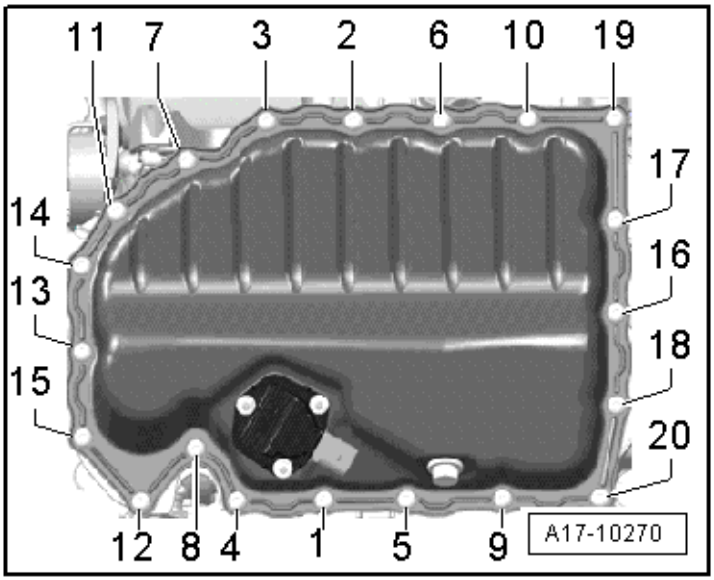
[1)] Replace fastener(s).

Upper Oil Pan Tightening Specifications



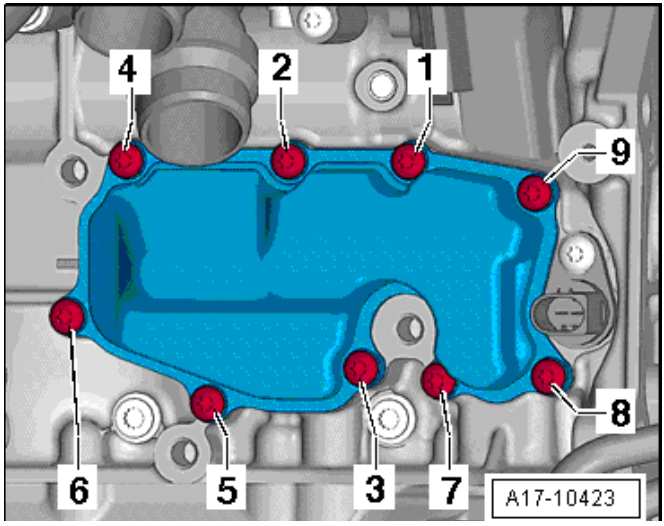
Step	Component	Nm
1	Tighten bolts 1 through 14 in sequence	Hand-tighten
2	Tighten bolts 1 through 14 in sequence	15
3	Tighten bolts 1 through 14 in sequence	an additional 90° (¼ turn)

Oil Pan Tightening Specifications



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

Oil Separator Tightening Specification



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

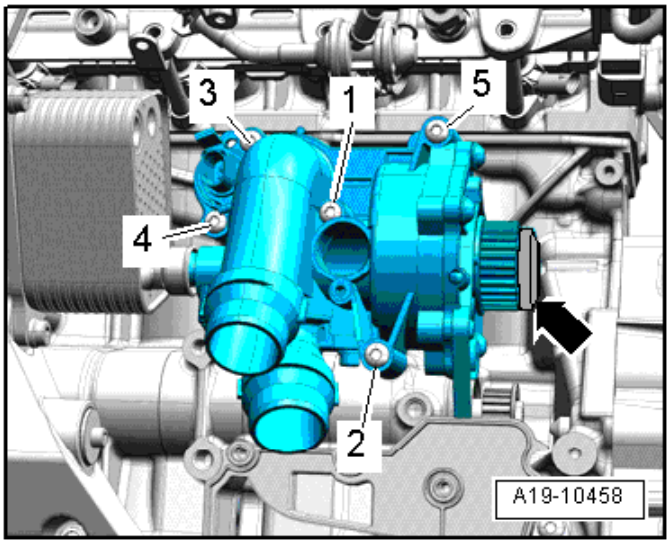
Cooling System – 2.0L CETA

Fastener Tightening Specifications

Component	Nm
After run coolant pump bracket-to-mounting bracket bolt	4
After run coolant pump mounting bracket-to-cylinder block bolt	5
Connecting piece	9
Coolant fan nut	10
Fan shroud nut/bolt	5
Front coolant pipes	5
Radiator	5
Small coolant pipe	9
Toothed belt drive gear [1)]	10 plus an additional 90° (¼ turn)
Toothed belt guard	9

[1)] Replace fastener(s).

Coolant Pump Tightening Specification



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

Fuel Supply – 2.0L CETA

Fastener Tightening Specifications

Component	Nm
Accelerator pedal module-to-body bolt	9
Air filter housing-to-bracket bolt	4
Bracket-to-body nut	4
Evaporative Emission (EVAP) canister to underbody bolt	8
Fuel filter bracket bolt	1
Leak Detection Pump (LDP) bracket bolt	4
Front Wheel Drive (FWD)	
Fuel tank filler tube-to-underbody bolt	11
Fuel tank locking ring	110
Fuel tank-to-underbody nut	20
Heat shield-to-fuel tank lock washer	3
Securing strap-to-underbody nut	20
All Wheel Drive (AWD)	
Fuel tank filler tube-to-underbody bolt	11
Fuel tank locking ring	110
Heat shield-to-underbody nut	23
Securing strap-to-underbody nut	23

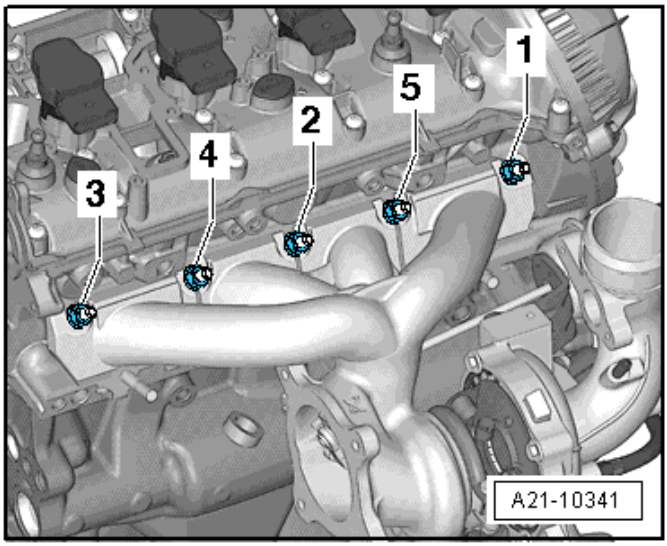
Turbocharger, G-Charger – 2.0L CETA

Fastener Tightening Specifications

Component	Nm
Air guide pipe-to-bracket	10
Charge Air Cooler (CAC) mount	5
Charge air pipe	10
Charge air pressure sensor	5
Connection	9
Coolant return line [4]	9
	35
Coolant supply line [3]	9
	35
Fastening strip nut [1] [5]	30
Oil return line	9
Oil supply line [2]	30 [5]
	9
Right air guide pipe-to-oil pan	10
Turbocharger bracket [5]	30
Turbocharger recirculating valve	7
Turbocharger vacuum diaphragm bolt	10
Turbocharger vacuum diaphragm nut [6]	9
Wastegate bypass regulator valve	3

1) Replace fastener(s).
2) For bolt tightening clarification, refer to ElsaWeb, *Turbocharger Overview Part II*, items 2, 5 and 6.
3) For bolt tightening clarification, refer to ElsaWeb, *Turbocharger Overview Part II*, items 8, 9 and 10.
4) For bolt tightening clarification, refer to ElsaWeb, *Turbocharger Overview Part III*, items 3 and 6.
5) Coat the bolt with hot bolt paste.
6) Secure with sealing wax.

Turbocharger Tightening Specifications



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

Exhaust System – 2.0L CETA

Fastener Tightening Specifications

Component	Nm
Exhaust system bracket nut/bolt	23
Front exhaust pipe with catalytic converter and front muffler nut [1) 2)]	40
Oxygen Sensors (O2S) [3)]	55
Suspended mount	23
Transverse beam	23

1) Replace fastener(s).
2) Coat turbocharger stud bolts with hot bolt paste.
3) Only use hot bolt paste to grease the threads.

Multiport Fuel Injection – 2.0L CETA

Technical Data

Engine data		**2.0L Turbo FSI Engine**
Idle speed cannot be adjusted, it is regulated by idle stabilization		640 to 800 RPM
Engine speed limitation via fuel injector shut-off		6500 RPM
Fuel pressure	Fuel supply-pressure up to high-pressure pump (is produced by an electric fuel pump in the fuel tank)	3.0 to 7.0 Bar (the same under all operating conditions)
	Fuel high pressure (produced by a mechanical single-piston pump) at approximately 85 degree coolant temperature	Approximately 40 Bar positive pressure at idle Approximately 150 Bar positive pressure at certain operating points.

Fastener Tightening Specifications

Component	**Nm**
Air filter upper section	1.5
Engine Speed (RPM) sensor	4.5
Fuel pressure sensor	27
Fuel rail	8
Fuel supply line connectors [1)]	25
Fuel supply line-to-fuel rail connections [1)]	25
Fuel supply line union nut	20
High pressure fuel line	20
High pressure pump	20
Intake Air Temperature (IAT) sensor	9
Intake manifold	9
Intake manifold support bolt	20
Intake manifold support nut	10
Knock Sensor (KS) 1	20
Oxygen Sensor (O2S)	55
Throttle valve control module	9

[1)] Replace fastener(s).

Ignition/Glow Plug System – 2.0L CETA

Technical Data

Engine data	2.0L Turbo FSI Engine
Idle speed cannot be adjusted, it is regulated by idle stabilization	640 to 800 RPM
RPM limited by switching off the fuel injectors and closing the throttle valve.	6500 RPM
Ignition timing is regulated by the control module. It is not possible to adjust the ignition timing.	
Ignition System	Single coil ignition system with 4 ignition coils (output stages integrated), that are connected directly to the spark plugs via the ignition cables; The ignition coils can be pulled out of the cylinder head using ignition coil puller -T40039-
Ignition sequence	1-3-4-2

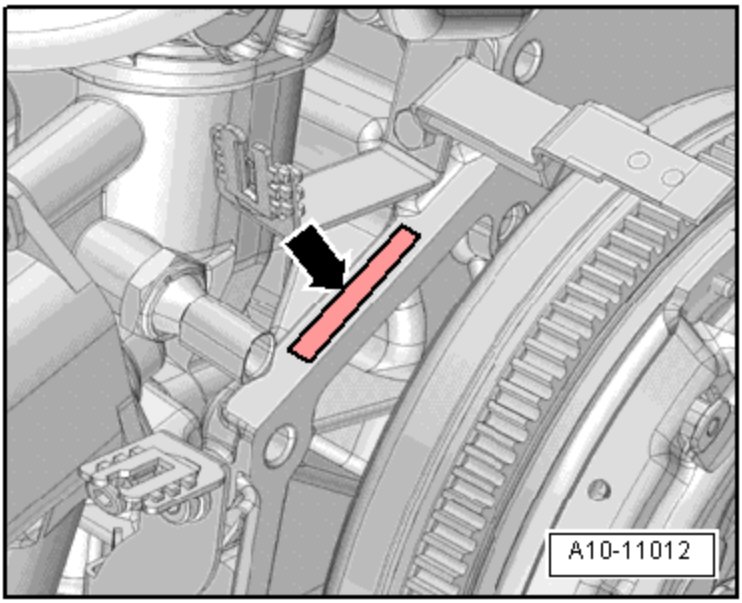
Fastener Tightening Specifications

Component	Nm
Camshaft position sensor	10
Knock sensor	20
Spark plug	30

ENGINE MECHANICAL – 2.0L CDMA

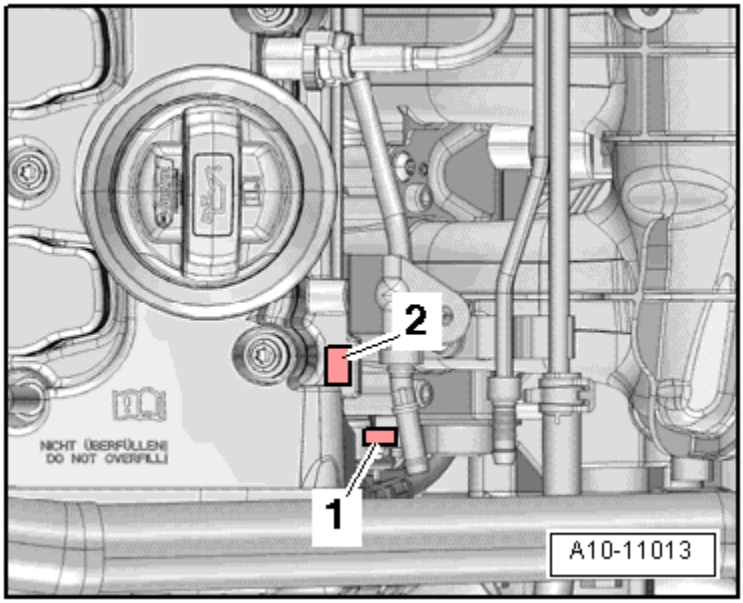
General, Technical Data

Engine Number Location



The engine number (engine code and serial number) (➡) is located where the engine/transmission are joined.

Engine Number Location *(cont'd)*



The engine codes are also stamped on the right side of the cylinder head (2) and on the cylinder block (1).

In addition, a sticker with the engine codes and serial number is affixed to the toothed belt guard.

Engine Data

Identification codes		CDMA
Displacement	liter	1.984
Output	kW at RPM	195 @ 6000
Torque	Nm at RPM	350 @ 2500 to 5250
Bore	diameter mm	82.5
Stroke	mm	92.8
Compression ratio		9.8
RON	at least	98 [1]
Ignition sequence		1-3-4-2
Emissions values		EU4
Exhaust Gas Recirculation (EGR)		No
Turbocharger		Turbocharger
Knock control		Yes
Charge Air Cooler (CAC)		Yes
Oxygen Sensor (O2S) regulation		2 sensors
Variable valve timing		Intake
Variable intake manifold		No
Secondary Air Injection (AIR) system		No
Valve per cylinder		4

[1] Super unleaded RON 95 is also permitted but performance is reduced.

Engine Assembly – 2.0L CDMA

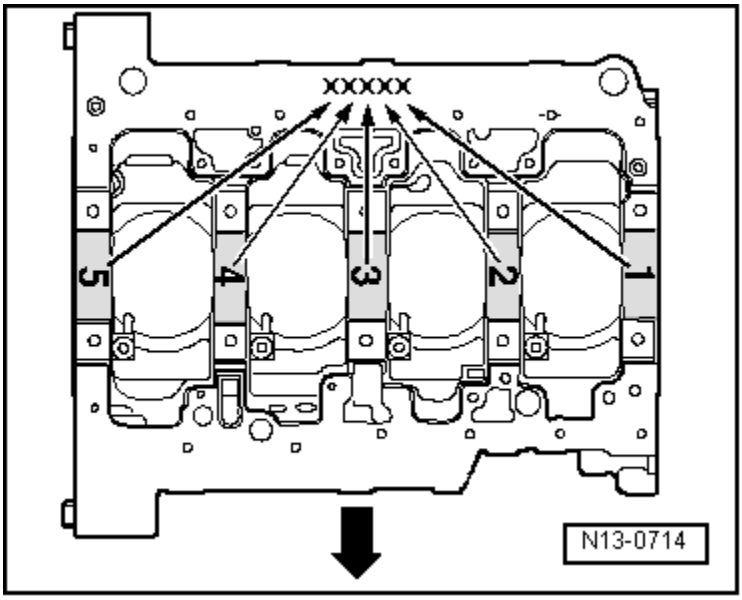
Fastener Tightening Specifications

Component	Fastener size	Nm
Bolts/nuts	M6	10
	M7	15
	M8	22
	M10	40
	M12	65
Exceptions:		
Bracket-to-body	-	20 plus an additional 90° (¼ turn)
Bracket-to-engine mount	-	20 plus an additional 90° (¼ turn)
Engine mount-to-body	-	40 plus an additional 90° (¼ turn)
Engine mount-to-engine support	-	60 plus an additional 90° (¼ turn)
Engine support-to-engine	-	45
Ground (GND) wire	-	22

1) Replace fastener(s).

Crankshaft, Cylinder Block – 2.0L CDMA

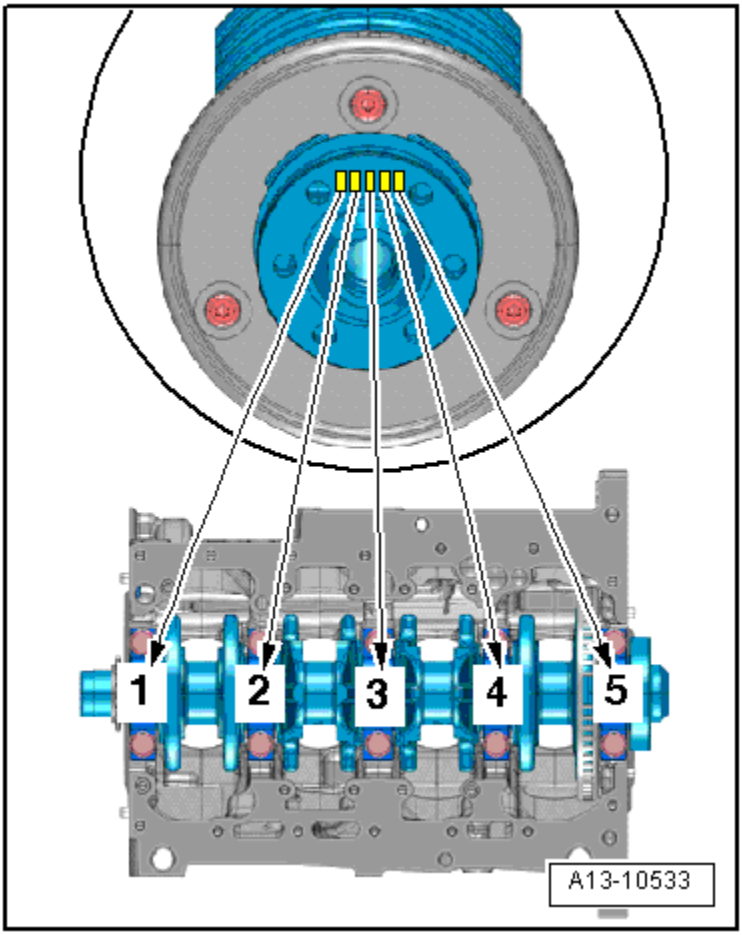
Cylinder Block Bearing Shell Identification



The upper bearing shells with the correct thickness are allocated to the cylinder block in the factory. Colored dots on the sides of the bearing shells identify the bearing shell thickness. The letters marked on the lower sealing surface of the cylinder block identify which bearing thickness must be installed in which location.

Letter on cylinder block	Color of bearing
S	Black
R	Red
G	Yellow

Bearing Cover Bearing Shell Identification



The bearing shells with correct thickness are allocated to the bearing cap at the factory. Colored dots on the sides of bearing shells identify bearing shell thickness.

The allocation of the bearing shells for the bearing cover is identified by a series of letters on the crankshaft ribbed belt sprocket flange. The first letter of the row of letters represents bearing 1, the second letter is for bearing 2, and so forth.

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

Fastener Tightening Specifications

Component	Nm
Bearing cap [1]	65 plus an additional 90° (¼ turn)
Connecting rod bearing cap[1] [2]	45 plus an additional 90° (¼ turn)
Dual mass flywheel [1]	60 plus an additional 90° (¼ turn)
Oil spray jet and pressure relief valve	27
Ribbed belt tensioning damper	23
Sensor wheel	10 plus an additional 90° (¼ turn)
Vibration damper [1]	10 plus an additional 90° (¼ turn)

[1] Replace fastener(s).
[2] Lubricate threads.

Crankshaft Dimensions

Reconditioning dimension in mm	Crankshaft bearing pin diameter		Crankshaft bearing pin diameter	
Basic dimension	54.000	-0.017 -0.037	47.800	-0.022 -0.042

Piston Ring End Gaps

Piston ring dimensions in mm	New	Wear limit
Compression ring	0.20 to 0.40	0.80
Oil scraping ring	0.25 to 0.55	0.80

Piston Ring Clearance

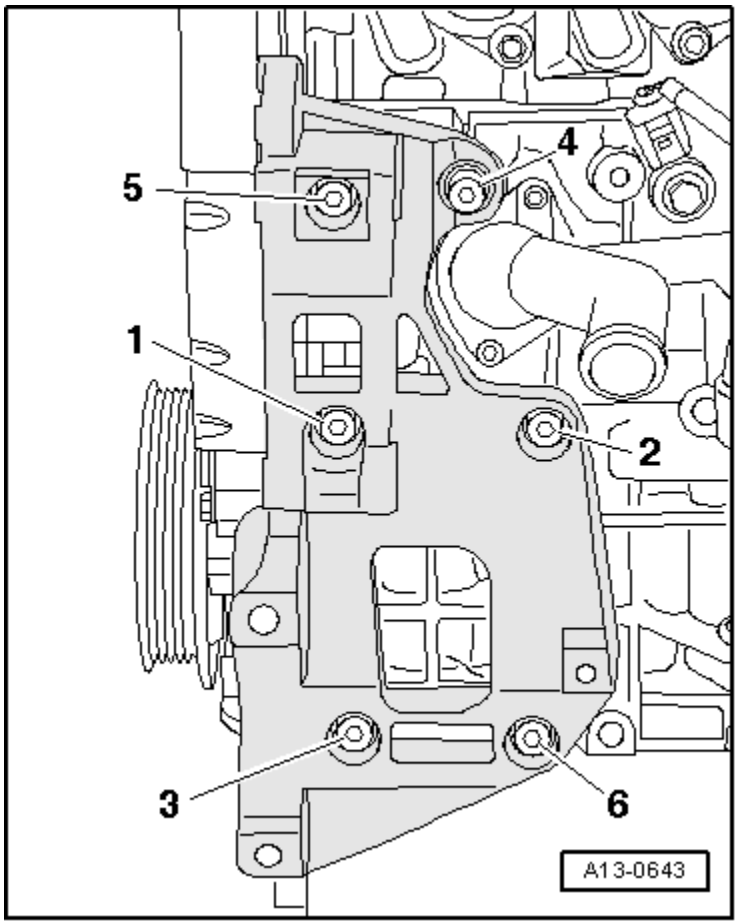
Piston ring dimensions in mm	New	Wear limit
Compression ring	0.035 to 0.075	0.015
Oil scraping ring	0.03 to 0.06	0.15

Piston and Cylinder Dimensions

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

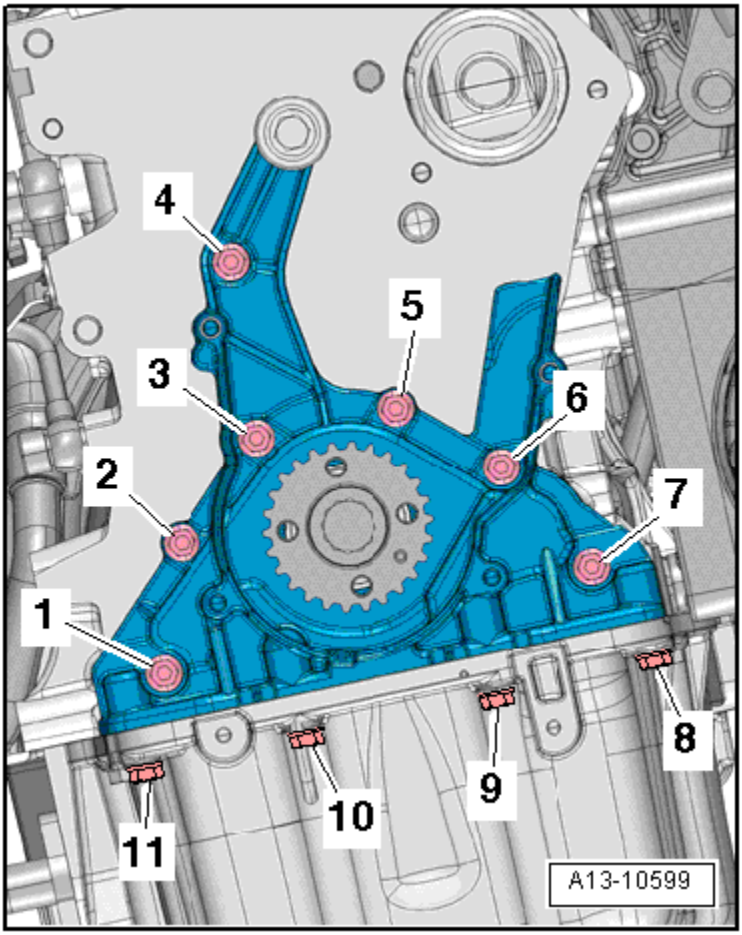
[1)] Measurements without graphite coating (thickness = 0.02 mm). The graphite coating wears off.

Accessory Assembly Bracket Tightening Specifications



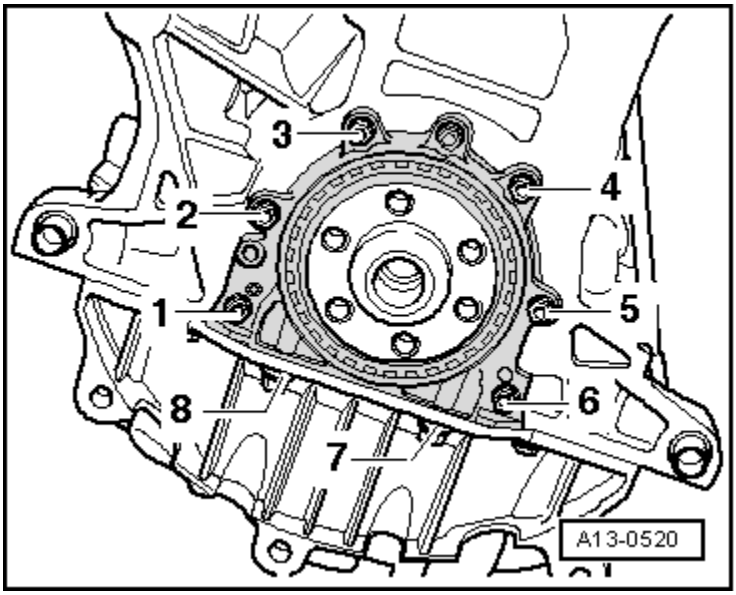
Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence	Hand-tighten
2	Tighten bolts 1 through 6 in sequence	40

Ribbed Belt Pulley Side Sealing Flange Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 11 in sequence	Hand-tighten
2	Tighten bolts 1 through 7 in stages and in sequence	15
3	Tighten bolts 8 through 11 in sequence	15

Ribbed Belt Transmission Side Sealing Flange Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	Hand-tighten
2	Tighten bolts 1 through 6 in stages and in sequence	15
3	Tighten bolts 7 and 8 in sequence	15

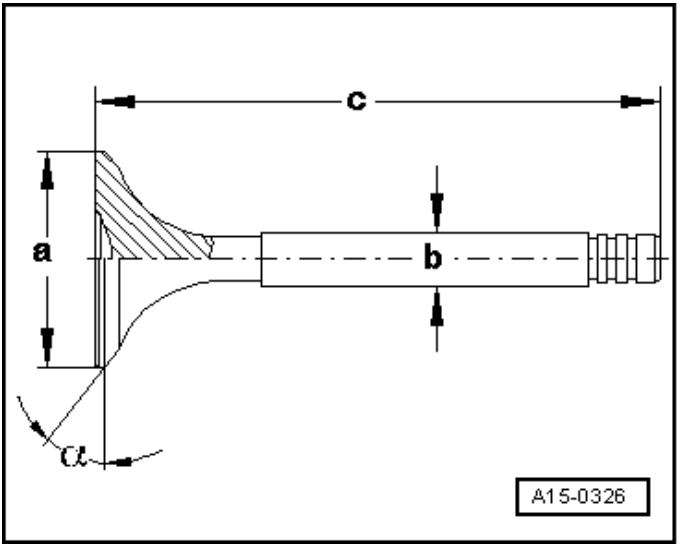
Cylinder Head, Valvetrain – 2.0L CDMA

Fastener Tightening Specifications

Component	Nm
Camshaft adjuster [1]	20 plus an additional 45° (⅛ turn)
Camshaft adjustment valve 1	4
Camshaft Position (CMP) sensor	9
Camshaft sprocket [1]	50 plus an additional 180° (½ turn)
Chain tensioner [1]	9
Coolant pump	15
Crankshaft toothed belt sprocket [1]	90 plus an additional 90° (¼ turn)
Damper roller	23
Drive chain housing	9
Engine lifting eye	23
Exhaust manifold threaded pin	17
Harness mount	9
Intake manifold threaded pin	9
Lower toothed belt guard	9
Pressure regulator valve	4
Rear toothed belt guard [2]	9
Tensioning roller nut	23
Tensioning roller threaded pin	15
Toothed belt camshaft gear [1]	50 plus an additional 180° (½ turn)
Upper toothed belt guard	9

[1] Replace fastener(s).
[2] Insert using locking compound, refer to the Electronic Parts Catalog (ETKA).

Valve Dimensions



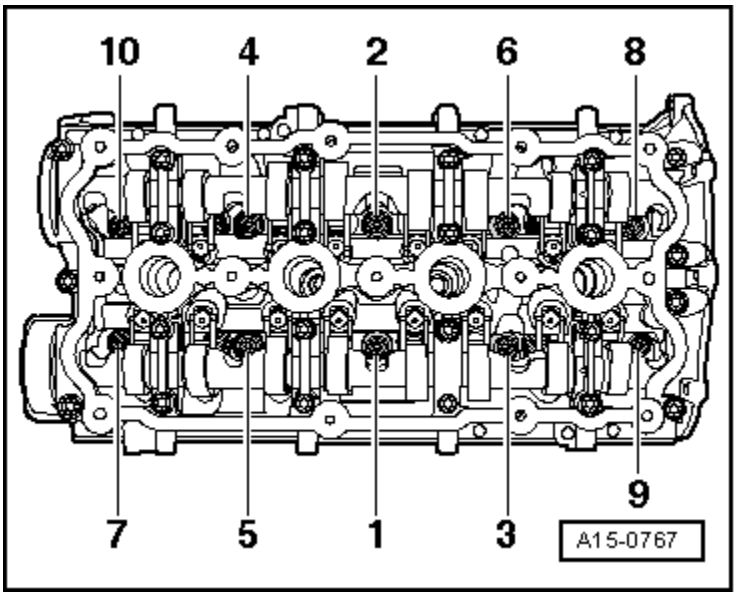
Dimension		Intake valve	Exhaust valve
Diameter a	mm	33.85 ± 0.10	28.0 ± 0.1
Diameter b	mm	5.98 ± 0.01	5.96 ± 0.01
c	mm	104.0 ± 0.2	101.9 ± 0.2
α	∠°	45	45

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

Compression Pressures

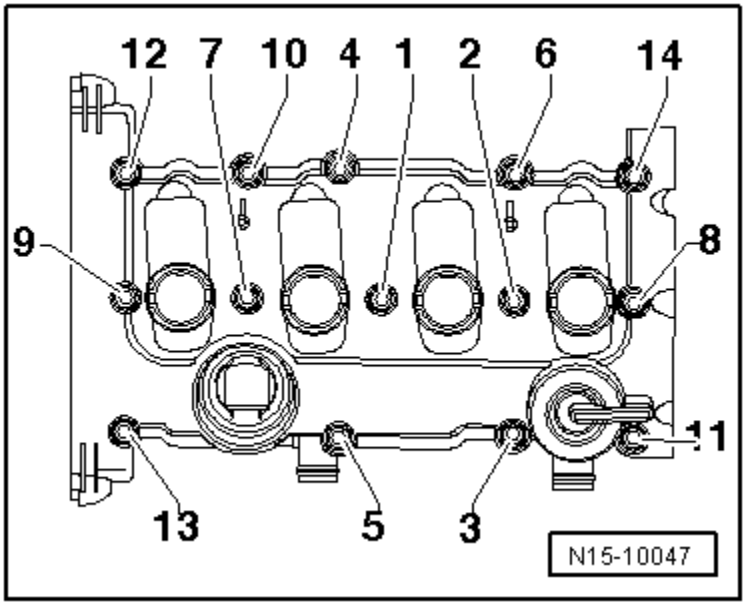
New Bar positive pressure	Wear limit Bar positive pressure	Difference between cylinders Bar positive pressure
10.0 to 14.0	7.0	Maximum 3.0

Cylinder Head Tightening Specifications



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

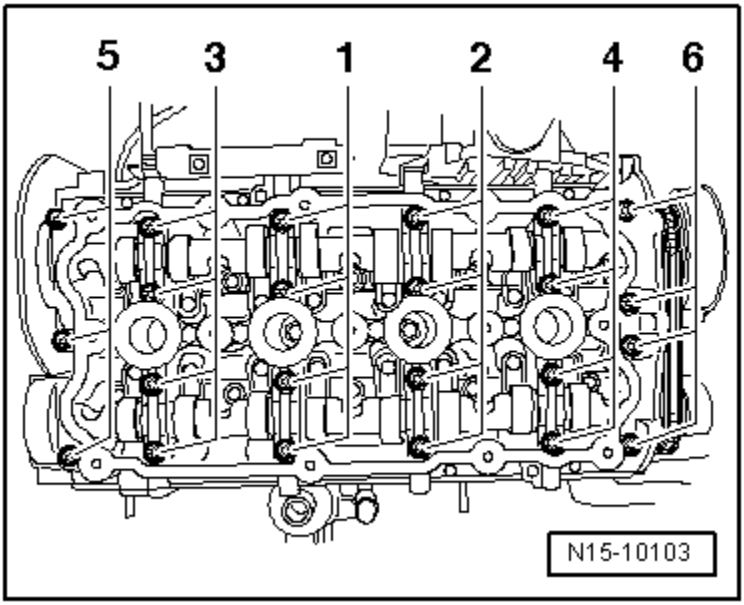
Cylinder Head Cover Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 14 in sequence	Hand-tighten
2	Tighten bolts 1 through 14 in sequence	10

1) Replace fastener(s).

Guide Frame Tightening Specifications



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

[1] The guide frame must be in contact with the entire contact surface of the cylinder head.

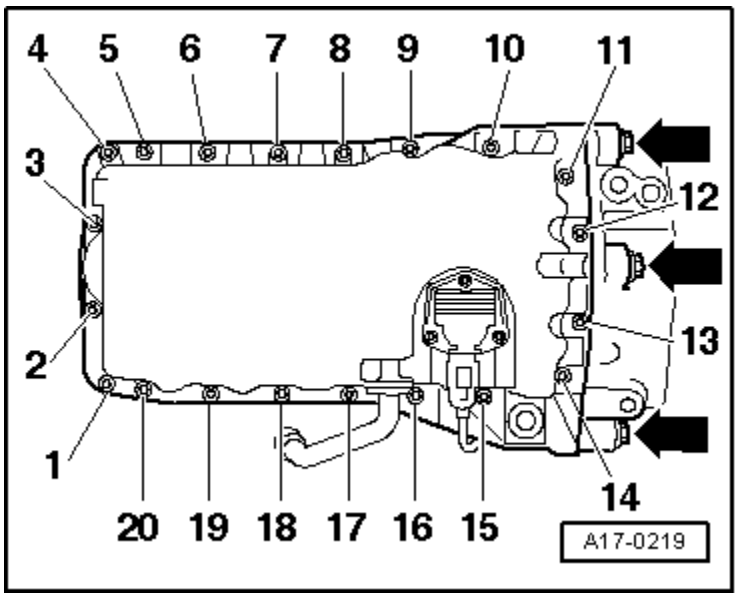
Lubrication – 2.0L CDMA

Fastener Tightening Specifications

Component	Nm
Chain sprocket [1)]	20 plus an additional 90° (¼ turn)
Chain tensioner with tensioning rail	15
Oil baffle	9
Oil cooler bracket	15
Oil dipstick guide tube	9
Oil drain plug	30
Oil filter bracket	15
Oil intake pipe	8
Oil level thermal sensor	9
Oil pressure switch	21
Oil pump cover	8
Oil return pipe	9

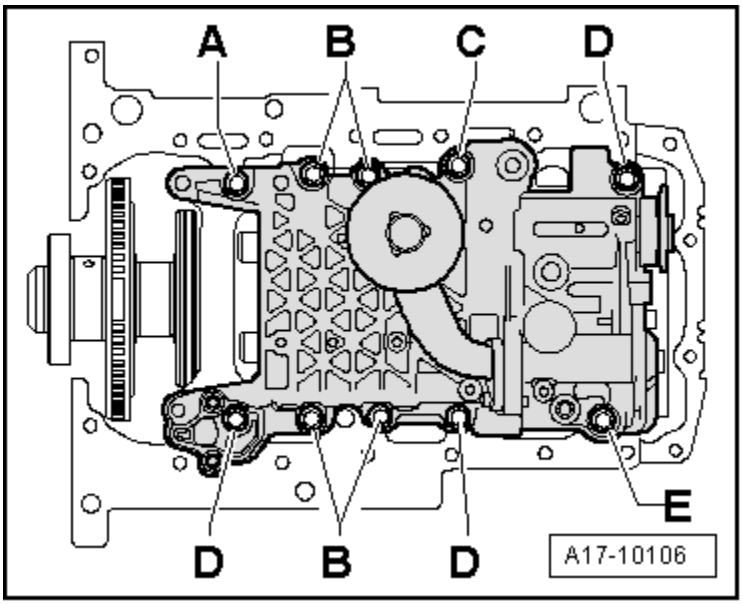
[1)] Replace fastener(s).

Oil Pan Tightening Specifications



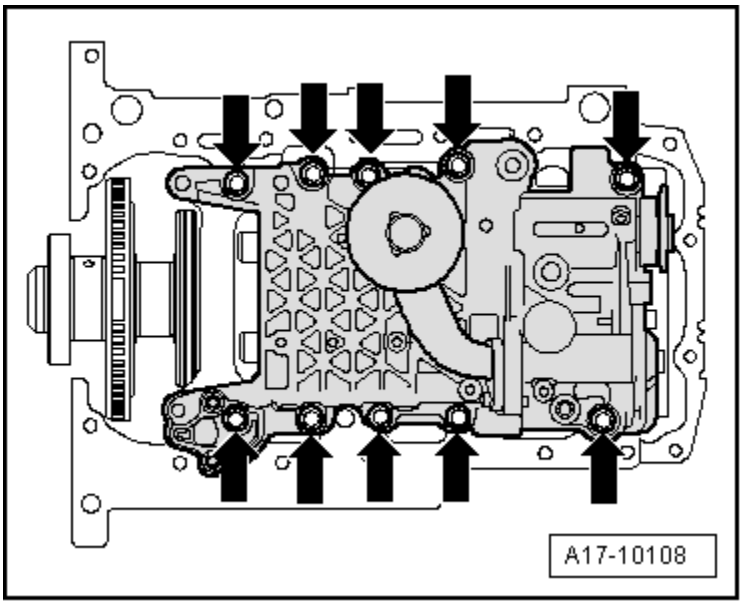
Step	Component	Nm
1	Tighten bolts 1 through 20 in sequence	5
2	Tighten bolts (➡)	40
3	Tighten bolts 1 through 20 in sequence	15

Balance Shaft Housing Bolts



Item	Component	Fastener size
A	Collar bolt	M7 x 40
B	Collar bolt	M7 x 70
C	Collar bolt	M7 x 90
D	Collar bolt	M7 x 55
E	Sealing plug with O-ring	

Balance Shaft Housing Tightening Specifications



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

Cooling System – 2.0L CDMA

Fastener Tightening Specifications

Component	Nm
After run coolant pump bracket	9
After run coolant pump-to-bracket	4
Coolant connection	9
Coolant fan nut	10
Coolant pump	15
Coolant thermostat with housing	9
Coolant ventilation line [1)]	9
	23
	40
Fan rib	5
Front coolant pipe 1	9
Front coolant pipe 2	9
Radiator	5
Right front coolant pipe bolt	6
Right front coolant pipe nut	9

[1)] For bolt tightening clarification, refer to ElsaWeb, *Coolant Pipes Overview*, items 3, 4, and 6.

Fuel Supply – 2.0L CDMA

Fastener Tightening Specifications

Component	Nm
Accelerator pedal module-to-body bolt	9
Air filter housing-to-bracket bolt	4
Bracket-to-body nut	4
Leak Detection Pump (LDP) bracket bolt	4
Evaporative Emission (EVAP) canister-to-underbody bolt	8
Fuel filter bracket bolt	1
Front Wheel Drive (FWD)	
Fuel tank filler tube-to-underbody bolt	11
Fuel tank locking ring	110
Fuel tank-to-underbody nut	20
Heat shield-to-fuel tank lock washer	3
Securing strap-to-underbody nut	20
All Wheel Drive (AWD)	
Fuel tank filler tube-to-underbody bolt	11
Fuel tank locking ring	110
Heat shield-to-underbody nut	23
Securing strap-to-underbody nut	23

Turbocharger, G-Charger – 2.0L CDMA

Fastener Tightening Specifications

Component	Nm
Air guide pipe nut/bolt	10
Bracket-to-turbocharger [5) 6)]	30
Bracket-to-turbocharger [7)]	23
Charge Air Cooler (CAC) bearings	5
Charge air pressure sensor	5
Connection	7
Coolant supply pipe bolt	23
Coolant supply pipe banjo bolt	35
Fastening strip [1) 2)]	30
Heat shield	9
Oil return pipe [3)]	9
Oil return pipe banjo bolt [4)]	35
Oil return pipe bolt [4)]	9
Oil supply pipe banjo bolt	30
Oil supply pipe bolt	9
Ring connection banjo bolt	8
Turbocharger nut [1) 2)]	21
Turbocharger recirculating valve	7
Turbocharger vacuum diaphragm bolts [1)]	9
Turbocharger vacuum diaphragm lock nut [8)]	9
Wastegate bypass regulator valve	3

1) Replace fastener(s).
2) Coat the exhaust manifold threaded pins with hot bolt paste.
3) For bolt tightening clarification, refer to ElsaWeb, *Turbocharger Overview Part II*, items 13, 16 and 18.
4) For bolt tightening clarification, refer to ElsaWeb, *Turbocharger Overview Part III*, items 3, 5 and 6.
5) For bolt tightening clarification, refer to ElsaWeb, *Turbocharger Overview Part III*, items 8 and 9.
6) Insert with hot bolt paste.
7) For bolt tightening clarification, refer to ElsaWeb, *Turbocharger Overview Part III*, items 11 and 12.
8) Secure with sealing wax after tightening.

Exhaust System – 2.0L CDMA

Fastener Tightening Specifications

Component	Nm
Clamping sleeve nut	23
Exhaust door valve bolt/nut	23
Exhaust system bracket nut	23
Front exhaust pipe with catalytic converter and front muffler [1) 2)]	40
Rear muffler bracket bolt/nut	23
Suspended mount	23
Tunnel brace	23

1) Replace fastener(s).
2) Coat the threaded pin with hot bolt paste.

Fuel Injection and Ignition – 2.0L CDMA

Technical Data

Engine data		2.0L Turbo FSI engine
Idle speed cannot be adjusted, it is regulated by idle stabilization		640 to 800 RPM
Engine speed limitation via fuel injector shut-off		6500 RPM
Fuel pressure	Fuel supply-pressure up to high-pressure pump, (is produced by an electric fuel pump in the fuel tank)	Approximately 6.0 Bar positive pressure (same under all operating conditions)
	Fuel high pressure (produced by a mechanical single-piston pump) at approximately 85 degree coolant temperature	Approximately 50 Bar positive pressure at idle Approximately 110 Bar positive pressure at certain operating points.

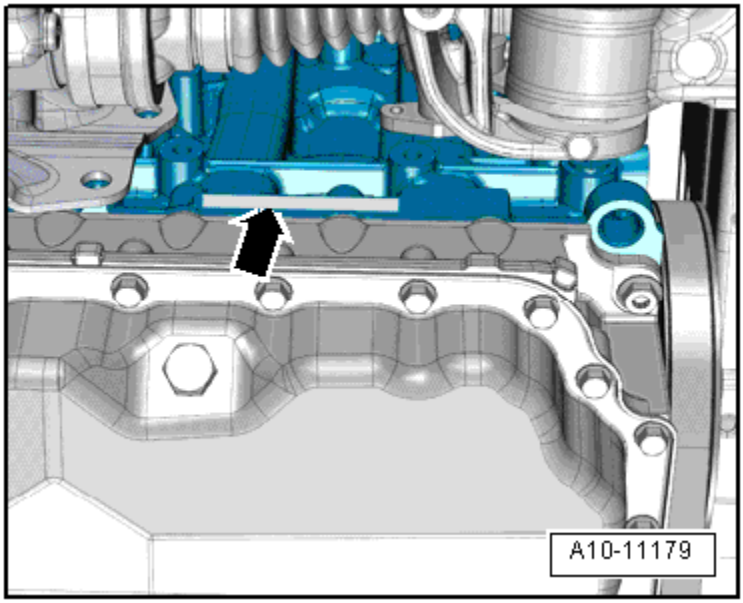
Fastener Tightening Specifications

Component	Nm
Air filter housing bracket bolts	10
Air filter housing bolts	5
Camshaft Position (CMP) sensor	10
Front air guide bolt	2
Fuel pressure sensor	20
Fuel supply line connection on the fuel rail	27
Fuel supply line connectors	30
High pressure pump bolts	10
Intake Air Temperature (IAT) sensor	5
Intake Air Temperature (IAT) sensor 2	5
Intake flap motor bolts	7
Intake manifold bolts	9
Intake manifold support bolt	23
Knock Sensor (KS) bolts	20
Low fuel pressure sensor	15
Mass Air Flow (MAF) sensor	3
Oxygen Sensors (O2S)	55
Retaining pin	10
Spark plug	30
Throttle valve control module	7

ENGINE MECHANICAL – 2.5L CEPB

General, Technical Data

Engine Number



The engine number (engine codes and serial number) are found behind the joint for the cylinder block and upper oil pan section (➡). There is also a label located on the right timing chain cover with the engine code and serial number.

Engine Data

Identification codes		CEPB
Displacement	liter	2,480
Output	kW at RPM	265 @ 5700 to 6300
Torque	Nm at RPM	465 @ 1750 to 5300
Bore	diameter mm	82.5
Stroke	mm	92.8
Compression ratio		10
RON	at least	98 [1]
Fuel injection and ignition system		Bosch Motronic
Ignition sequence		1-2-4-5-3
Exhaust Gas Recirculation (EGR)		No
Exhaust temperature control		1 sensors
Turbocharger		Turbocharger
Knock control		2 sensors
Charge Air Cooler (CAC)		Yes
Oxygen Sensor (O2S) regulation		1 sensor before the catalytic converter 1 sensor after the catalytic converter
Variable valve timing		Intake Exhaust
Variable intake manifold		Yes
Secondary Air Injection (AIR) system		No
Valve per cylinder		4

[1] Super unleaded RON 95 is also permitted but performance is reduced.

Engine Assembly – 2.5L CEPB

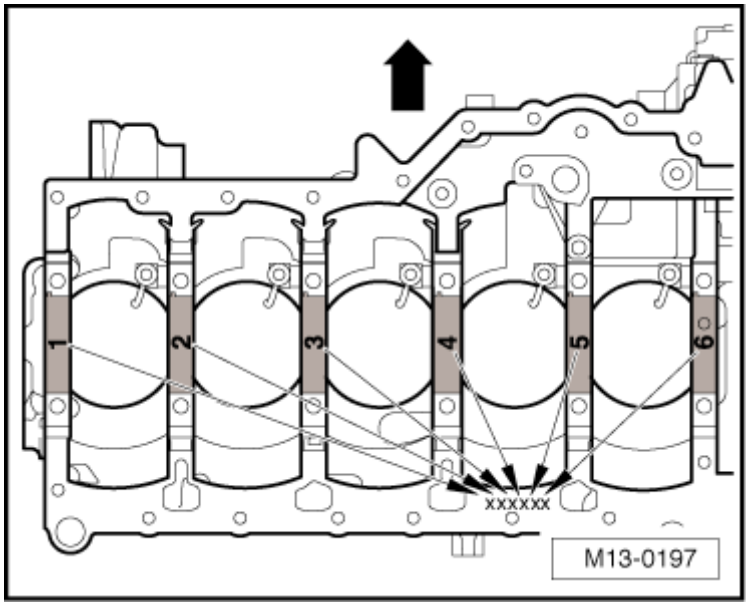
Fastener Tightening Specifications

Component	Fastener size	Nm
Bolts/nuts	M6	10
	M7	15
	M8	22
	M10	40
	M12	65
Evaporative Emission (EVAP) canister bracket [2]		
-Bolt [1]	-	40 plus an additional 90° (¼ turn)
-Nut	-	8
Engine mount [1]	-	40 plus an additional 90° (¼ turn)
Engine mount bracket [1]	-	20 plus an additional 90° (¼ turn)

[1] Replace fastener(s).
[2] For bolt tightening clarification, refer to ElsaWeb, *Subframe Overview*, items 3 and 5.

Crankshaft, Cylinder Block – 2.5L CEPB

Allocation of Crankshaft Bearing Shells for Cylinder Block

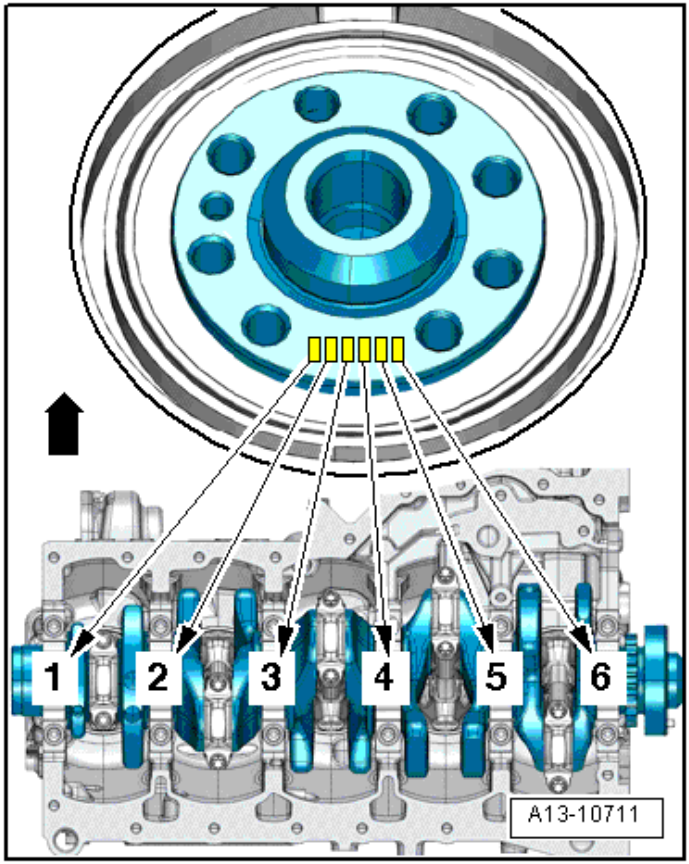


The bearing shells with the correct thickness are allocated to the cylinder block in the factory. The colored dots on the sides of the bearing shells identify the bearing shell thickness. The letters marked on the lower sealing surface of the cylinder block identify which bearing thickness must be installed in which location.

NOTE: The arrow points in direction of travel.

Letter on cylinder block	Color of bearing
G	Yellow
B	Blue
W	White

Allocation Crankshaft Bearing Shells for the Bearing Cover



Bearing shells with correct thickness are allocated to bearing cap at the factory. The colored dots on the sides of the bearing shells identify bearing shell thickness. The allocation of the bearing shells for the bearing cover is identified by a series of letters on the crankshaft ribbed belt sprocket flange. The first letter of the row of letters represents bearing 1, the second letter is for bearing 2, and so forth.

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

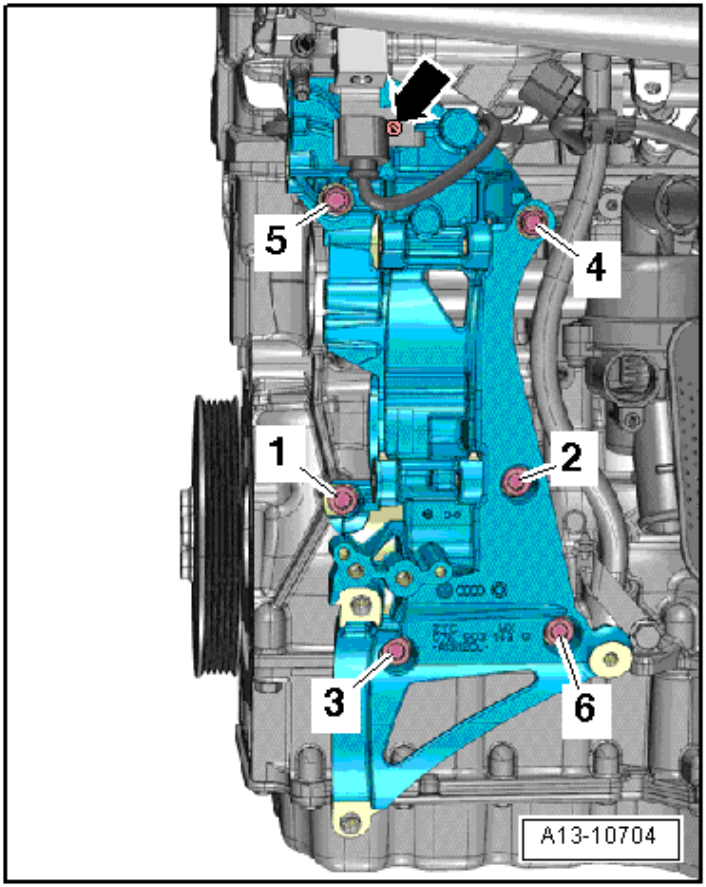
Fastener Tightening Specifications

Component	Nm
A/C compressor ribbed belt tensioning element	35
Bearing cap [1]	40 plus an additional 90° (¼ turn)
Connecting rod bearing cap [1]	45 plus an additional 90° (¼ turn)
Coolant pump	9
Dual mass flywheel [1]	60 plus an additional 90° (¼ turn)
Idler roller [2]	8
	23
Oil spray jet	27
TDC locking bolt- marking	45
Tensioning element for ribbed belt for generator and coolant pump	35
Vibration damper [1]	50 plus an additional 90° (¼ turn)

[1] Replace fastener(s).

[2] For bolt tightening clarification, refer to ElsaWeb, *Ribbed Belt Drive and Accessory Assembly Bracket Overview*, items 12 and 20.

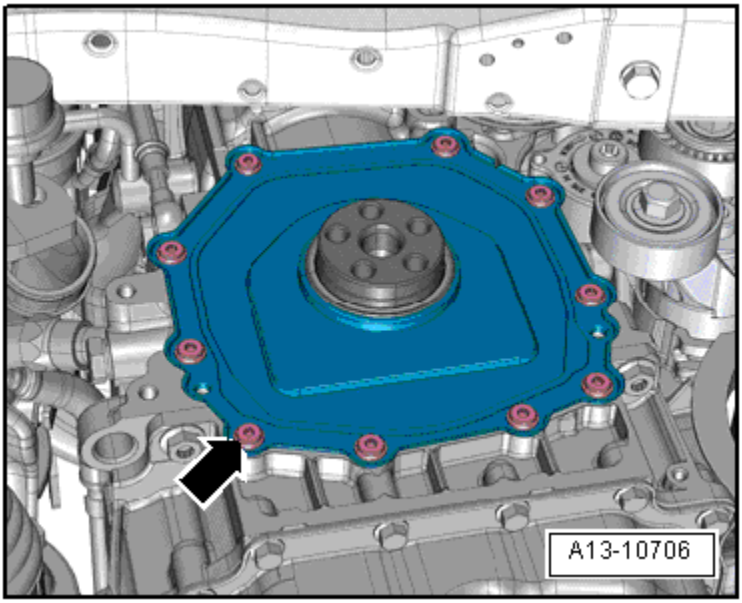
Accessory Assembly Bracket Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence [1)]	Hand-tighten
2	Tighten bolts 1 through 6 in sequence	9

[1)] Replace fastener(s) 1, 2, 3, 6 = M8 x 30, 4 = M8 x 60, 5 = M8 x 110.

Ribbed Belt Pully Side Sealing Flange Tightening Specifications



Step	Component	Nm
1	Tighten bolts (➡) in a diagonal sequence	Hand-tighten
2	Tighten bolts (➡) in stages and in a diagonal sequence	9

Crankshaft Dimensions

Honing dimension	Crankshaft bearing pin diameter mm		Crankshaft connecting rod journal diameter mm	
Basic dimension	58.000	-0.022 -0.042	47.800	-0.022 -0.042

Piston Ring Gap

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

Piston Ring Groove Clearance

Piston ring dimensions in mm	Ring to Groove Clearance	
	New	Wear limit
Compression rings	0.06 to 0.09	0.20
Oil scraping ring	0.03 to 0.06	0.15

Piston and Cylinder Dimensions

Honing dimension in mm	Piston diameter	Cylinder bore diameter
Basic dimension	82.451 [1)]	82.510

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

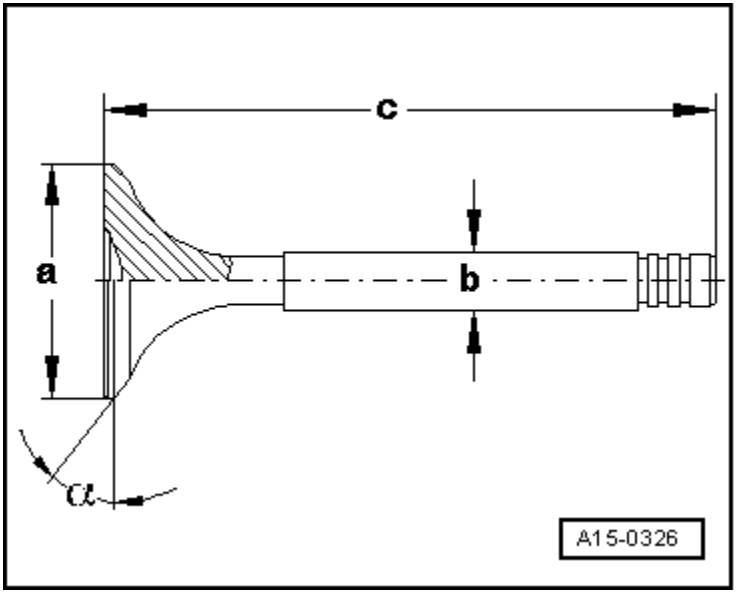
Cylinder Head, Valvetrain – 2.5L CEPB

Fastener Tightening Specifications

Component	Nm
Axial bearing disc	9
Camshaft adjustment valve 1	2.4
Camshaft timing chain drive chain sprocket [1)]	60 plus an additional 90° (¼ turn)
Camshaft timing chain tensioner	9
Chain tensioner	9
Crankcase ventilation housing	3.2
Drain plug (side of cylinder head) [1)]	15
Drain plug (top of cylinder head)	35
Engine cover and connectors bracket bolt/nut	8
Engine lifting eye	22
Exhaust camshaft adjuster [1)]	60 plus an additional 90° (¼ turn)
Exhaust camshaft adjustment valve 1	2.4
Intake camshaft adjuster [1)]	60 plus an additional 90° (¼ turn)
Mounting pin	40
Oil pump drive sprocket [1)]	20 plus an additional 90° (¼ turn)
Oil spray jet bolt with check valve	27

[1)] Replace fastener(s).

Valve Dimensions

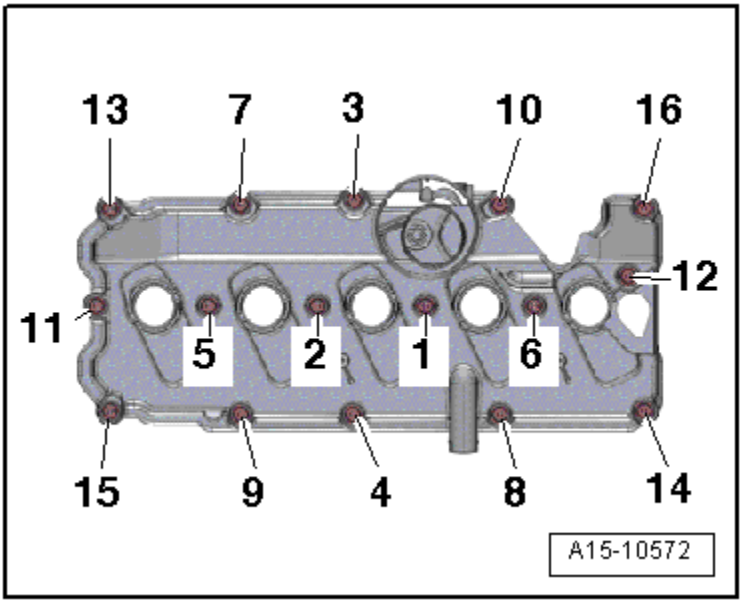


Dimension		Intake valve	Exhaust valve
Diameter a	mm	33.85 ± 0.10	28.0 ± 0.1
Diameter b	mm	5.965 ± 0.005	5.955 ± 0.007
c	mm	103.97 ± 0.20	101.87 ± 0.20
α	∠°	45	45

Compression Pressures

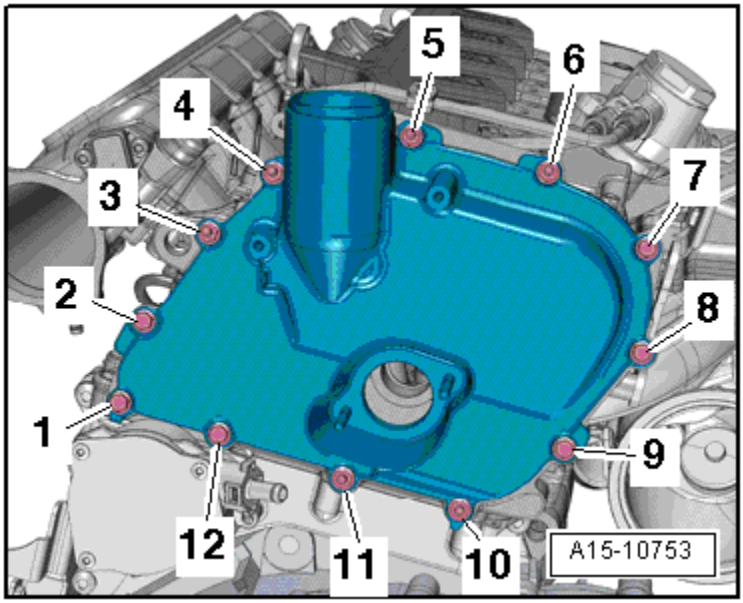
Compression pressure	Bar pressure
New	10.0 to 14.0
Wear limit	7.0
Maximum difference between cylinders	3.0

Cylinder Head Cover Tightening Specifications



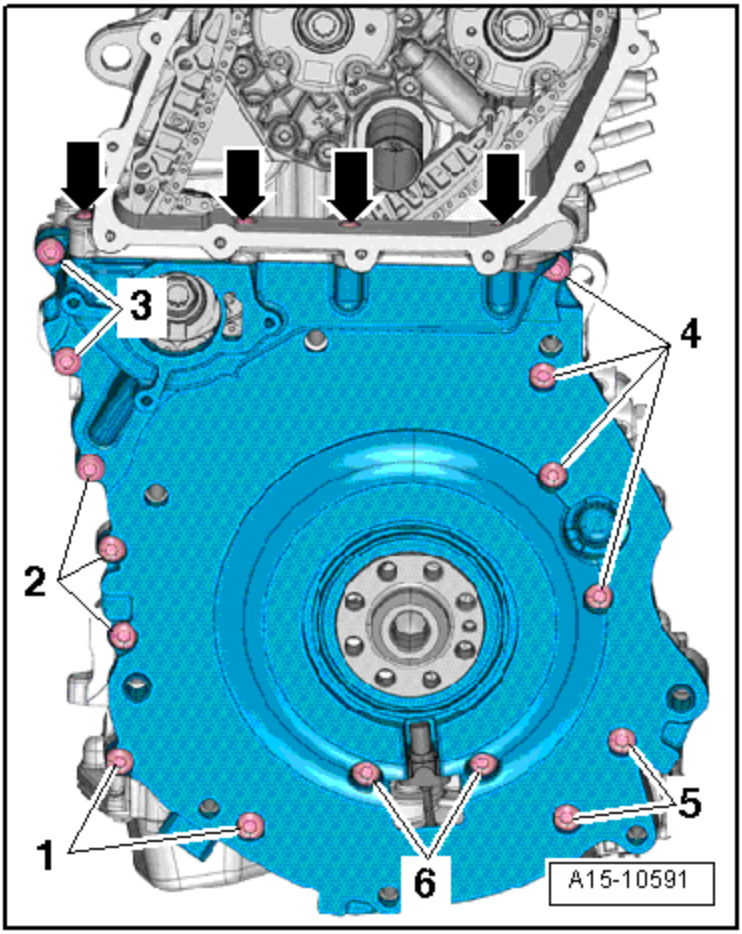
Step	Component	Nm
1	Tighten bolts 1 through 16 in sequence	Hand-tighten
2	Tighten bolts 1 through 16 in sequence	10

Upper Timing Chain Cover Tightening Specifications



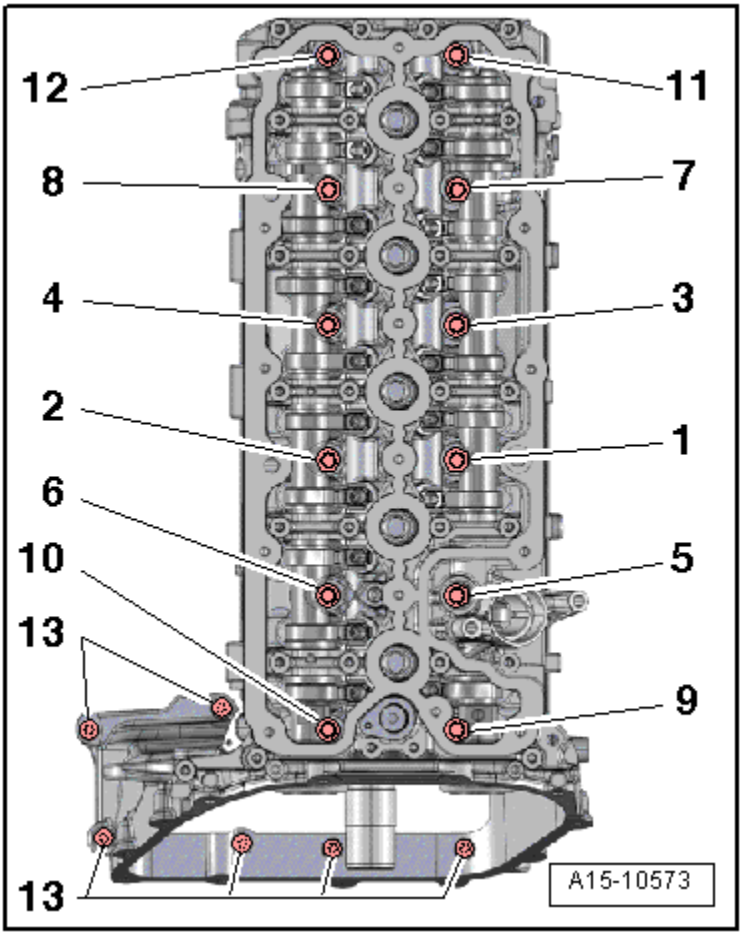
Step	Component	Nm
1	Tighten bolts 1 through 12 in sequence	Hand-tighten
2	Tighten bolts 1 through 12 in sequence	9

Lower Timing Chain Cover Tightening Specifications



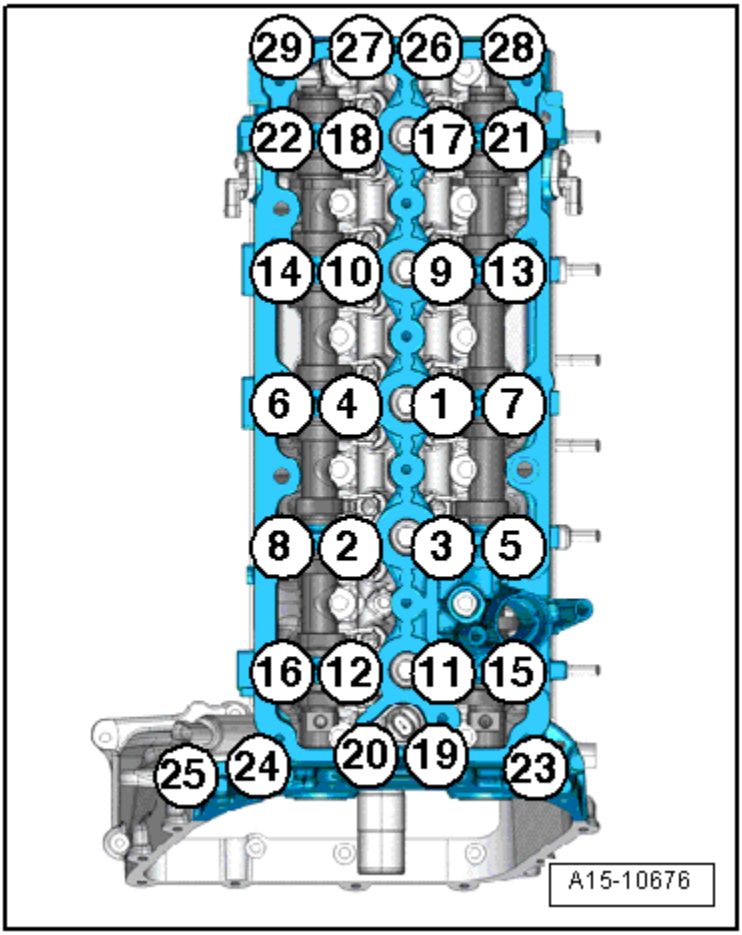
Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence	Hand-tighten
2	Tighten bolts (➡)	5
3	Tighten bolts 1 through 6 in sequence	8
4	Tighten bolts (➡)	8
5	Tighten bolts 1 through 6 in sequence	20
6	Tighten bolts (➡)	an additional 90° (¼ turn)

Cylinder Head Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 12 in sequence	10
2	Tighten bolts 1 through 12 in sequence	40
3	Tighten bolts 1 through 12 in sequence	an additional 90° (¼ turn)
4	Tighten bolts 1 through 12 in sequence	an additional 90° (¼ turn)
5	Tighten bolts 13	8
6	Tighten bolts 1 through 12 in sequence	an additional 90° (¼ turn)

Guide Frame Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 29 in sequence [1)]	Hand-tighten
2	Tighten bolts 1 through 29 in several steps and in sequence	8
3	Tighten bolts 1 through 29 in sequence	an additional 90° (¼ turn)

[1)] The guide frame must be in contact with the entire contact surface of the cylinder head.

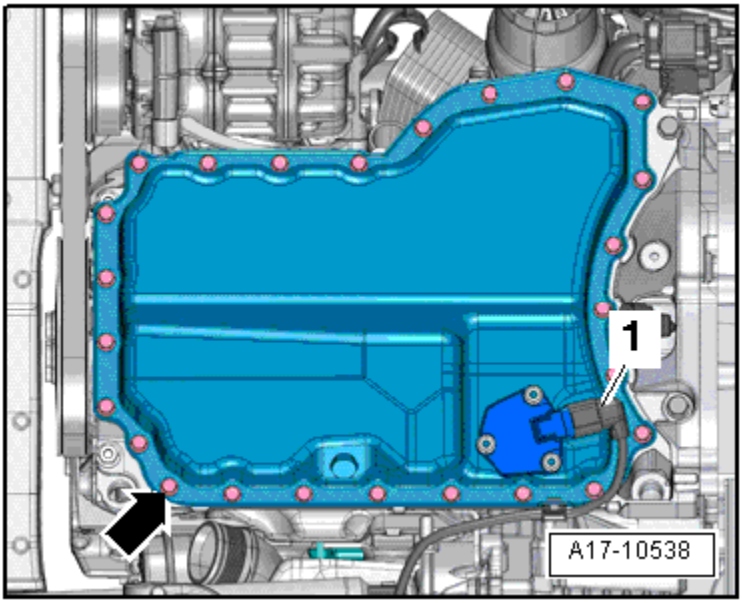
Lubrication – 2.5L CEPB

Fastener Tightening Specifications

Component	Nm
Bracket-to-lower oil pan nut	9
Engine oil cooler	20
Oil dipstick guide tube	
- M6	9
- M8	23
Oil drain plug	25
Oil filter bracket	20
Oil intake pipe	9
Oil intake pipe retaining plate	9
Oil level thermal sensor nut	9
Oil pressure regulation valve (N428 from September 2010)	9
Oil pressure switch (F1) or Reduced oil pressure switch (F378)	20
Oil pressure switch (F22 from September 2010)	20
Oil pump	20
Oil pump drive sprocket [1)]	20 plus an additional 90° (¼ turn)
Oil return connection	9

[1)] Replace fastener(s).

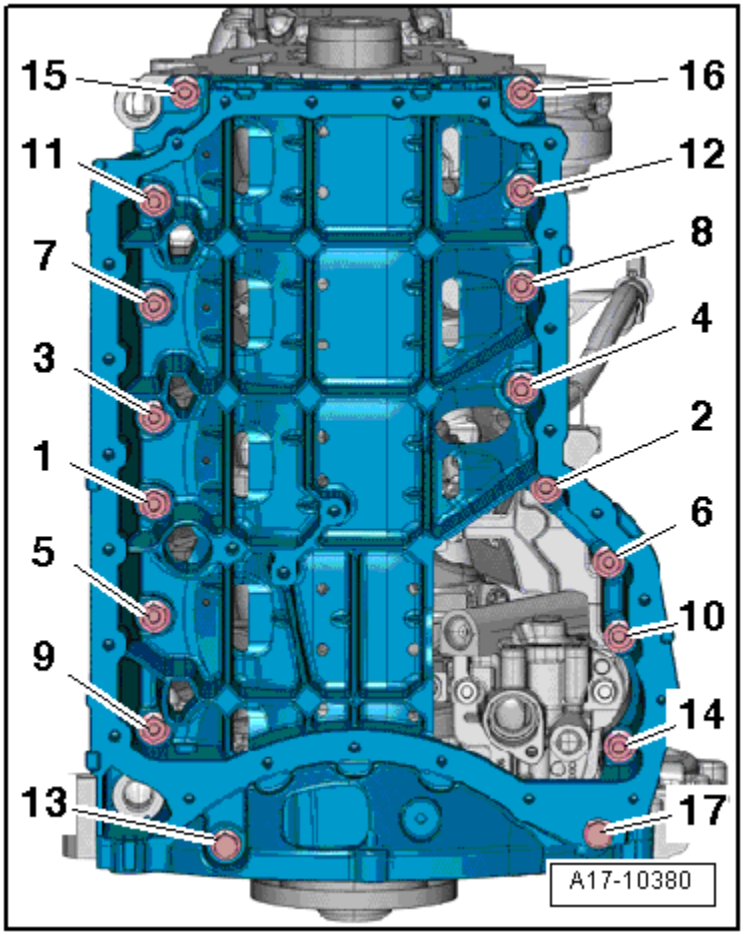
Oil Pan Tightening Specifications



Step	Component	Nm
1	Tighten bolts (➡) in a diagonal sequence [1)]	Hand-tighten
2	Tighten bolts (➡) in a diagonal sequence	8
3	Tighten bolts (➡) in a diagonal sequence	an additional 45° (⅛ turn)

[1)] Replace fastener(s).

Upper Section of Oil Pan Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 17 in sequence [1]	Hand-tighten
2	Tighten bolts 1 through 17 in sequence	20
3	Tighten bolts 1 through 17 in sequence	an additional 90° (¼ turn)

[1] Replace fastener(s).

Cooling System – 2.5L CEPB

Fastener Tightening Specifications

Component	Nm
After run coolant pump	9
Air guide	6.5
Coolant circuit solenoid valve	9
Coolant connection nut	9
Coolant distribution housing	9
Coolant fan nut	10
Coolant pump	9
Coolant thermostat with housing	6
Fan shroud	5
Front coolant pipe	9
Front coolant pipe clamp	9
Left auxiliary cooler lower bracket nut	8
Left auxiliary cooler upper bracket	8
Left coolant pipe nut	9
Radiator bracket	5
Right auxiliary cooler	6.5
Right auxiliary cooler lower bracket [1)]	6
	8
Right coolant pipe	9

[1)] For bolt tightening clarification, refer to ElsaWeb, *Radiator and Coolant Fan Overview*, items 12 and 14.

Fuel Supply – 2.5L CEPB

Fastener Tightening Specifications

Component	Nm
Accelerator pedal module-to-body bolt	9
Air filter housing-to-bracket bolt	4
Bracket-to-body nut	4
Evaporative Emission (EVAP) canister-to-underbody bolt	8
Fuel filter bracket bolt	1
Leak Detection Pump (LDP) bracket bolt	4
Front Wheel Drive (FWD)	
Fuel tank filler tube-to-underbody bolt	11
Fuel tank locking ring	110
Fuel tank-to-underbody nut	20
Heat shield-to-fuel tank lock washer	3
Securing strap-to-underbody nut	20
All Wheel Drive (AWD)	
Fuel tank filler tube-to-underbody bolt	11
Fuel tank locking ring	110
Heat shield-to-underbody nut	23
Securing strap-to-underbody nut	23

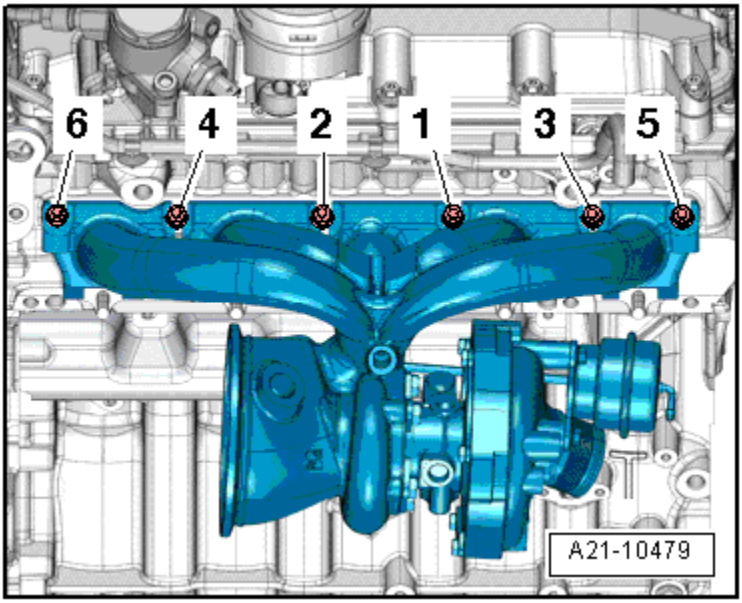
Turbocharger, G-Charger – 2.5L CEPB

Fastener Tightening Specifications

Component	Nm
Air guide pipe	9
Charge Air Cooler (CAC) bracket	5
Charge air pressure sensor (G31)/Intake Air Temperature (IAT) sensor 2 (G299)	9
Crankcase ventilation connecting piece	9
Coolant supply and return pipe banjo bolts	37.5
Coolant supply and return pipe bolts	9
Hose-to-air guide pipe banjo bolt	15.5
Left air guide pipe	9
Oil return pipe	9
Oil supply pipe banjo bolt	37.5
Oil supply pipe bolt	9
Right air duct pipe	9
Securing strip [1)]	30
Turbocharger recirculating valve	9
Wastegate bypass regulator valve	4

1) Replace fastener(s).

Turbocharger Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence [1)]	15
2	Tighten bolts 1 through 6 in sequence	33
3	Tighten bolts 1 through 6 in sequence [2)]	33

1) Replace fastener(s).
2) If kept constant, all of the bolts will remain tightened to 33 Nm after the seal for the turbocharger is installed.

Exhaust System, Emission Control – 2.5L CEPB

Fastener Tightening Specifications

Component	Nm
Center muffler bracket nut	20
Clamping sleeve nut	23
Exhaust system bracket nut	20
Exhaust flap valve bolt/nut	20
Exhaust Gas Temperature (EGT) sensor 1	5
Primary catalytic converter nut [1) 2)]	23
Primary catalytic converter bolt	25
Primary catalytic converter bracket	23
Suspended mount	23
Suspended mount bracket	23
Temperature sensor [2)]	45
Transverse beam	23

1) Replace fastener(s).
2) Coat the threaded pin with hot bolt paste.

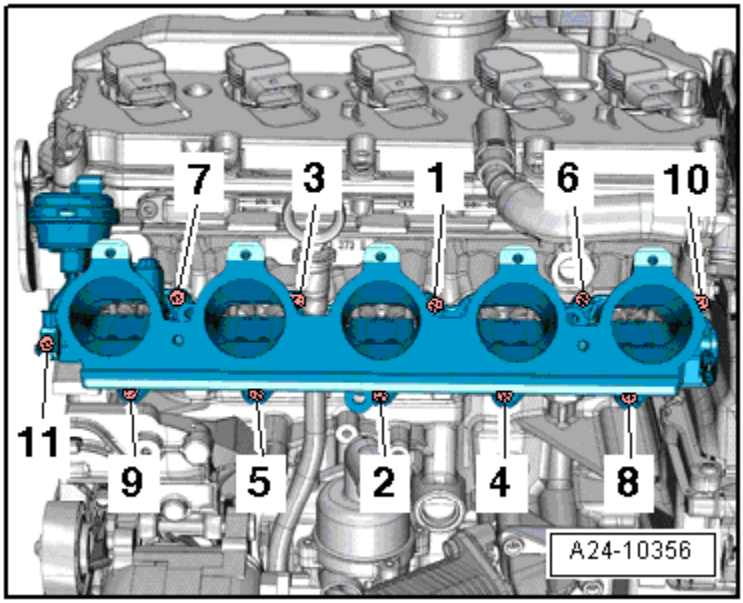
Multiport Fuel Injection – 2.5L CEPB

Fastener Tightening Specifications

Component	Nm
Air filter housing lower section	10
Air filter upper section	5
Air filter housing bracket bolt	10
Air filter housing bracket retaining pin	10
Air guide pipe	3
Bracket-to-intake manifold lower section	9
Bracket-to-intake manifold upper section	9
Camshaft adjustment valve 1	2.5
Camshaft Position (CMP) sensor	9
Charge air pressure sensor/Intake Air Temperature (IAT) sensor 2	9
Drain plug [1)]	15
Exhaust Gas Temperature (EGT) sensor 1 electrical harness connector	5
Front air guide	1.5
Fuel pressure sensor	27
Fuel supply line union nut	27
High pressure line bolt	9
High pressure line union nut	27
Low fuel pressure sensor	10
High pressure pipe	9
High pressure pump	20
Intake Air Temperature (IAT)/Manifold Absolute Pressure (MAP) sensor	9
Intake manifold lower section	9
Intake manifold runner position sensor	2.5
Intake tube	9
Non-return valve	9
Oxygen Sensor (O2S)	55
Threaded connection	27
Threaded piece [2)]	20
Turbocharger recirculating valve	9
Vacuum actuator	9

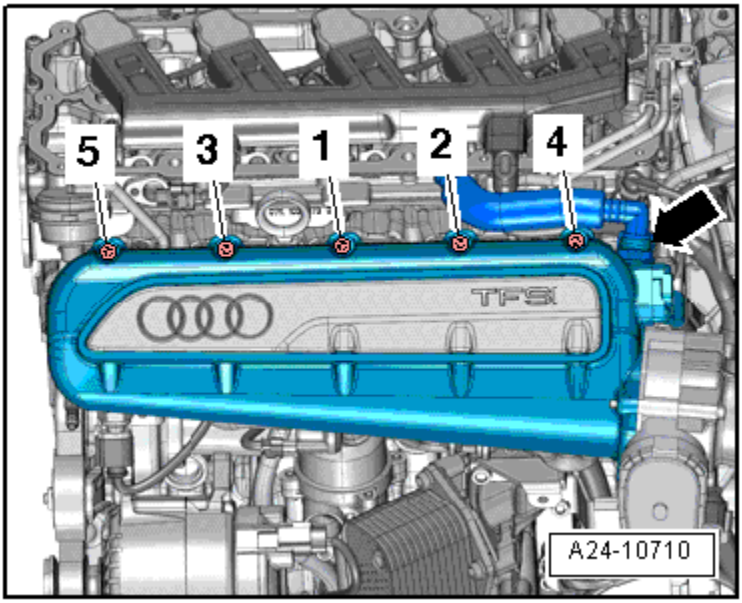
1) Replace fastener(s).
2) Install with locking compound.

Lower Intake Manifold Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 11 in sequence	7
2	Tighten bolts 1 through 11 in sequence	9

Upper Intake Manifold Tightening Specifications



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

Ignition – 2.5L CEPB

Fastener Tightening Specifications

Component	Nm
Camshaft Position (CMP) sensor bolt	9
Engine Speed (RPM) sensor	5
Ignition coil connectors	5
Knock Sensor (KS) bolt	20
Spark plug	30

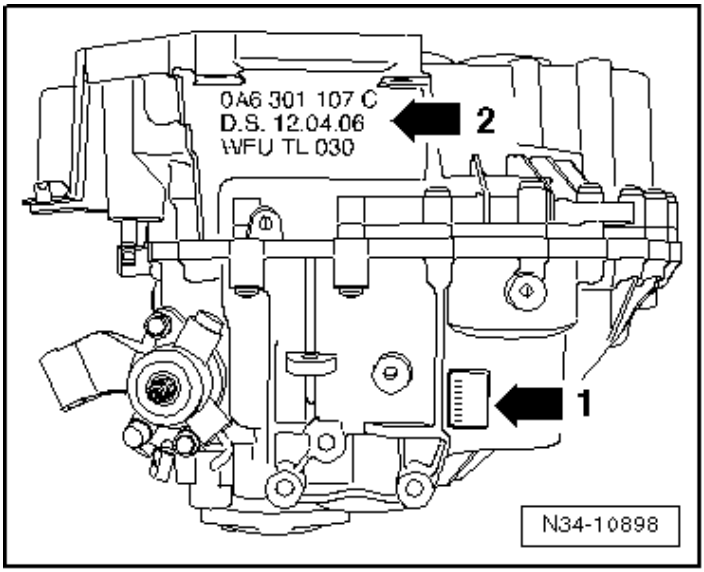
Technical Data

Engine data		2.5L/4V Engine
Idle speed		Not adjustable
Ignition timing		Not adjustable, regulated by the Engine Control Module (ECM).
Ignition/glow plug system		Single coil ignition system with 5 ignition coils (output stages integrated) that are connected directly to spark plugs via the ignition cables.
Spark plugs	Names	Data sheets for exhaust emission test
	Tightening Specifications	Refer to the Maintenance Procedures Rep. Gr. 03.
Ignition sequence		1-2-4-5-3

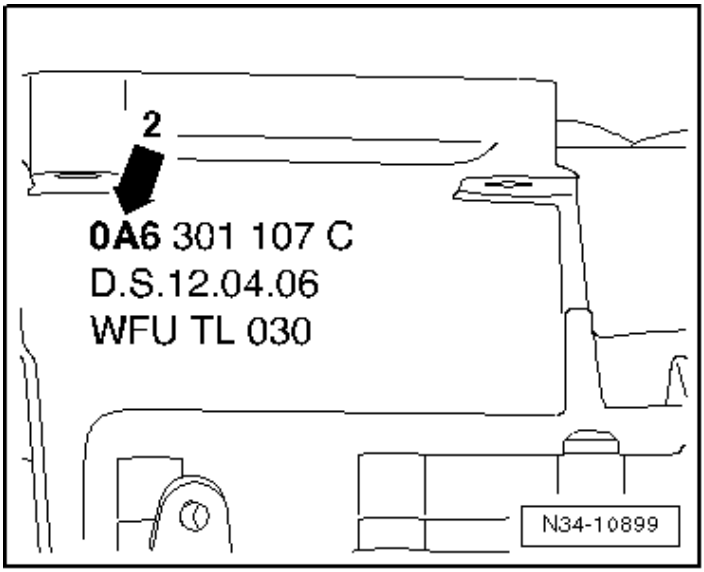
MANUAL TRANSMISSION – 0A6

General, Technical Data

Transmission Identification

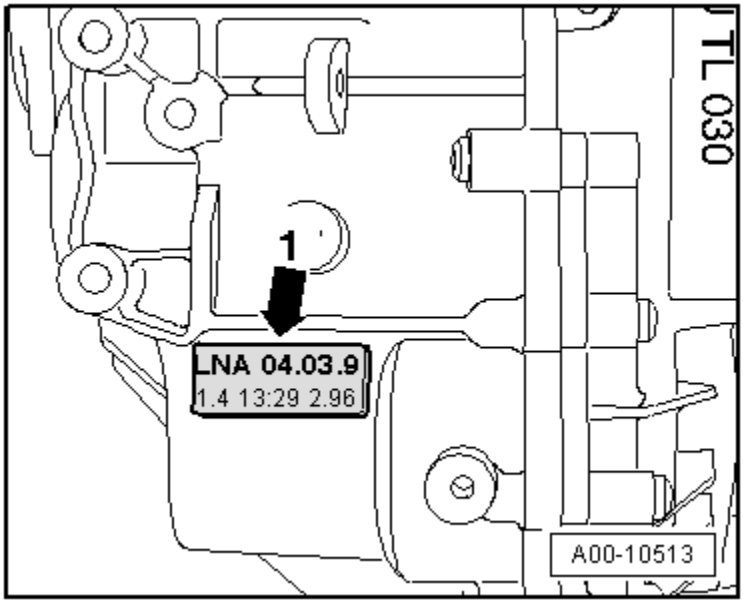


(1) and (2) Location on the manual transmission.



(2) Manual transmission 0A6 AWD.

Transmission Code Letters



(1) Transmission code letters and build date.

Example:

LNA	04	03	9
Identification codes	Day	Month	Year (2009) of production

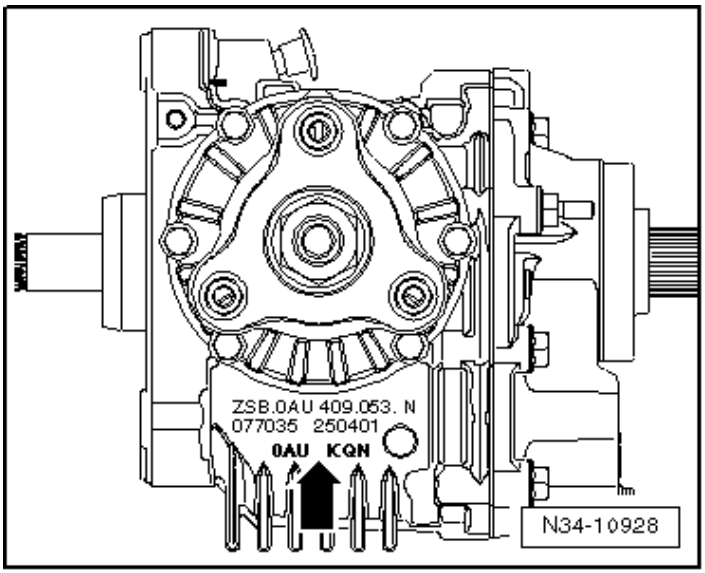
Transmission Codes, Allocation, Ratios and Capacities

Manual transmission		**0A6 AWD**	
Identification codes		LNA	MCK
Manufactured	from	07.2008	03.2009
	through		
Allocation	Type	Audi TT from MY 2007	Audi TT from MY 2007
	Engine	2.5L TFSI - 250 kW	2.5L TFSI - 250 kW
Ratio	Final drive I for $1^{st}/2^{nd}$ gear	64:17 = 3.765	64:17 = 3.765
$Z_2:Z_1 = i$	Final drive II for $3^{rd}/4^{th}$ gear	64:22 = 2.909	64:22 = 2.909
	Final drive III for reverse gear	64:20 = 3.200	64:20 = 3.200
Capacity in manual transmission		Refer to the Fluid Capacity Tables Rep. Gr. 03.	
Capacity in bevel box		Refer to the Fluid Capacity Tables Rep. Gr. 03.	
Clutch mechanism		Hydraulic	

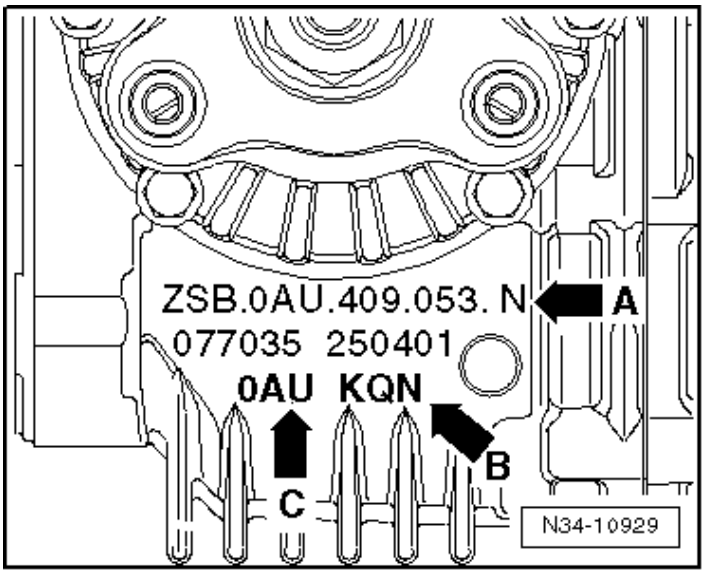
Refer to the Electronic Parts Catalog (ETKA) for the following:

- Individual gear ratios
- Gear oil specification
- Bevel box allocation
- Driveshaft flanges allocation
- Clutch allocation
- Rear final drive allocation

Bevel Box Identification



Bevel box code letters and part number (➡).



A - Bevel box part number
B - Bevel box code letters
C - Bevel box 0AU or 0A6
If there are no code letters present, use the part number for the allocation. Refer to the Electronic Parts Catalog (ETKA).

Bevel Box Code Letters, Transmission Allocation and Capacities

Bevel box		0AU/0A6		
Identification codes		LGS	LGY	LGZ
Manufactured	from	07.2008	07.2008	07.2008
	through			
Allocation	Type	Audi TT from MY 2007	Audi TT from MY 2007	Audi TT from MY 2007
	Engine	2.5L TFSI - 250 kW	2.5L TFSI - 250 kW	2.5L TFSI - 250 kW
Capacity		Refer to the Fluid Capacity Tables Rep. Gr. 03.		

Refer to the Electronic Parts Catalog (ETKA) for the following:
- Bevel box axle oil specification
- Manual transmission allocation

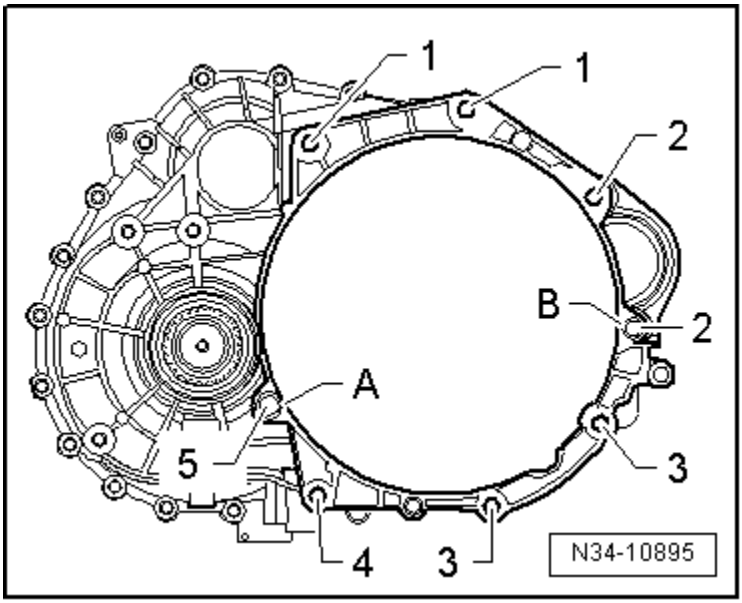
Clutch – 0A6

Fastener Tightening Specifications

Component	Fastener size	Nm
Clutch pedal bracket nuts [1) 2)]	-	20
	-	25
Clutch slave cylinder with release bearing [1)]	-	15
Crash bolster	M6	10
	M8	20
SAC pressure plate	M6	13
	M7	20
Vent screw	-	4.5

1) Replace fastener(s).
2) For bolt tightening clarification, refer to ElsaWeb, *Pedal Assembly and Clutch Master Cylinder Overview,* items 15 and 16.

Transmission to Engine Tightening Specifications



Item	Fastener size	Quantity	Nm
1	M12 x 50	2	80
2	M12 x 165 [1)]	2	80
3	M10 x 50	2	40
4	M10 x 68	1	40
5	M12 x 65 [2)]	1	80
A and B	Centering alignment pins		

[1)] Also used to secure the starter.

[2)] Installed into the transmission from the engine side.

Fastener Tightening Specifications

Component	Nm
Back-up lamp switch	20
Bracket to-transmission housing	20
Cable mounting bracket [2]	3.5
	20
Frame	1.5
Gearshift lever nut [1]	23
Oil drain plug	45
Pendulum support-to-transmission [1] [3]	60 plus an additional 90° (¼ turn)
Pendulum support-to-subframe [1] [3]	100 plus an additional 90° (¼ turn)
Right drive axle heat shield	25
Securing plate	5
Selector housing with spring and selector bracket nut	8
Shift unit [1]	25
Transmission fluid filler plug	45
Transmission housing bolt [1]	8 plus an additional 120° (⅓ turn)
Transmission housing nut	20 plus an additional 90° (¼ turn)
Transmission mount-to-chassis [1] [4]	40 plus an additional 90° (¼ turn)
Transmission mount-to-transmission [1] [4]	60 plus an additional 90° (¼ turn)

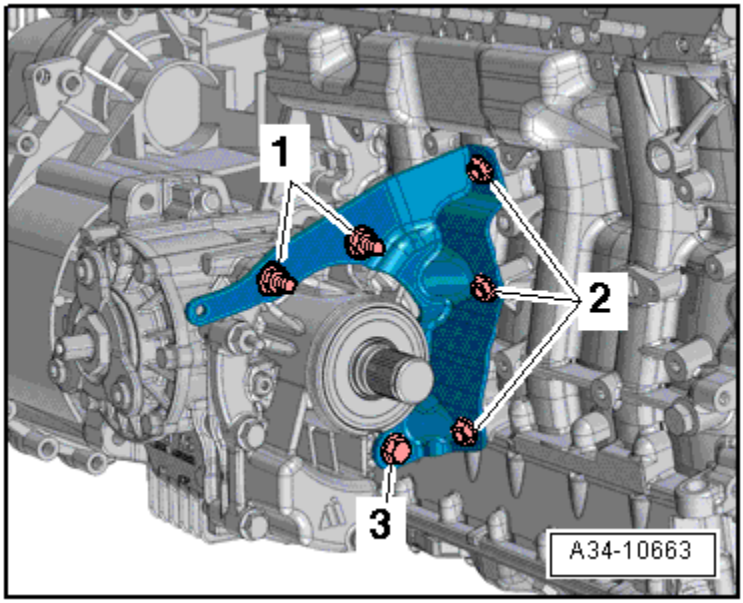
[1] Replace fastener(s).

[2] For bolt tightening clarification, refer to ElsaWeb, *Shift Cable and Selector Cable Overview,* items 10 and 11.

[3] For bolt tightening clarification, refer to ElsaWeb, *Engine and Transmission Mount Overview,* items 13, 14 and 15.

[4] For bolt tightening clarification, refer to ElsaWeb, *Engine and Transmission Mount Overview,* items 16 and 17.

Bevel Box Bracket – Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 3	Hand-tighten
2	Tighten bolts 2	8
3	Tighten bolts 1 and 3	8
4	Tighten bolts 2	40
5	Tighten bolts 1 and 3	40

Rear Final Drive, Differential – 0A6

Fastener Tightening Specifications

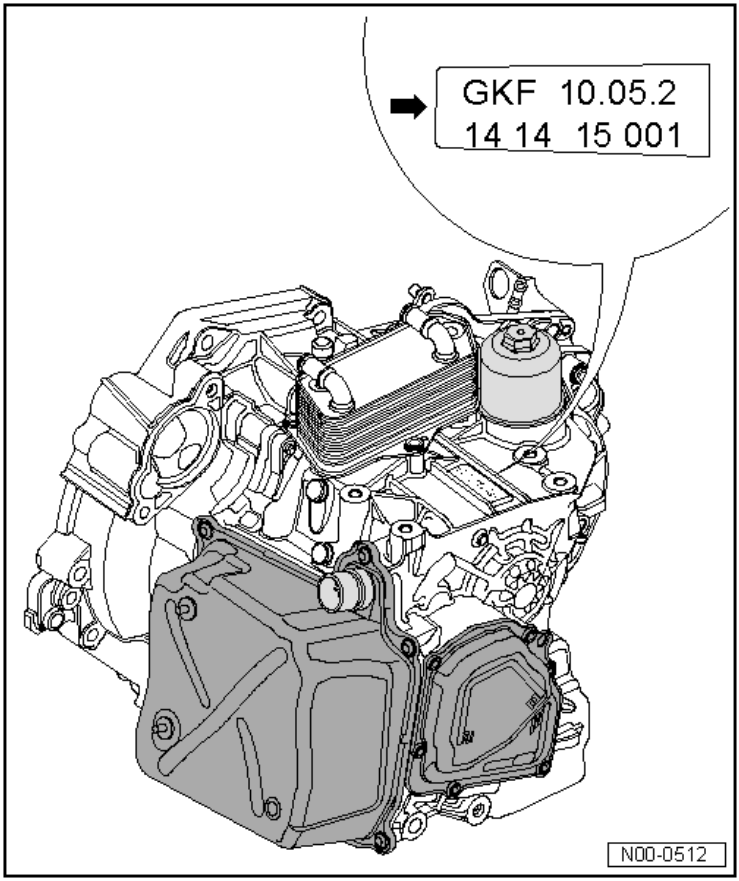
Component	Nm
Bevel box	
- Countersunk Bolt	35
-Bolt [3]	60 plus an additional 90° (¼ turn)
Left Stub Shaft, Countersunk Bolt	35
Output Flange to Bevel Box, Nut [2]	480
Pinion Housing [1]	25

[1] Tighten in a diagonal sequence.
[2] Install with locking fluid -D 000 600-.
[3] Replace.

S TRONIC TRANSMISSION – 02E

General, Technical Data

Identification on Transmission



The transmission code letters are on top of the transmission near the transmission oil cooler.

Example for above transmission:

- GKF = Transmission code
- 10.05.2 = Production date May 10th, 2002.

The transmission code is also listed on the vehicle data plate.

Code Letters, Transmission Allocations, Ratios and Equipment

Direct shift transmission		02E AWD		
Transmission	Identification codes	MMC	MMF	MMG
Manufactured	from through	05.2010 11.2010	05.2010 11.2010	05.2010 11.2010
Allocation Type		Audi TT from MY 2007	Audi TT from MY 2007	Audi TT from MY 2007
Engine		2.0L - 155 kW 4-cylinder TFSI	2.0L - 195, 200 kW 4-cylinder TFSI	2.0L - 155 kW 4-cylinder TFSI
Allocation: rear final drive	Designation	Rear final drive 0AV and 0BR		

Direct shift transmission		02E AWD		
Transmission	Identification codes	MTB	MTX	MTY
Manufactured	from through	11.2010 05.2011	11.2010 05.2011	11.2010 05.2011
Allocation Type		Audi TT from MY 2007	Audi TT from MY 2007	Audi TT from MY 2007
Engine		2.0L - 155 kW 4-cylinder TFSI	2.0L - 195, 200 kW 4-cylinder TFSI	2.0L - 155 kW 4-cylinder TFSI
Allocation: rear final drive	Designation	Rear final drive 0AV and 0BR		

Direct shift transmission		02E AWD	
Transmission	Identification codes	NJB	NJE
Manufactured	from through	05.2011	05.2011 11.2011
Allocation Type		Audi TT from MY 2007	Audi TT from MY 2007
Engine		2.0L - 155 kW 4-cylinder TFSI	2.0L - 195, 200 kW 4-cylinder TFSI
Allocation: rear final drive	Designation	Rear final drive 0AV and 0BR	

Direct shift transmission		02E AWD	
Transmission	Identification codes	NJW	NMA
Manufactured	from through	05.2011 11.2011	11.2011
Allocation Type		Audi TT from MY 2007	Audi TT from MY 2007
Engine		2.0L - 155 kW 4-cylinder TFSI	2.0L - 195, 200 kW 4-cylinder TFSI
Allocation: rear final drive	Designation	Rear final drive 0AV and 0BR	

Controls, Housing – 02E

Fastener Tightening Specifications

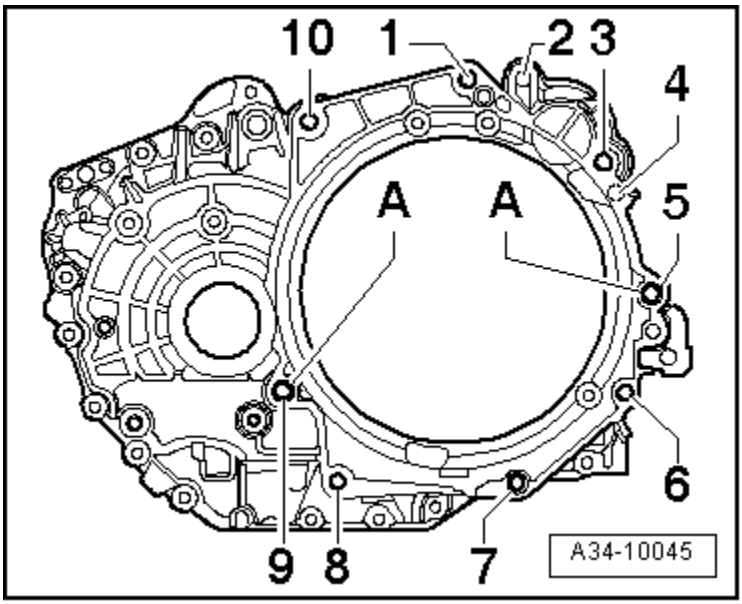
Component	Nm
Bracket or selector lever cable [1) 2)]	20 plus an additional 90° (¼ turn)
Disengaging spring [2)]	3.5
Locking plate [2)]	3.5
Overflow tube	3
Selector lever boot trim with selector lever scale illumination bulb [2)]	1
Selector lever cable [2)]	13
Selector lever cable adjusting screw [3)]	15
Selector mechanism function unit nut [2)]	8
Selector mechanism shift unit nut [1) 2)]	9
Selector mechanism-to-body nut [3)]	8
Transmission oil filter housing	20
Pendulum support [1) 4)]	
-To transmission	50 plus an additional 90° (¼ turn)
-To subframe	100 plus an additional 90° (¼ turn)
Transmission fluid check plug	45
Transmission fluid drain plug	45
Transmission input speed sensor and clutch oil temperature sensor bolt	10

Fastener Tightening Specifications *(cont'd)*

Component	Nm
Transmission mount with support arm [1]	
-Transmission mount-to-chassis	40 plus an additional 90° (¼ turn)
-Transmission mount-to-transmission support	60 plus an additional 90° (¼ turn)
Transmission oil cooler [1]	20 plus an additional 45° (⅛ turn)
Transmission oil pump cover	8
Transmission support-to-transmission [1]	40 plus an additional 90° (¼ turn)

[1] Replace fastener(s).
[2] Through 11.2009.
[3] From 11.2009.
[4] For bolt tightening clarification, refer to ElsaWeb, *Subframe Mount Overview,* items 2 and 13.

Transmission to Engine Tightening Specifications



Item	Fastener size	Nm
1, 3 [1], 10	M12 x 55	80
2 [2]	M10 x 45	40
4 [2]	M10 x 40	40
5	M12 x 65	80
6, 7, 8	M10 x 50	40
9	M12 x 70	80
A	Alignment sleeves for centering	

[1] The bolt is only accessible through the starter opening with the starter removed.
[2] Starter mount.

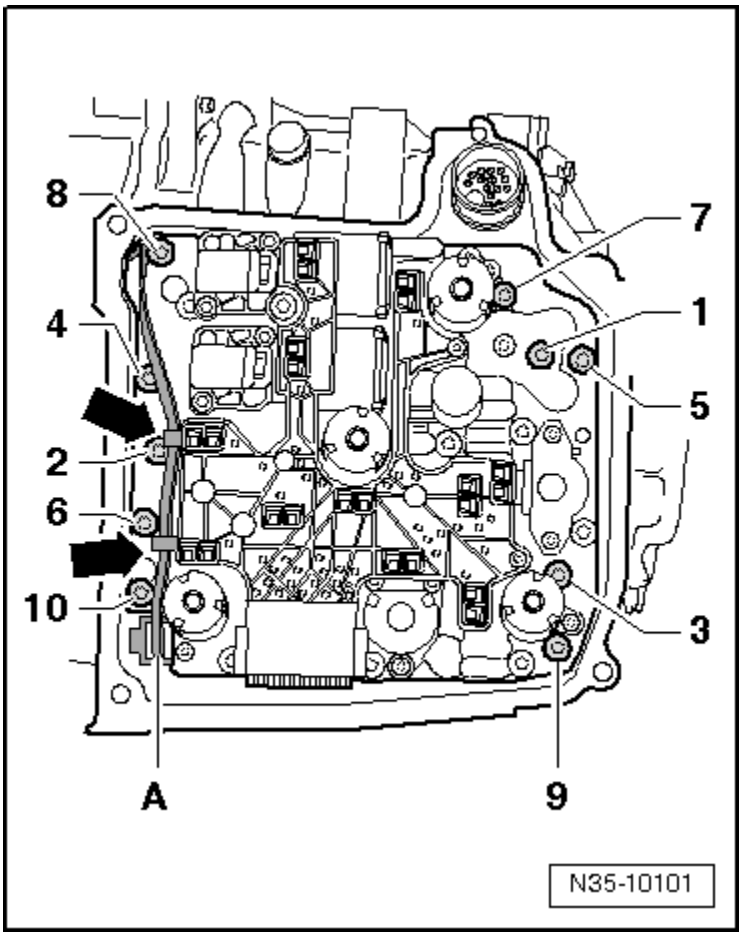
Gears, Shafts – 02E

Fastener Tightening Specifications

Component	Nm
Guard plate	32
Transmission input speed sensor	10
Oil pan [1]	16
Transmission oil pump	
- Countersunk bolts	8
- Flat head bolts	8 plus an additional 90° (¼ turn)
Transmission oil pump cover [1]	8

[1] Tighten the bolts diagonally

Mechatronic Tightening Specifications



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

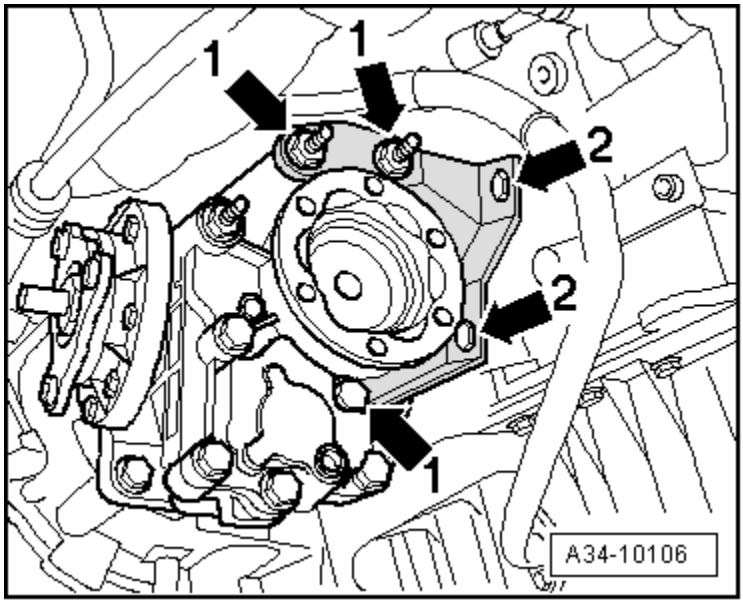
Rear Final Drive, Differential – 02E

Fastener Tightening Specifications

Component	Nm
Bevel box output flange [1]	480
Bevel box to transmission [1]	40 plus an additional 90° (⅛ turn)
Drain plug for bevel box oil filler hole [1]	15
Gearshift lever, nut	20
Left flange shaft [1]	30
Oil drain plug for bevel box	60
Right drive axle heat shield	25
Right flange shaft [1]	30

[1] Replace

Bevel Box Bracket for Vehicles with 2.0L TFSI Tightening Specifications

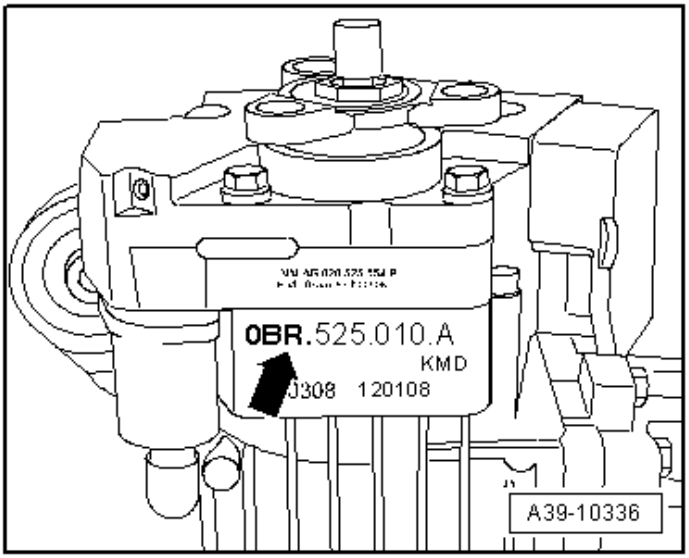


Step	Component	Nm
1	Tighten bolts 1	Hand-tighten
2	Tighten bolts 2	40
3	Tighten bolts 1	40

REAR FINAL DRIVE – 0BR, 0BY

General, Technical Data

Rear Final Drive Identification



Rear final drive 0BR or 0BY

The identification (➡) on the bottom side of the final drive identifies which final drive is installed.

Rear Final Drive Transmission Allocations, Ratios, Capacities

Rear Final Drive 0BR with Haldex Clutch Generation IV			
Part number		0BR.525.010	0BR.525.010.A
Identification codes		KMC	KMD
Manufactured	from	01.2008	01.2008
	through		-
Allocation	Type	Audi TT from MY 2007	Audi TT from MY 2007
	Engine	2.0L - 195 kW TFSI 2.0L - 199 kW TFSI	2.0L - 195 kW TFSI 2.0L - 199 kW TFSI
Ratio: Z_2: Z_1	Rear final drive	27:17 = 1.588	27:17 = 1.588
Driveshaft flange diameter (mm)		100	100
Final drive capacity		Fluid Capacity Tables; Rep. Gr.03	
Haldex clutch capacity		Fluid Capacity Tables; Rep. Gr.03	

Rear Final Drive Transmission Allocations, Ratios, Capacities *(cont'd)*

Rear Final Drive 0BR with Haldex Clutch Generation IV			
Part number		0BR.525.010.B	0BR.525.010.C
Identification codes		MMK	MML
Manufactured	from	11.2009	10.2009
	through		
Allocation	Type	Audi TT from MY 2007	Audi TT from MY 2007
	Engine	2.0L - 155 kW TFSI 2.0L - 195 kW TFSI 2.0L - 200 kW TFSI	2.0L - 155 kW TFSI 2.0L - 195 kW TFSI 2.0L - 200 kW TFSI
Ratio: Z_2: Z_1	Rear final drive	27:17 = 1.588	27:17 = 1.588
Driveshaft flange diameter (mm)		100	100
Final drive capacity		Fluid Capacity Tables; Rep. Gr.03	
Haldex clutch capacity		Fluid Capacity Tables; Rep. Gr.03	
Replacement capacity in Haldex clutch		Fluid Capacity Tables; Rep. Gr.03	

Rear Final Drive 0BY With Haldex Clutch Generation IV			
Part number		0BY.525.010	0BY.525.010.A
Identification codes		LEK	MBE
Manufactured	from	01.2009	09.2009
	through		
Allocation	Type	Audi TT RS from 2007	Audi TT RS from 2011
	Engine	2.5L - 250 kW TFSI	2.5L - 250 kW TFSI
Ratio: Z_2: Z_1	Rear final drive	27:17 = 1.588	27:17 = 1.588
Driveshaft flange diameter (mm)		100	100
Final drive capacity		Fluid Capacity Tables; Rep. Gr.03	
Haldex clutch capacity		Fluid Capacity Tables; Rep. Gr.03	
Replacement capacity in Haldex clutch		Fluid Capacity Tables; Rep. Gr.03	

The following information can be found in the Electronic Parts Catalog (ETKA):

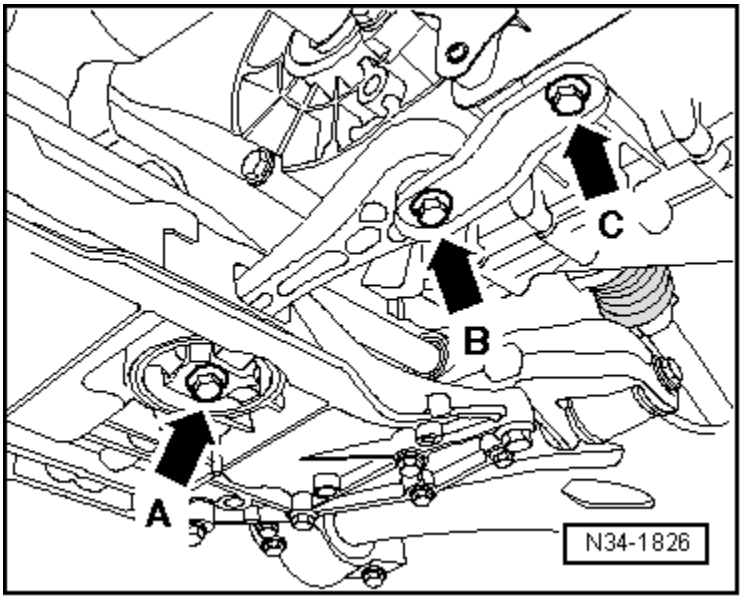
- Rear final drive transmission oil specification
- Haldex clutch high performance oil specification
- Transmission allocation

Fastener Tightening Specifications

Component	Fastener size	Nm
All wheel drive control module-to-rear final drive	-	6
Buffer-to-rear final drive [1)]	-	60 plus an additional 90° (¼ turn)
Cross member-to-underbody	-	23
Driveshaft-to-bevel box	-	60
Flange-to-driveshaft nut	-	210
Flange-to-rear driveshaft tube	-	45
Flexible disc with a heat shield-to-front driveshaft tube [1)]	-	50 plus an additional 90° (¼ turn)
Flexible disc with a heat shield-to-manual transmission with bevel box	-	60
Flexible disc with vibration damper-to-rear driveshaft tube balance nut	-	10
Flexible disc with vibration damper-to-rear driveshaft tube bolt [1)]	-	50 plus an additional 90° (¼ turn)
Flexible disc with vibration damper-to-rear final drive	-	60
Front flexible disc [1)]	-	50 plus an additional 90° (¼ turn)
Haldex clutch housing	-	50
Haldex clutch pump drain plug	-	30
Haldex clutch pump-to-Haldex clutch housing	-	6
Haldex clutch-to-rear final drive	-	50
Intermediate bearing heat shield	-	25
Lock plate-to-Constant Velocity (CV) joint protective boot	-	40
Manual transmission with bevel gear transfer case [1)]	-	50 plus an additional 90° (¼ turn)
Oil filler plug	M10 x 1	15
Oil filler plug	M20 x 1	40
Oil filter cover	-	35

[1)] Replace fastener(s).

Pendulum Support First to Transmission Tightening Specifications

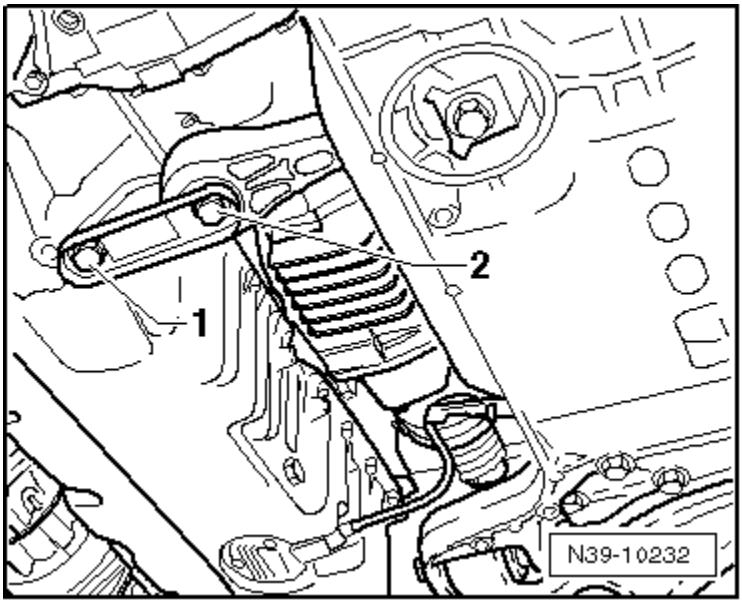


Tighten pendulum support first to transmission -arrows B and C- and then to subframe -arrow A-.

Step	Component	Nm
Pendulum support to	Transmission -arrows B and C-	40 plus an additional 90° (¼ turn)
	Subframe -arrow A-	100 plus an additional 90° (¼ turn)

1) Replace fastener(s).

Pendulum Support to Transmission Tightening Specifications



Step	Component	Nm
Pendulum support to	Transmission -1-	40 plus an additional 90° (¼ turn)
	Transmission -2-	40 plus an additional 90° (¼ turn)

1) Replace fastener(s).

SUSPENSION, WHEELS, STEERING

General, Technical data

Chassis

Front and All Wheel Drive		
Front suspension	-	McPherson struts with lower transverse link subframe stabilizer bar.
Rear suspension	-	Four-link suspension with separate spring-shock absorber configuration tubular stabilizer.
Wheelbase	mm	2467
Front/rear track width [1]	mm	1572/1558

[1] Front/rear track width only applicable with 225/55/R16 tires on 7.5Jx16 ET 45 rims.

Steering

Front and All Wheel Drive	
Steering gear	Electromechanically assisted, maintenance-free rack-and-pinion steering
Maximum steering lock angle on inside wheel	36° 48’
Turning diameter	Approximately 10.9 meters

Front Suspension

Fastener Tightening Specifications

Component	**Fastener size**	**Nm**
ABS wheel speed sensor-to-wheel bearing housing bolt	-	8
Ball joint-to-transverse link nut [1]	-	40 plus an additional 45° (⅛ turn)
Ball joint-to-wheel bearing housing nut [1]	-	20 plus an additional 90° (¼ turn)
Brake disc-to-wheel hub bolt	-	4
Coupling rod-to-stabilizer bar nut [1]	-	65
Coupling rod-to-suspension strut nut [1]	-	65
Cover plate-to-wheel bearing housing bolt	-	10

Component	Fastener size	Nm
Drive axle-to-transmission bolt [1) 5) 6)]	M8	40
	M10	70
Drive axle to wheel hub bolt [1)]		
- Hex bolt	-	200 plus an additional 180° (½ turn)
- 12-point bolt with ribs	-	70 plus an additional 90° (¼ turn)
- 12-point bolt without ribs	-	200 plus an additional 180° (½ turn)
Level control system sensor-to-subframe bolt	-	9
Level control system sensor-to-transverse link nut	-	9
Lower bonded rubber bushing for pendulum support-to-subframe bolt [1) 3)]	-	100 plus an additional 90° (¼ turn)
Shock absorber-to-suspension strut bearing nut [1)]	-	60
Stabilizer bar-to-subframe bolt [1)]	-	20 plus an additional 90° (¼ turn)
Subframe-to-body bolt [1)]	-	70 plus an additional 90° (¼ turn)
Suspension strut-to-suspension strut dome bolt [1)]	-	15 plus an additional 90° (¼ turn)
Suspension strut-to-wheel bearing housing bolt [1) 4)]	-	70 plus an additional 90° (¼ turn)
Tie rod end-to-wheel bearing housing nut [1)]	-	20 plus an additional 90° (¼ turn)
Transverse link mounting bracket-to-body bolt [1)]	-	70 plus an additional 90° (¼ turn)
Transverse link mounting bracket-to-subframe bolt [1)]	-	50 plus an additional 90° (¼ turn)
Transverse link-to-subframe bolt [1) 2)]	-	70 plus an additional 180° (½ turn)

Fastener Tightening Specifications *(cont'd)*

Component	Fastener size	Nm
Wheel hub-to-wheel bearing housing bolt [1]	-	70 plus an additional 90° (¼ turn)

1) Replace fastener(s).
2) Tighten in the curb weight position.
3) Only tighten when pendulum support is bolted to transmission.
4) Bolt point must face in direction of travel.
5) Pre-tighten diagonally to 10 Nm.
6) Tighten diagonally.

Rear Suspension

Fastener Tightening Specifications

Component	Fastener size	Nm
Brake disc-to-wheel hub bolt	-	4
Coupling rod-to-stabilizer bar nut	-	40
Coupling rod-to-wheel bearing housing nut	-	25
Cover plate-to-wheel bearing housing bolt	-	10
Cross member brace bolt (Roadster, AWD)	-	40
Cross member -to-subframe nut (Coupe, AWD)	-	50 plus an additional 180° (½ turn)
Drive axle-to-rear final drive bolt [1] [3]	M8	40
	M10	70
Drive axle to wheel hub bolt (AWD) [1]		
- Hex bolt	-	200 plus an additional 180° (½ turn)
- 12-point bolt with ribs	-	70 plus an additional 90° (¼ turn)
- 12-point bolt without ribs	-	200 plus an additional 180° (½ turn)
Diagonal brace bolt (Roadster, AWD) [1]	-	40 plus an additional 45° (⅛ turn)

Component	Fastener size	Nm
Diagonal brace bolt (Roadster, FWD) [1]	-	40 plus an additional 45° (⅛ turn)
	-	90 plus an additional 45° (⅛ turn)
Level control system sensor bolt	-	5
Lower transverse link-to-subframe nut [1] [2]	-	95
Lower transverse link-to-wheel bearing housing nut [1] [2]	-	90 plus an additional 90° (¼ turn)
Shock absorber-to-body bolt [1]	-	50 plus an additional 45° (⅛ turn)
Shock absorber-to-shock absorber mounting nut [1]	-	25
Shock absorber-to-wheel bearing housing bolt	-	180
Stabilizer bar-to-body bolt [1]	-	25 plus an additional 90° (¼ turn)
Subframe-to-body bolt [1]	-	90 plus an additional 90° (¼ turn)
Tie rod-to-subframe nut [1] [2]	-	90 plus an additional 90° (¼ turn)
Tie rod-to-wheel bearing housing bolt [1] [2]	-	130 plus an additional 90° (¼ turn)
Trailing arm mounting bracket-to-body bolt [1]	-	50 plus an additional 45° (⅛ turn)
Trailing arm-to-mounting bracket bolt [1]	-	90 plus an additional 90° (¼ turn)
Trailing arm-to-wheel bearing housing bolt [1]	-	90 plus an additional 45° (⅛ turn)
Upper transverse link-to-subframe nut [1] [2]	-	95
Upper transverse link-to-wheel bearing housing bolt [1] [2]	-	130 plus an additional 90° (¼ turn)

Fastener Tightening Specifications *(cont'd)*

Component	Fastener size	Nm
Wheel bearing unit-to-wheel bearing housing bolt [1]	-	70 plus an additional 90° (¼ turn)
Wheel hub-to-wheel bearing housing bolt (FWD) [1]	-	200 plus an additional 180° (½ turn)
Wheel speed sensor-to-wheel bearing housing bolt	-	8

[1] Replace fastener(s).
[2] Tighten in the curb weight or control position.
[3] Pre-tighten diagonally to 10 Nm.

Wheels, Tires

Fastener Tightening Specifications

Component	Nm
Decorative trim-to-wheel rim bolt	5
Tire pressure monitoring sensor union nut	8
Wheel bolt-to-hub	120
Wheel electronics-to-metal valve microencapsulated bolt (Beru system)	4

Wheel Alignment Data

Wheel Alignment Specified Values

Front suspension	Standard suspension (1BA)	Sport suspension Audi Magnetic Ride (AMR) (1BL)
Individual toe	5′ ± 5′	5′ ± 5′
Total toe	10′ ± 10′	10′ ± 10′
Camber	-41′ ± 30′	-41′ ± 30′
Maximum permissible difference between both sides	30’	30’
Toe differential angle at 20° steering angle [1]	1° 18′ ± 20′	1° 18′ ± 20′
Maximum steering angle at inner wheel	36° 48’	36° 48’

Front suspension	Sport suspension (1BV/1BD)	Sport suspension Audi Magnetic Ride (AMR) (1BQ)
Individual toe	5′ ± 5′	5′ ± 5′
Total toe	10′ ± 10′	10′ ± 10′
Camber	-41′ ± 30′	-41′ ± 30′
Maximum permissible difference between both sides	30’	30’
Toe differential angle at 20° steering angle [1)]	1° 20′ ± 20′	1° 20′ ± 20′
Maximum steering angle at inner wheel	36° 48’	36° 48’

[1)] The wheel stop on the outer wheel is reduced by this amount. Depending on the computer manufacturer, the toe-out angle difference can be indicated negatively in the alignment computer.

Rear suspension	Standard suspension (1BA)	Sport suspension Audi Magnetic Ride (AMR) (1BL)
Total toe	25′ ± 10′	25′ ± 10′
Individual toe	12.5′ ± 5′	12.5 ′± 5′
Maximum permissible deviation from direction of rotation	10’	10’
Camber	-1° 20′ ± 30′	-1° 20′ ± 30′
Maximum permissible difference between both sides	30’	30’

Rear suspension	Sport suspension (1BV/1BD)	Sport suspension Audi Magnetic Ride (AMR) (1BQ)
Total toe	25′ ± 10′	25′ ± 10′
Individual toe	12.5 ′± 5′	12.5′ ± 5′
Maximum permissible deviation from direction of rotation	10’	10’
Camber	-1° 20′ ± 30′	-1° 20′ ± 30′
Maximum permissible difference between both sides	30’	30’

Steering

Fastener Tightening Specifications

Component	Nm
Shield-to-steering gear bolt	6
Steering column-to-mounting bracket bolt	20
Steering column-to-steering gear bolt [1)]	20 plus an additional 90° (¼ turn)
Steering gear-to-subframe bolt [1)]	50 plus an additional 90° (¼ turn)
Steering wheel-to-steering column bolt [1)]	50
Strut-to-steering column bolt	9
Tie rod-to-steering gear	100
Tie rod end-to-tie rod nut	50
Tie rod end-to-wheel bearing housing nut [1)]	20 plus an additional 90° (¼ turn)

[1)] Replace fastener(s).

BRAKE SYSTEM

General, Technical Data

Brakes

Brake System
Dual-circuit brake system with diagonal distribution, Anti-lock Brake System (ABS) with Electronic Brake Distribution (EBD). Depending on equipment and construction, may also be equipped with Electronic Differential Lock (EDL), Anti-Slip Regulation (ASR), Electronic Stability Program (ESP).

Front Wheel Brakes – Technical Data

Front wheel brakes				
Production Relevant No. (PR. No.)		1LJ	1LL	1LK
Front brake caliper		FN3	FN3	FNR-G-57
Pistons	Diameter mm	54	54	57
Production Relevant No. (PR. No.)		1LJ	1LL	1LK
Front brake disc	Diameter mm	312 (16”)	312 (16”)	340 (17”)
Brake disc thickness (ventilated)	mm	25	25	30
Brake pad wear limit	mm	21	21	28
Brake pads				
Pad thickness, new (not including backing plate)	mm	14	14	14
Brake pad wear limit (not including backing plate)	mm	2	2	2

Front wheel brakes			
Production Relevant No. (PR. No.)		1LM	1LN
Front brake caliper		FNR-G-57	FNR-G-57
Pistons	Diameter mm	57	57
Production Relevant No. (PR. No.)		1LK	1LK
Front brake disc	Diameter mm	340 (17”)	340 (17”)
Brake disc thickness (ventilated)	mm	30	30
Brake pad wear limit	mm	28	28

Front Wheel Brakes – Technical Data *(cont'd)*

Brake pads			
Pad thickness, new (not including backing plate)	mm	14	14
Brake pad wear limit (not including backing plate)	mm	2	2

TT RS Front Wheel Brakes

Front wheel brakes	
Brakes PR number	1LA
Front Brake Caliper	Brembo M4
Pistons	40/40 mm diameter
Brake disc PR number	1LK
Front brake disc	370 mm
Brake disc thickness, ventilated	32 mm
Brake disc wear limit	30 mm
Brake pad wear limit (not including backing plate)	2 mm

Wheel Brakes – Technical Data

Rear wheel brakes (FWD)			
Production Relevant No. (PR. No.)		2ED	1KZ
Rear brake caliper		CII 38HR	CII 38HR
Pistons	Diameter mm	38	38
Production Relevant No. (PR. No.)		2ED, 2EE	1KZ, 1KJ
Rear brake disc	Diameter mm	286 (16")	286 (16")
Brake disc thickness (not ventilated)	mm	12	12
Brake disc thickness (ventilated)	mm	-	-
Brake disc wear limit	mm	9	9
Brake pads			
Pad thickness, new (not including backing plate)	mm	12	12
Brake pad wear limit (not including backing plate)	mm	2	2

Rear wheel brakes, AWD				
Production Relevant No. (PR. No.)		1KJ	2EE	2EA
Rear brake caliper		CII 41HR	CII 41HR	CII 41HR
Pistons	Diameter mm	41	41	41
Production Relevant No. (PR. No.)		1KJ,1KZ	2EE,2ED	2EA

Rear brake disc	Diameter mm	286 (16”)	286 (16”)	310 (17”)
Brake disc thickness (not ventilated)	mm	12	12	-
Brake disc thickness (ventilated)	mm	-	-	22
Brake disc wear limit	mm	9	9	19
Brake pad wear limit (not including backing plate)	mm	2	2	2

Rear wheel brakes, AWD			
Production Relevant No. (PR. No.)		2EF	2EG
Rear brake caliper		CII 41HR	CII 41HR
Pistons	Diameter mm	41	41
Production Relevant No. (PR. No.)		2EF	2EG
Rear brake disc	Diameter mm	310 (17”)	310 (17”)
Brake disc thickness (not ventilated)	mm	-	-
Brake disc thickness, ventilated	mm	22	22
Brake disc wear limit	mm	19	19
Brake pad wear limit (not including backing plate)	mm	2	2

TT RS Rear Wheel Brakes

Rear wheel brakes	
Brakes PR number	CII 41 HR
Pistons	41 mm diameter
Rear brake disc	370 mm diameter
Brake disc thickness, ventilated	22 mm
Brake disc wear limit	19 mm
Brake pad wear limit (not including backing plate)	2 mm

Anti-lock Brake System (ABS)

Fastener Tightening Specifications

Component	**Nm**
ABS control module and ABS hydraulic unit brake lines	14
ABS hydraulic unit-to-bracket bolt	8
ABS wheel speed sensor bolt	8
Brake light switch-to-brake master cylinder bolt	5
ESP sensor unit bolt	9

Mechanical Components

Fastener Tightening Specifications

Component	Nm
Brake disc-to-wheel hub bolt	4
Brake hose connection with anti-rotation device-to-caliper bolt (16” FN3)	35
Brake line bracket-to-front brake caliper bolt	15
Front brake carrier-to-wheel bearing housing bolt [1)]	200
Rear brake carrier-to-wheel bearing housing bolt [1)]	90 plus an additional 90° (¼ turn)
Brake line connection to front brake caliper	
- 17” FNR G57	14
- 16” FN3	19
Brake line connection to front brake hose	
- 17” FNR G57	14
- 16” FN3	12
Brake pedal to mounting bracket nut	25
Brake pedal mounting bracket nut	25
Cover plate-to-front wheel bearing housing bolt	10
Damper-to-front brake caliper bolt	10
Front brake caliper guide pin [1)]	30
Parking brake cable left and right bolt	4
Parking brake cable lower right clip nut	12
Parking brake lever nut	15
Parking brake lever trim bolt	0.7
Rear brake caliper bleeder screw	10
Rear brake caliper bolt [1)]	35
Rear brake line and brake hose	14
Wear indicator wiring bracket-to-front brake caliper bolt	25
Wheel speed sensor bolt	8

[1)] Replace fastener(s).

Hydraulic Components

Hydraulic Tightening Specifications

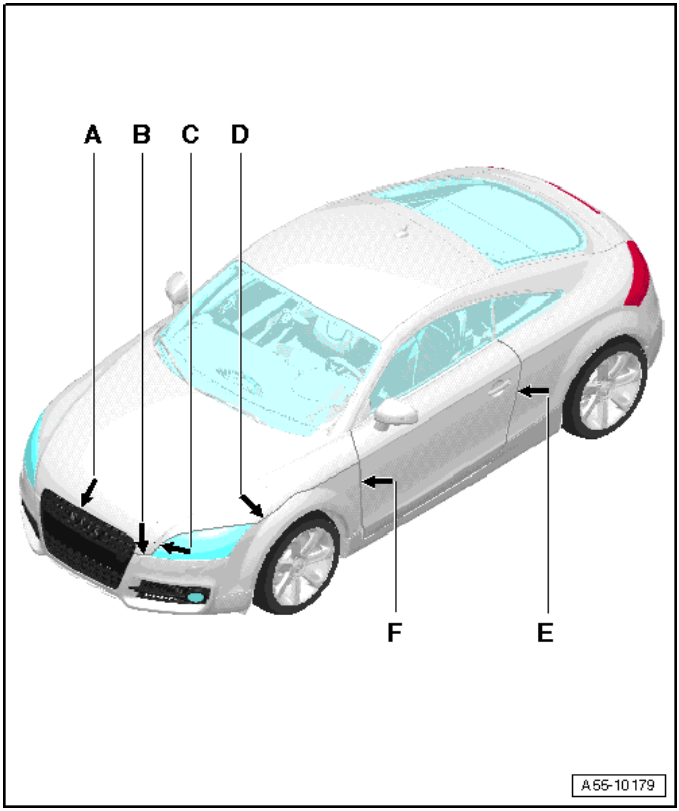
Component	Nm
Brake booster nut [1)]	25
Brake hose connection with anti-rotation device to front brake caliper	
- 16” FN-3	35
- 17” FNR-G-57	14
Brake line	
- to brake master cylinder	14
- to hydraulic unit	14
- to front brake hose	14
- to rear brake caliper	14
- at rear axle	14
- at underbody	14
Brake master cylinder-to-brake booster nut [1)]	20
Front brake caliper bleeder screw (FN3)	10
Front brake caliper bleeder valve (FNR-G-57)	15
Front brake caliper guide pin	30
Rear brake caliper bleeder screw	10
Rear brake caliper-to-guide pin bolt [1)]	35

[1)] Replace fastener(s).

BODY

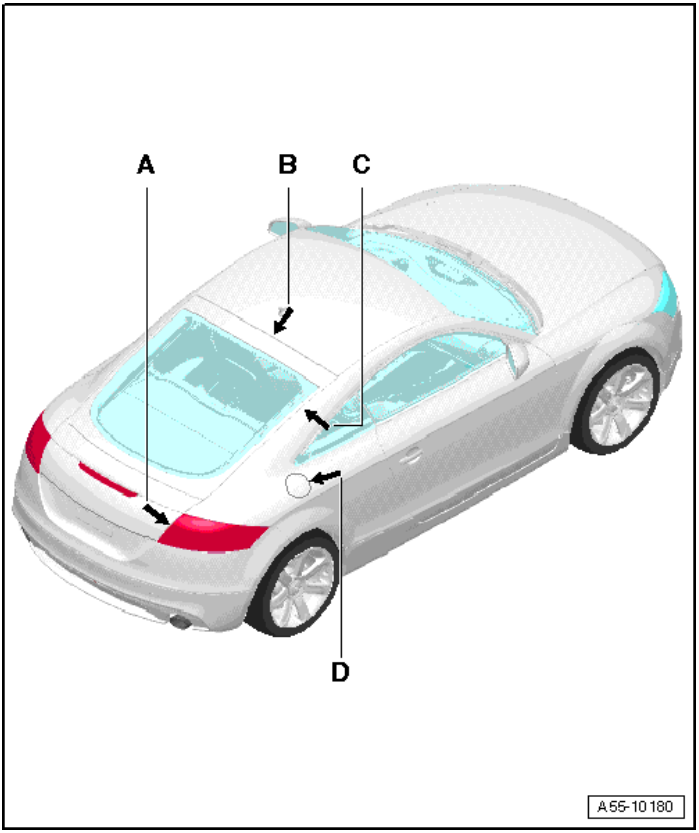
Air Gap Body Dimensions

Front Gap Dimensions



Component	mm
A	4.5 ± 0.5
B	4.5 ± 0.5
C	3.5 ± 0.5
D	3.5 ± 0.5
E	3.5 ± 0.5
F	3.5 ± 0.5

Rear Gap Dimensions



Component	mm
A	4.0 ± 0.5
B	4.5 ± 0.5
C	3.5 ± 0.5
D	2.0 ± 0.5

Body Exterior

Lock Carrier, Noise Insulation Frame Tightening Specifications

Component	Nm
Bumper bracket	5
Impact member	30
Lock carrier bolts [1)]	6
	23
Noise insulation frame bolts	30

[1)] For bolt tightening clarification, refer to ElsaWeb, *Lock Carrier with Attachments Assembly Overview*.

Front Fender, Engine Mount Brace Tightening Specifications

Component	Nm
Engine mount brace bolts	23
Engine mount brace nut	10
Fender brace bolts	23
Fender end plate screws	11
Front fender bolts	11

Front Hood Tightening Specifications

Component	Nm
Anti-rotation protection for striker pin bolt	2
Anti-theft protection brace	
- Bolt	11
- Nut	9
Center hood latch	11
Front hood gas filled strut ball head pin	23
Front hood hinge bolts	34
Front hood hinge nuts	34
Front hood lock brace bolt	11
Front hood lock brace nut	9
Front hood lock mount bolt	3
Front hood lock bolts	11
Front hood striker pin with catch nuts	9
Hood latch bolts	11
Left hood latch mount bolt	10
Right hood latch mount bolt	3

Rear Lid Tightening Specifications

Component	Nm
Rear lid ball stud	21
Rear lid hinge bolt/nuts	21
Rear lid latch bracket bolts	21
Rear lid lock nuts	21
Rear lid striker nuts	21

Door Tightening Specifications

Component	Nm
Actuating link bolt	2.5
Anti-theft cover-to-door lock	20
Bottom door hinge, lower part combination screw	32
Door handle bolts	2.5
Door lock bolts	20
Fuel filler door release cable	1.5
Fuel filler door unlock motor nut	9
Outer window shaft strip bolts	1.5
Upper door hinge, lower part nut	25
Window regulator motor bolts	3.5
Window regulator nuts	8

[1)] For bolt tightening clarification, refer to ElsaWeb, *Removal and Installation, Door*.

Convertible Top Tightening Specifications

Component	Nm
Convertible top bracket bolts	36
Convertible top bracket tensioning strap bolts	2
Convertible top control module housing	10
Convertible top end plate bolts	15
Convertible top frame cover bolts	5
Convertible top latch bolts	9
Convertible top latch bracket screws	8
Convertible top latch cover bolts	2.5
Convertible top latch handle bolt	8
Convertible top latch motor bolts	10
Convertible top rail tensioning strap bolts	1.5-3.0
Convertible top roof guide stop bolts	2
Convertible top seal bolts	3
Convertible top water tray bolts	2
Rail tensioning strap	2.5

Front Bumper and Impact Member Tightening Specifications

Component	Nm
Bumper cover bolts [1]	1.5
	2.0
	4
	5
Impact member bolts	30

[1] For bolt tightening clarification, refer to ElsaWeb, *Front Bumper Assembly Overview.*

Rear Bumper and Impact Member Tightening Specifications

Component	Nm
Impact member bolts/nuts [2]	2
	2.5
	4
	6.5
	23
Rear bumper cover bolts [1]	2.5
	4
	23

[1] For bolt tightening clarification, refer to ElsaWeb, *Rear Bumper Cover Assembly Overview.*

[2] For bolt tightening clarification, refer to ElsaWeb, *Rear Bumper Assembly Overview.*

Rear Spoiler Tightening Specifications

Component	Nm
Rear spoiler base plate bolts	3
Rear spoiler base plate nuts	2
Rear spoiler center part collar bolts	7

Radiator Grille Tightening Specification

Component	Nm
Radiator grille nuts and bolts	0.9 - 2.0

Rear View Mirror Tightening Specifications

Component	Nm
Mirror adjusting unit bolts	2
Mirror base cover bolts	6.5

Storage Compartment, Center Console, Central Tube Tightening Specifications

Component	Nm
Center console bolts and nuts [1]	1
	2.5
	3.5
	8
Central tube bolts [2]	3.5
	9
	20
	23
Glove compartment bolts	1.6 - 2.5
Lower center storage compartment cover bolts	2
Steering column trim bolts	2.5 - 3

[1] For bolt tightening clarification, refer to ElsaWeb, *Center Console Assembly Overview.*

[2] For bolt tightening clarification, refer to ElsaWeb, *Central Tube Assembly Overview.*

Instrument Panel Tightening Specifications

Component	Nm
Instrument panel cover bolts/nuts	2.5
Panel trim bolts	1.5 – 3.5

Passenger Protection Tightening Specifications

Component	Nm
Airbag control module (J234) nuts	9
Automatic belt retractor bolts	45
Battery interrupt igniter (N253) nuts	15
Belt anchor bolts	55
Belt latch bolts - bucket seat only	22
Belt latch bolts	34
Belt guide bolts	45
Belt retainer bolts	4.5 - 6
Crash sensor bolts	5 - 9
Driver side knee airbag mount nuts and bolts	9
Front seat belt guide bolts	5
Front side airbag bolts	10
Head curtain airbag bolts	5
LATCH child seat anchor seat pan bolts	12
Passenger airbag bolts/nuts	7
Passenger side airbag bolts	10

Passenger Protection Tightening Specifications *(cont'd)*

Component	Nm
Passenger side knee airbag mount nuts and bolts [1)]	9
Seat position sensor bolts	1.3

[1)] Replace fastener(s).

Interior Trim Tightening Specifications

Component	Nm
Basic interior trim bolts	1.3 - 3.5
Central tube bolt	20
C-pillar trim bolts	3.5
Footrest cover bolts	3.5
Front passenger airbag unit nut [1)]	7
Instrument cluster bolts	2.5
Instrument panel bracket bolts	20
Intermediate plate-to-right support	3.5
Left center section bracket bolt	9
Luggage compartment side trim bolts	4
Rear side trim bolts	1
Rear lid trim bolts	1.8
Right support (passenger side)	9
Rollover protection trim bolts	3
Steering column mounting bracket bolt	20
Sun visor bolts	3.5
Support for the front passenger airbag unit	9
Wind deflector bolts	7

[1)] Replace fastener(s).

Seat Frames Tightening Specifications

Component	Nm
Backrest frame bolts	4
Backrest bolts	40
Backrest nuts	55
Cable clip-to-seat pan	3.5
Driver seat height adjustment motor or front passenger's seat height adjustment motor self-locking	31
Front backrest self-locking screws	36
Front seat frame bolts	40
Front seat pan bolts	29
Lower seat pan frame bolt [1)]	27
Seat adjustment control head screws	0.4
Seat angle adjustment motor self locking bolt [1)]	22
Seat angle adjustment motor bolts	14
Seat height adjuster screws	8 - 12
Seat storage compartment bolts	3.5
Sill side trim retaining bracket screws	2 - 3.5
Storage compartment	3.5

[1)] Replace fastener(s).

HEATING, VENTILATION AND AIR CONDITIONING

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

Fastener Tightening Specifications

Component	Nm
Air intake grille	3.5
Compressor drive plate	
Denso version 1	35
Denso version 2	30
Compressor mounting bolts	25
Coolant pipes-to-heater core	2.5
Expansion valve-to-evaporator bracket	10
Fluid reservoir on condenser	10
High pressure sensor	8
Sanden drive plate	25
Oil drain plug	
Denso	30
Sanden	10
Pressure relief valve	
Denso	10
Sanden	14.5
Refrigerant lines-to-compressor	25
Refrigerant lines-to-condenser	12
Refrigerant lines-to-expansion valve	10

ELECTRICAL EQUIPMENT

Communication Tightening Specifications

Component	Nm
Antenna amplifier 2 nut [1]	6
Antenna amplifier 2 screw [2]	2
Antenna amplifier 4 screw	2
Antenna mast nut [2]	4
Antenna selection control module screw	2
Center mid/high range loudspeaker screw	1
Center speaker nut [1]	2
Center speaker screw	2
Digital sound system control module nut	5
Digital sound system control module (BOSE®) nut	5
Digital sound system control module screw	3
Digital sound system control module (BOSE®) screw	3
External audio source connection screw	1
Left front bass speaker/right front bass speaker screw	3.5
Left front midrange speaker/right front midrange speaker screw	2
Left rear and right rear mid/low range loudspeaker screws	2
Navigation system/telephone antenna screw [2]	2
Radio antenna 2 screw	2
Radio, telephone, navigation system antenna nut [1]	6
Satellite antenna nut	6
Telephone base plate screw	2
Windshield antenna suppression filter nut	6

[1] Coupe
[2] Roadster

Battery, Starter, Generator, Cruise Control Tightening Specifications

Component	Nm
Battery ground cable nut	6
Battery jump start terminal nut	5.5
Battery jump start pin	9
Battery positive cable nut	15
Battery retaining bracket nut	20
Generator bolts	23
Generator terminal 30/B+	15
Main fuse box nut	6
Starter ground wire nut	23
Starter terminal B+ nut	15
Starter wiring harness bracket nut	23

Instruments Tightening Specifications

Component	Nm
Horn nut	9
Instrument cluster	2.5
Radio frequency controlled clock receiver	2.5

Windshield Wiper/Washer Tightening Specifications

Component	Nm
Headlamp washer spray nozzle	2.5
Windshield wiper frame bracket nut	6 - 8
Wiper arm nut	17

Exterior Lights, Switches Tightening Specifications

Component	Nm
Exterior rearview mirror housing-to-base	9.5
Exterior rearview mirror mount	2
Exterior rearview mirror turn signal bulb	0.4
Fog lamp housing	5
Headlamp beam adjustment motor	2
Headlamp housing bracket screw	4.5
Headlamp housing cover	2
Headlamp range control module	3
License plate lamp	0.8
Rear fog lamp	1.2
Steering column electronic systems control module	0.4
Tail lamp bulb holder	1.7
Tail lamp housing	3.5

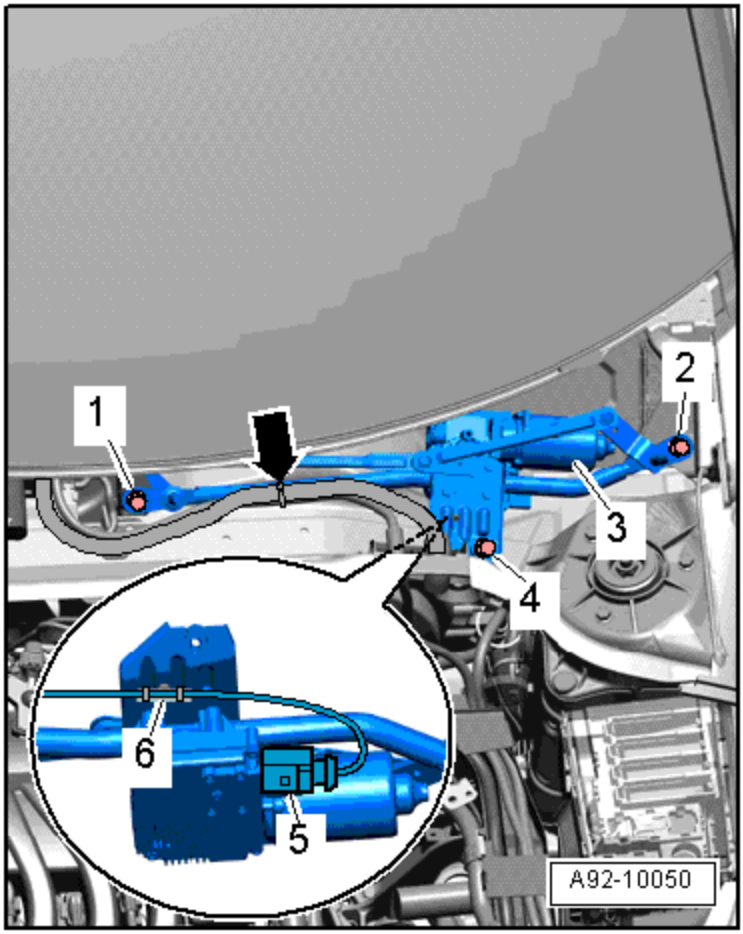
Interior Lights, Switches Tightening Specification

Component	Nm
Alarm horn nut	9

Wiring Tightening Specifications

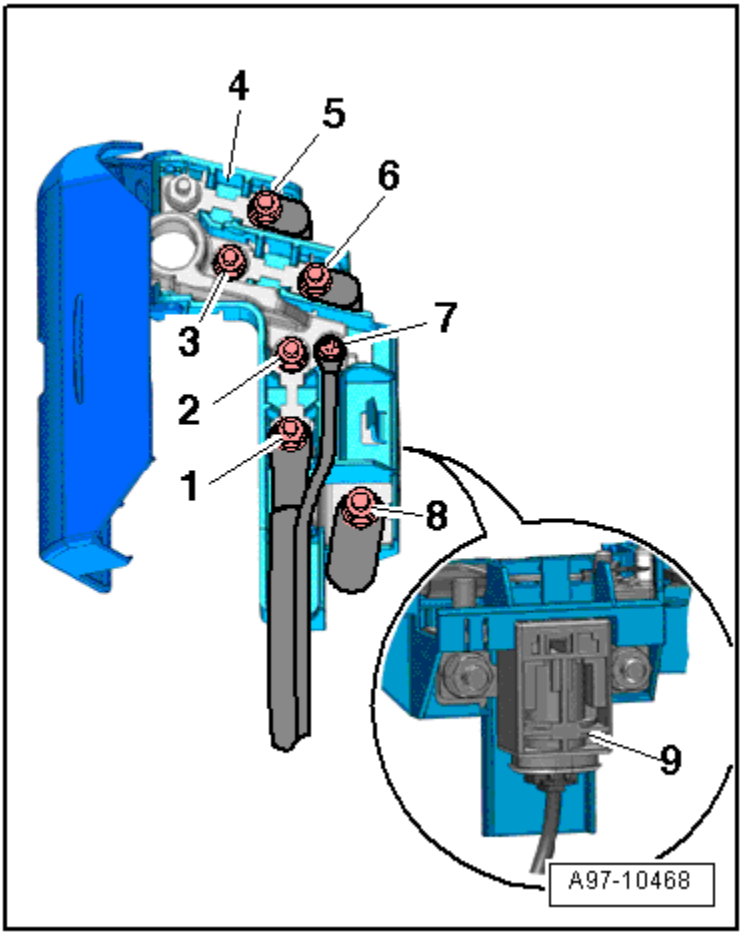
Component	Nm
Engine compartment E-box wire nuts	7.5
Left instrument panel fuse panel	3

Windshield Wiper Motor Tightening Specification



Step	Component	Nm
1	Tighten bolts 1, 2 and 4 insequence	Hand-tighten
2	Tighten bolts 1, 2 and 4 insequence	8

Fuse Panel D Tightening Specification



Item	Component	Nm
1	Electrical wire	7.5
2	Nut	9
3	Nut	9
4	Fuse panel D inside the luggage compartment	-
5	Electrical wire	7.5
6	Electrical wire	7.5
7	Bolt	3.5
8	Electrical wire	15
9	Battery interrupt igniter (N253)	-

DTC CHART

Engine Code – 2.0L CETA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake (A) Camshaft Position Slow Response (Bank 1)	Signal change < 3 - 4 °CRK/s
P008A	Fuel Pressure Out of Range	Actual pressure < 0.08 MPa
P008B	Fuel Pressure Out of Range	Actual pressure > 0.08 MPa
P0010	Intake (A) Camshaft Position Actuator Circuit/Open (Bank 1)	Signal voltage > 4.4 - 5.6 V
P0011	Intake (A) Camshaft Position Timing - Over-Advanced (Bank 1)	Target error (Stuck position) > 7° CA
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1, Sensor A)	Adaptive vs. target values > 20 °CA
P025A	Fuel Pump Open Circuit	Signal voltage > 4.4 - 5.6 V
P025C	Fuel Pump Short to Ground	Signal voltage < 2.15 - 3.25 V
P025D	Fuel Pump Short to B+	Signal current > 1.1 A
P0030	HO2S Heater Control Circuit (Bank 1, Sensor 1) Open Circuit	Heater voltage 4.4 - 5.6 V
P0031	HO2S Heater Control Circuit Low (Bank 1, Sensor 1) Short to Ground	Heater voltage 2.15 - 3.25 V
P0032	HO2S Heater Control Circuit High (Bank 1, Sensor 1) Short to B+	Heater current > 3.0 A
P0036	HO2S Heater Control Circuit (Bank 1, Sensor 2) Open Circuit	Heater voltage, 4.50 - 5.50 V
P0037	HO2S Heater Control Circuit Low (Bank 1, Sensor 2) Short to Ground	Heater voltage 2.15 - 3.25 V
P0038	HO2S Heater Control Circuit High (Bank 1, Sensor 2) Short to B+	Heater current > 3.0 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0042	HO2S Heater Circuit (Bank 1, Sensor 3) open circuit SULEV	Heater voltage 4.50 - 5.50 V
P0043	HO2S Heater Control Circuit Low (Bank 1, Sensor 2) Short to Ground	• SULEV Heater voltage < 3 V • ULEV Heater voltage < 3 V
P0044	HO2S Heater Control Circuit High (Bank 1, Sensor 2) Short to B+	Heater current > 2.70 - 5.50 A
P050A	Idle Air Control System RPM Lower or Higher Than Expected	Out of range - Low • Engine speed deviation < 80 RPM Out of range - High • Engine speed deviation > 80 RPM
P052A	Idle Air Control System Response Check	Signal change > 3.5° CA
P0068	MAP/MAF – Throttle Position Correlation	• Plausibility with fuel system load calculation < 50% • Plausibility with fuel system load calculation > 50%
P0070	Ambient Air Temperature Sensor Short to B+	Ambient air temp < 45.0 °C
P0071	Rationality Check	• Difference value AAT-ECT @ engine start (depending on engine-off time) > 25 - 40K and • Difference value AAT-IAT engine start (depending on engine-off time) > 25 - 40K
P0072	Ambient Air Temperature Sensor short to Ground	Ambient air temp >87.0° C
P0087	Fuel Rail/System Pressure - Too Low	• Pressure control activity > 4.00 MPa and • Fuel trim activity 1.30 - 16.00
P0088	Fuel Rail/System Pressure - Too High	Fuel rail pressure > 13.9 mPa
P0089	Fuel Pressure Regulator 1 Performance	Actual pressure deviation • < 100 kPa • > 100 kPa
P0100	Mass or Volume Air Flow A Circuit	MAF sensor signal 0 µs

DTC	Error Message	Malfunction Criteria and Threshold Value
P0101	Mass or Volume Air Flow A Circuit Range/Performance	• Mass air flow vs. lower threshold model < 3 - 197 kg/h • Mass air flow vs. upper threshold > 6 kg/h
P0102	Mass or Volume Air Flow A Circuit Low Input	MAF sensor signal < 66 µs
P0103	Mass or Volume Air Flow A Circuit High Input	MAF sensor signal > 4.5 m Sec.
P0106	Manifold Absolute Pressure/ BARO Sensor Range/ Performance	• Boost pressure signal sensor signal < - 13 kPa • vs. altitude sensor signal 23 kPa
P0107	Manifold Absolute Pressure/ BARO Sensor Range/ Performance	• Short to ground signal voltage < 0.20 V • Range check manifold pressure signal < 0.00 hPa
P0108	Manifold Absolute Pressure/ BARO Sensor Range/ Performance	• Short to battery / open circuit signal voltage > 4.80 V • Range check manifold pressure signal > 5119.92 hPa
P0111	Intake Air Temperature (Sensor 1) Rationality Check ULEV Only	• Difference in value: IAT-ECT @ engine start (depending on engine-off time, 25 - 40 K and • Difference in value between IAT and AAT at engine start (depending on engine off time) > 25 - 40 K
P0112	Intake Air Temperature (Sensor 1) Circuit Low Input	Intake air temperature > 141°C
P0113	Intake Air Temperature (Sensor 1) Circuit High Input	Intake air temperature < 45.75°C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0116	Engine Coolant Temperature (Sensor 1) Circuit Range/ Performance. Only SULEV	Stuck high • No change of signal, < 1.5 K Stuck low: • No change of signal, < 1.5 K Stuck in range • 88.5 - 109.5 °C and • No change on signal, 1.5 K • Delta ECT < 2.25 - 3.75 K and • ECT@ engine start (depending on engine off time) > 50 °C • Delta ECT < 2.25 - 3.75
P0117	Engine Coolant Temperature Sensor 1 Circuit Low Input	Engine coolant temperature > 141 °C
P0118	Engine Coolant Temperature Sensor 1 Circuit Open	Engine coolant temperature < 43.5 °C
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	• TPS 1 - TPS 2 > 6.30% and • Actual TPS 1 calculated value > actual TPS 2 calculated value or • TPS 1 calculated value > 9.00%
P0122	Throttle/Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.25 V
P0123	Throttle/Pedal Position Sensor A Circuit High Input	Signal voltage > 4.75 V
P0130	O2 Sensor Circuit (Bank 1, Sensor 1)	O2S ceramic temperature < 640°C
P0131	O2 Sensor Circuit (Bank 1, Sensor 1) Low Voltage	Virtual mass 1.66 - 2.36 V
		Nernst voltage 1.42 - 2.1 v
		Adjustment voltage 0 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass 2.61 - 3.41 V
		Nernst voltage 3.42 - 4.26 V
		Adjustment voltage 4.75 - 7.25 V
P0133	O2 Circuit Slow Response (Bank 1, Sensor 1)	• O2S signal front vs. modeled O2S signal ratio ≤ 0.3 • Cycles completed ≥ 40

DTC	Error Message	Malfunction Criteria and Threshold Value
P0135	O2 Heater Circuit (Bank 1, Sensor 1)	• Out of range-high • O2S ceramic temperature < 715 °C and • Heater duty cycle, 100% • Rationality check: • Ceramic temperature, < 715 °C and • Time after O2S heater on 40 Sec
P0136	O2 Circuit (Bank 1, Sensor 2)	• Delta voltage one step at heater switching > 2.00 V and • Cycles completed ≥ 6
P0137	O2 Circuit Low Voltage (Bank 1, Sensor 2)	• Signal voltage < 0.06 V for time > 3 Sec. and • Difference of sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) < 0.01 V
P0138	O2 Circuit High Voltage (Bank 1, Sensor 2)	Signal voltage > 1.26 V for > 5 Sec.
P0139	O2 Circuit Slow Response (Bank 1 Sensor 2)	• O2S signal rear during fuel cut off > 160 mV • O2S signal rear < 624 • O2S signal rear > 624
P013A	Oxygen Sensors Rear (Binary LSF)	• EWMA filtered max differential transient time at fuel cut off ≥ 0.7 Sec and • Number of checks ≥ 3.00 (initial phase and step function)
P0140	O2 Circuit No Activity Detected (Bank 1, Sensor 2)	Signal voltage, 401 - 499 mV
P0141	O2 Heater Circuit (Bank 1, Sensor 2) Out of Range	Heater resistance, 1920 - 25920 Ω
P0142	O2 circuit (Bank 1 Sensor 3) Heater Check	• Delta voltage one step at heater switching, > 2.0 V • Number of checks, 10

DTC	Error Message	Malfunction Criteria and Threshold Value
P0143	O2 Circuit (Bank 1 Sensor 3) Short to Ground	• Cold condition, signal voltage, < 59.6 mV • Warm condition, signal voltage < 59.6 mV • Short to B+, voltage > 1.26 V
P0144	O2 Circuit (Bank 1 Sensor 3) Short to Battery +	Signal voltage > 1.26 V
P0145	O2 Circuit Slow Response (Bank 1, Sensor 2)	• EWMA filtered transient time at fuel cut off > 0.4 Sec. • In voltage range, 401.4 - 201.2 mV • Number of checks (initial phase), > 3 • Number of checks (step function), > 3
P0146	O2 Circuit (Bank 1 Sensor 3) Open Circuit	• Signal voltage, 401.4 - 499 mV • Internal resistance, 40 KΩ
P0147	O2 Circuit (Bank 1 Sensor 3) Heater Check	Heater resistance 1056 - 11656 Ω
P0169	Incorrect Fuel Composition	• Cylinder individual interventions on injection path incorrect • Injection cut off incorrect • Comparison with fuel quantity incorrect • Internal check failed • Correction factor incorrect • Fuel quantity incorrect • ABS difference between predicted and real air mass > 8.30%
P0171	System Too Lean (Bank 1)	Adaptive value > 6.0 only
P0172	System Too Rich (Bank 1)	Adaptive value < 6.0 only
P0190	Fuel Rail Pressure Sensor A Circuit	Signal voltage > 4.8 V
P0191	Fuel Rail Control Valve, High Pressure Side	Actual pressure > 18 MPa
P0192	Fuel Rail Pressure Sensor A Circuit Low Input	Signal voltage < 0.2 V
P0201	Injector Circuit/Open - Cylinder 1	• Low side signal current < 2.1 A
P0202	Injector Circuit/Open - Cylinder 2	• Low side signal current < 2.1 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0203	Injector Circuit/Open - Cylinder 3	• Low side signal current < 2.1 A
P0204	Injector Circuit/Open - Cylinder 4	• Low side signal current < 2.1 A
P0221	Throttle/Pedal Position Sensor/Switch B Circuit Range/Performance	• TPS 1 - TPS 2 > 6.30% and • Actual TPS 2 calculated value > actual TPS 1 calculated value or • TPS 2 calculated value > 9.00%
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 > 4.75 V
P0234	Turbocharger/Supercharger Overboost Condition Rationality Check High	Modeled pressure 30 - 127 kPa
P0236	Turbocharger/Supercharger Boost Sensor A Plausibility Check ULEV	Difference in boost pressure signal vs. altitude sensor signal > 230 hPa or Difference in boost pressure signal vs altitude sensor signal, <130 hPa
P0237	Turbocharger/Supercharger Boost Sensor A Circuit Low	Signal voltage < 0.2 V
P0238	Turbocharger/Supercharger Boost Sensor A Circuit High	Signal voltage > 4.88 V
P0243	Turbocharger/Supercharger Wastegate Solenoid A	Signal voltage > 4.4 - 5.6 V
P0245	Turbocharger/Supercharger Wastegate Solenoid A Low	Signal voltage < 2.15 - 3.25 V
P0246	Turbocharger/Supercharger Wastegate Solenoid A High	Signal current > 2.2 A
P0261	Cylinder 1 Injector Circuit Low	Signal current < 2.1 A
P0262	Cylinder 1 Injector Circuit High	Signal current > 14.70 A
P0264	Cylinder 2 Injector Circuit Low	Signal current < 2.1 A
P0265	Cylinder 2 Injector Circuit High	Signal current > 14.70 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0267	Cylinder 3 Injector Circuit Low	Signal current < 2.1 A
P0268	Cylinder 3 Injector Circuit High	Signal current > 14.70 A
P0270	Cylinder 4 Injector Circuit Low	Low side signal current < 2.1 A
P0271	Cylinder 4 Injector Circuit High	Signal current > 14.70 A
P0299	Turbocharger/Supercharger Underboost Rationality Check Low	Difference of set boost pressure vs. actual boost pressure value > 15 KPa
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	• Normal closed position, unable to reach • Signal voltage < 2.62 or > 4.65 V or • Normal open position, unable to reach signal voltage < 0.35 or > 2.38 V
P2008	Intake Manifold Runner Control Circuit/Open (Bank 1)	• Signal duty cycle > 80% • ECM power stage failure • Deviation vs. calculated value > 5% • ECM power stage failure
P2009	Intake Manifold Runner Control Circuit Shorted (Bank 1)	Signal voltage 2.15 - 3.25 V
P2010	Intake Manifold Runner Control Circuit Shorted to B+ (Bank 1)	Signal current > 2.20 A
P2014	Intake Manifold Runner Position Sensor/Switch Circuit (Bank 1)	Signal voltage > 4.82 V
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance (Bank 1)	• Signal duty cycle > 80% • Deviation vs. calculated value > 5%
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low (Bank 1)	Signal voltage < 0.18 V
P2088	Camshaft Position A Actuator Control Circuit Low (Bank 1) Short to Ground	Signal voltage < 2.15 - 3.25 V
P2089	Camshaft Position A Actuator Control Circuit High (Bank 1) Short to B+	Signal voltage < 2.15 - 3.25 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2096	Post-Catalyst Fuel Trim System Too Lean (Bank 1)	Deviation lambda control loop < 3%
P2097	Post-Catalyst Fuel Trim System Too Rich (Bank 1)	Deviation lambda control loop > 3%
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 Misfire Detected	• Emission threshold 1st misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 2.5 - 20.0%
P0301	Cylinder 1 Misfire Detected	• Emission threshold 1st misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 2.5 - 20.0%
P0302	Cylinder 2 Misfire Detected	• Emission threshold 1st misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 2.5 - 20.0%
P0303	Cylinder 3 Misfire Detected	• Emission threshold 1st misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 2.5 - 20.0%
P0304	Cylinder 4 Misfire Detected	• Emission threshold 1st misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 2.5 - 20.0
P0321	Ignition/Distributor Engine Speed Input Circuit Range/ Performance	Counted teeth versus reference, incorrect > 1
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	Comparison with phase sensor no signal
P0324	Knock Control System Error	Zero test procedure failed
P0327	Knock Sensor 1 Circuit Low Input (Bank 1) Short to Ground, Port B	• Lower threshold < 70 V
P0328	Knock Sensor 1 Circuit signal range check (Bank 1)	Upper threshold 4.5 - 30.0 V
P0332	Knock Sensor 2 Circuit	Lower threshold 0.05 - 0.38 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0333	Knock Sensor 2 Circuit	Upper threshold 4.5 - 30.0 V
P0340	Camshaft Position Sensor A Circuit (Bank 1 or Single Sensor)	Cam adaptation values out of range • > 20° KW • < -20° KW • Difference of adapted and actual values > 9° KW
P0341	Camshaft Position Sensor A Circuit Range/Performance (Bank 1 or Single Sensor)	Signal pattern incorrect
P0342	Camshaft Position Sensor A Circuit Low Input (Bank 1 or Single Sensor)	Signal voltage low and 12 crankshaft revs
P0343	Camshaft Position Sensor A Circuit High Input (Bank 1 or Single Sensor)	Signal voltage high and 12 crankshaft revs
P0351	Ignition Coil A Primary/ Secondary Circuit	Signal current < 4.95 to 8.82 mA
P0352	Ignition Coil B Primary/ Secondary Circuit	Signal current 4.95 to 8.82 mA
P0353	Ignition Coil C Primary/ Secondary Circuit	Internal check, failed
P0354	Ignition Coil D Primary/ Secondary Circuit	Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	System Check After SAI PZEV Only	Deviation SAI pressure > 20.0 hPa
P0413	Open Circuit PZEV Only	Signal voltage 9.25 - 11.25 V
P0414	Short to Ground PZEV Only	Signal voltage < 6.00 V
P0415	Short to B+ PZEV Only	Signal current 2.20 - 4.20 A
P0418	Air Pump Relay Open Circuit PZEV Only	Signal voltage 4.50 - 5.50 V
P0420	Catalyst System (Front) Efficiency Below Threshold (Bank 1) PZEV Only	Amplitude ratio O2S < 1

DTC	Error Message	Malfunction Criteria and Threshold Value
P0420	Catalyst System (Main) Efficiency Below Threshold (Bank 1) PZEV Only	• Measured OSC / OSC of borderline catalyst value for main catalyst , <0.90 while • Value for front catalyst, <2.00
P0420	Catalyst System (Only Bin 5, ULEV) Efficiency Below Threshold (Bank 1)	Measured OSC/OSC of borderline catalyst. EWMA filter value for catalyst < .20
P0441	Evaporative Emission System Incorrect Purge Flow	Deviation less than -6 - 9.5% lambda controller and < 30% idle controller deviation
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.95 - 2.15 Sec.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage > 4.40 - 5.60 V
P0455	Evaporative Emission System Leak Detected (Gross Leak/ No Flow)	Time for pressure drop < 0.95 Sec.
P0456	Evaporative Emission System Leak Detected (Very Small Leak)	1.85 - 2.15 < x < 4.5 - 6.5 [s]
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage < 2.15 - 3.25 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.2 A
P0491	Secondary Air System Insufficient Flow. Flow Check During Catalyst Heating. PZEV only	SAI pressure measured with SAI pressure sensor vs modeled < 0.6 (0.62) %

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor A Range/Performance	VSS signal < 2 mph
P0501	Vehicle Speed Sensor A Range/Performance Only ULEV	VSS signal < 4 km/h

DTC	Error Message	Malfunction Criteria and Threshold Value
P0503	Vehicle Speed Sensor A Out of Range/High	Vehicle speed > 200 km/h
P0506	Idle Air Control System - RPM Lower Than Expected	Engine speed deviation < -80 RPM
P0507	Idle Air Control System - RPM Higher Than Expected	Engine speed deviation > 80 RPM
P050A	Cold Start Monitoring	Out of range low • Engine speed deviation > 80 RPM Out of range high • Engine speed deviation < 80 RPM
P050B	Cold Start Idle Air Control System Performance	Difference between commanded spark timing vs. actual value > 18.00%
P053F	Fuel Rail Control Valve High Pressure Side	• Difference between target pressure vs. actual pressure < -1.50 MPa • Difference between target pressure vs. actual pressure > 1.50 MPa

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0601	Internal Control Module Memory Check Sum Error	Internal check sum, incorrect
P0604	Internal Control Module Random Access Memory (RAM) Error	Write ability check, failed
P0605	Internal Control Module Read Only Memory (ROM) Error	Check sum incorrect
P0606	CAN: Internal Fault	RAM error memory check sum error
P0606	ECM Processor	Powerup calibration • EEPROM check, failed
P062B	Injection Valves Communication	Internal logic failure

DTC	Error Message	Malfunction Criteria and Threshold Value
P0627	Fuel Pump A Control Circuit/ Open	• Internal error fuel pump control unit • Feedback from fuel pump control unit pump blocked short circuit to battery +, ground or open circuit
P0638	Throttle Actuator Control Range/Performance (Bank 1)	Rationality check: • Time to close to reference point > 0.56 Sec. and • Reference point 2.88% Signal range check: • Duty cycle > 80% and • ECM power stage, no failure
P0641	Sensor Reference Voltage A Circuit/Open	Internal communication failure
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage < 4.6 - 5.0 V
P0643	Sensor Reference Voltage A Circuit High	5V supply voltage > 5.0 - 5.4 V
P0651	Sensor Reference Voltage B Circuit/Open	Internal communication failure
P0652	Sensor Reference Voltage B Circuit Low	Signal voltage < 4.6 - 5.0 V
P0653	Sensor Reference Voltage B Circuit High	5V supply voltage > 5.4 - 5.4 V
P0657	Actuator Supply Voltage A Circuit/Open	Signal voltage > 4.4 - 5.6 V
P0658	Actuator Supply Voltage A Circuit Low	Signal voltage < 2.15 - 3.25 V
P0659	Actuator Supply Voltage A Circuit High	Signal current > 1.1 A
P0685	ECM/PCM Power Relay Control Circuit/Open	• Signal voltage 2.6 - 3.7 V • Sense circuit voltage > 6 V
P0686	ECM/PCM Power Relay Control Circuit Low	• Signal voltage 2.6 - 3.7 V • Sense circuit voltage > 6 V
P0687	ECM/PCM Power Relay Control Circuit High	• Signal current > 1.4 - 0.7 A • Sense circuit voltage < 6 V
P0688	ECM/PCM Power Relay Sense Circuit	• Sense voltage < 3.0 V • Sense voltage, > 3.0 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0697	Sensor Reference Voltage C Circuit/Open	Internal communication failure
P0698	Sensor Reference Voltage C Circuit Low	Signal voltage < 4.6 - 5.0 V
P0699	Sensor Reference Voltage C Circuit High	5V supply voltage > 5.0 - 5.4 V
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus	Global time out
U0100	Lost Communication with ECM/PCM A	• Failure of all CAN engine messages, time out > 490 mSec. • Failure of all CAN engine messages, but not all CAN messages, time out > 1010 mSec.
U0101	Lost Communication with TCM	CAN communication with TCM • Time out check No message received by ECM
U0121	CAN ABS Brake Unit	CAN communication with ABS, time out
U0146	CAN Gateway A	CAN communication with gateway, time out
U0155	CAN Instrument Cluster	Received CAN message - no message
U0302	Software Incompatibility with Transmission Control Module	AT vehicle ECM coded as MT vehicle
U0323	CAN: Instrument cluster Audi only	Ambient temperature value module not encoded for ambient temp sensor, 00h
U0402	CAN Communication with TCM	Data length code transmitted, incorrect
U0404	Invalid Data Received From Gear Shift Control Module	• If the value of message counter is permanent, constant, or change exceeds a threshold, increment an event counter • Maximum change of message counter > 5
U0415	CAN link to speed sensor	Vehicle speed > 325 km/h

DTC	Error Message	Malfunction Criteria and Threshold Value
U0415	CAN: Vehicle Speed Sensor	• Speed sensor signal: initialization error 655.34 km/h • Speed sensor signal: low voltage error 655.33 km/h • Speed sensor signal: sensor error 655.35 km/h • Vehicle speed >/= 325 km/h
U0422	CAN: Instrument cluster	Ambient temperature value initialization, Audi 01 h
U0423	CAN: Instrument cluster	Received CAN message, implausible message
U0447	CAN Gateway	CAN message incorrect
U1030	LIN Communication	Not active
U102F	LIN Communication	Time out
U102E	LIN Communication	LIN message, incorrect

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P1114	Internal Resistance Too Large (Bank 1, Sensor 2)	Heater resistance, (128-648)*(8-40)1.02-25.9 k Ω (dep. on mod. exhaust temperature and heater power)
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	• Pressure control activity > 0.25 MPa and • Fuel trim activity < 0.80
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Pressure control activity < 0.14 mPa and • Fuel trim activity > 1.5
P12A4	Fuel Rail Pump Control Valve Stuck Closed	• Pressure control activity, < 6.00 mPa and • Fuel trim activity, 0.90 - 1.151.15
P13EA	Ignition Timing Monitor	Difference between commanded spark timing and actual value > 22%

DTC	Error Message	Malfunction Criteria and Threshold Value
P150A	Engine Off Time	• Difference between engine off time and ECM after run time < -12.0 Sec. • Difference between engine off time and ECM after run time > 12.0 Sec.
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	• Duty cycle >80% and • ECM power stage, no failure • Deviation throttle valve angles vs. calculated value 4.0 - 50.0%
P2106	Throttle Actuator Control System Functional Check	Internal check
P2110	Throttle Actuator Control System - Forced Limited RPM	Engine load out of range
P2122	Throttle/Pedal Position Sensor/Switch D Circuit Low Input	Signal voltage < 0.63 V
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High Input	Signal voltage > 4.8 V
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low Input	Signal voltage < 0.29 V
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.5 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage sensor 1 vs 2, > 0.12 - 0.70 V
P2146	Fuel Injector Group A Supply Voltage Circuit / Short to Ground	Signal current < 2.6 A
P2149	Fuel Injector Group B Supply Voltage Circuit / Short to Ground	Signal current > 14.90 A
P2177	Fuel System	Adaptive value > 26%
P2178	Fuel System	Adaptive value < 26%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2181	Cooling System Performance	• ECT < 76.5 °C and • Mass air integral 4.0 - 22.0 kg/h
P2184	Fan Control Coolant Temperature Sensor	ECT outlet > 141 °C
P2185	Fan Control Coolant Temperature Sensor	ECT outlet < -43 °C
P2187	Fuel System	Adaptive value > 6.00%
P2188	Fuel System	Adaptive value < 6.0%
P2195	O2 Sensor Signal Biased/ Stuck Lean (Bank 1, Sensor 1)	Lambda value > 1.08 and O2S rear signal > 0.777 V
P2196	O2 Sensor Signal Biased/ Stuck Rich (Bank 1, Sensor 1)	Lambda value < 0.92 and O2S rear signal < 0.16 V
P2231	O2 Sensor Signal Circuit Shorted to Heater Circuit	Delta O2S signal front > 190 uA
P2237	O2 Sensor Positive Current Control Circuit/Open (Bank 1, Sensor 1)	• Lambda set value < 0.97 or • Lambda value setting > 1.03 • O2S signal front 1.495 - 1.507 V
P2243	O2 Sensor Reference Voltage Circuit/Open (Bank 1, Sensor 1)	• O2S signal front > 4.70 V and Internal resistance > 1000 Ω • O2S signal front < 0.30 V and Internal resistance > 1000 Ω
P2257	Air Pump Relay Short to Ground PZEV Only	Signal voltage < 3.00 V
P2258	Air Pump Relay Short to B+ PZEV Only	Signal current 0.60 - 1.20 A
P2270	O2 Circuit Slow Response (Bank 1, Sensor 3) ULEV	Rationality check, O2S signal rear, < 0.620 - 0.654 mV
P2270	O2 Circuit Slow Response (Bank 1, Sensor 2) SULEV	Rationality check, O2S signal rear, < 0.557 - 0.630 mV
P2271	O2 Circuit (Bank 1, Sensor 3) ULEV	• Measurement range from fuel cut-off to voltage threshold, ≤ 152.3 mV • Number of checks (initial phase), ≥ 1
P2271	O2 Circuit (Bank 1, Sensor 2) SULEV	Rationality check, O2S signal rear, < 0.557 - 0.630 mV

DTC	Error Message	Malfunction Criteria and Threshold Value
P2274	O2 Circuit Slow Response (Bank 1, Sensor 3 SULEV	Rationality check, O2S signal rear, < 0.620 - 0.654 mV
P2275	O2 Circuit Slow Response (Bank 1, Sensor 3) SULEV	• Measurement range from fuel cut-off to voltage threshold, < 152.3 mV • Number of checks (initial phase), ≥ 1 • ULEV • O2S signal rear, > 0.620 - 0.654 mV
P2279	Intake Air System Leak	• Threshold to detect a defective system > 1.33 - 1.6 and • Ratio of the tie system defective during the measurement window to the whole duration of the measurement window > 0.60
P2293	Fuel Pressure Regulator 2 Performance	• Difference between target pressure vs. actual pressure: > 1.50 mPa
P2294	Fuel Pressure Regulator 2 Control Circuit	• Signal voltage 2.3 - 2.7 V
P2294	Fuel Pressure Regulator 2 Control Circuit Rationality check	Signal pattern incorrect
P2295	Fuel Pressure Regulator 2 Control Circuit Low Short to Ground	Signal voltage < 1.80 - 2.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.9 V

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Signal voltage < 0.5 - 1.0 V
P2301	Ignition Coil A Primary Control Circuit High	Signal current > 5.2 - 6.0 V
P2303	Ignition Coil B Primary Control Circuit Low	Signal voltage < 0.5 - 1.0 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2304	Ignition Coil B Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V
P2306	Ignition Coil C Primary Control Circuit Low	Signal voltage < 0.5 - 1.0 V
P2307	Ignition Coil C Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V
P2309	Ignition Coil D Primary Control Circuit Low	Signal voltage < 0.5 - 1.0 V
P2310	Ignition Coil D Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.4 - 5.6 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.15 to 3.25 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current > 1.1 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > 1 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	• > 0.36 Sec.
P2414	O2 Sensor Exhaust Sample Error (Bank 1, Sensor 1)	Signal voltage 2.5 - 3.2 V
P2431	Rationality check	Difference between SAI pressure and ambient pressure not -25.0 - 25.0 hPa
P2432	Signal Range Check	Signal voltage < 0.40 V
P2433	Signal Range Check	Signal voltage > 4.65 V
P2440	System Check After SAI PZEV Only	SAI pressure measured with SAI pressure sensor vs. modeled while SAI valve closed < 0.55%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2539	Low Pressure Fuel System Sensor Circuit	Signal voltage > 4.9 V
P2540	Low Pressure Fuel System Sensor Circuit Range/ Performance	Actual pressure deviation < 800 kPa < 80 kPa
P2541	Low Pressure Fuel System Sensor Circuit Low	Signal voltage < 0.2 V
P2568	RIS Sensor Wrong Signal PZEV Only	• Signal of sensor mismatched with radiator or • Measured temp. gradients during 3 measure windows always, < 0.25 K/2s
P2569	RIS Sensor Signal Low PZEV Only	Signal voltage < 0.2 V
P2570	RIS Sensor Signal Always High PZEV Only	Signal voltage > 5.0 V
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 4.81 V

DTC CHART

Engine Code – 2.0L CDMA

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake (A) Camshaft Position Slow Response (Bank 1)	Signal change < 3...4 °CRK/s
P008A	Fuel Pressure Out of Range	Actual pressure < 0.08 MPa
P008B	Fuel Pressure Out of Range	Actual pressure > 0.08 MPa
P0010	Intake (A) Camshaft Position Actuator Circuit/Open (Bank 1)	Signal voltage > 4.4 - 5.6 V
P0011	Intake (A) Camshaft Position Timing - Over-Advanced (Bank 1)	Target error (stuck position) > 7° CA
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1, Sensor A)	Adaptive vs. target values > 20 °CA
P025A	Fuel Pump Open Circuit	Signal voltage > 4.4 - 5.6 V
P025C	Fuel Pump Short to Ground	Signal voltage < 2.15 - 3.25 V
P025D	Fuel Pump Short to B+	Signal current > 1.1 A
P0030	HO2S Heater Control Circuit (Bank 1, Sensor 1) Open Circuit	Heater voltage 4.4 - 5.6 V
P0031	HO2S Heater Control Circuit Low (Bank 1, Sensor 1) Short to Ground	Heater voltage 2,15 - 3,25 V
P0032	HO2S Heater Control Circuit High (Bank 1, Sensor 1) Short to B+	Heater current > 3.0 A
P0036	HO2S Heater Control Circuit (Bank 1, Sensor 2) Open Circuit	Heater voltage 4.50 - 5.50 V
P0037	HO2S Heater Control Circuit Low (Bank 1, Sensor 2) Short to Ground	Heater voltage 2.15 - 3.25 V
P0038	HO2S Heater Control Circuit High (Bank 1, Sensor 2) Short to B+	Heater current, > 3.0 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0042	HO2S Heater Circuit (Bank 1, Sensor 3) Open Circuit SULEV	Heater voltage 4.50 - 5.50 V
P0043	HO2S Heater Control Circuit Low (Bank 1, Sensor 2) Short to Ground	• SULEV Heater voltage < 3 V • ULEV Heater voltage < 3 V
P0044	HO2S Heater Control Circuit High (Bank 1, Sensor 2) Short to B+	Heater current > 2.70 - 5.50 A
P050A	Idle Air Control System RPM Lower or Higher Than Expected	Out of range - Low • Engine speed deviation < 80 RPM Out of range-high • Engine speed deviation > 80 RPM
P052A	Idle Air Control System Response Check	Signal change > 3.5° CA
P0068	MAP/MAF – Throttle Position Correlation	• Plausibility with fuel system load calculation < -50% • Plausibility with fuel system load calculation > 50%
P0070	Ambient Air Temperature Sensor Short To B+	Ambient air temp <45.0 °C
P0071	Rationality Check	• Difference value AAT-ECT @ engine start (depending on engine-off time) > 25 - 40K and • Difference value AAT-IAT engine start (depending on engine-off time) > 25 - 40K
P0072	Ambient Air Temp Sensor Short to Ground	Ambient air temp >87.0° C
P0087	Fuel Rail/System Pressure - Too Low	• Pressure control activity > 5.00 mPa and • Fuel trim activity 0.90 - 120
P0088	Fuel Rail/System Pressure - Too High	Fuel rail pressure > 13.9 MPa
P0089	Fuel Pressure Regulator 1 Performance	Actual pressure deviation • < 100 kPa • > 100 kPa
P0100	Mass or Volume Air Flow A Circuit	MAF sensor signal 0 µs

DTC	Error Message	Malfunction Criteria and Threshold Value
P0101	Mass or Volume Air Flow A Circuit Range/Performance	• Mass air flow vs. lower threshold model < 3 - 197kg/h% • Mass air flow vs. upper threshold > 60 - 890 kg/h
P0102	Mass or Volume Air Flow A Circuit Low Input	MAF sensor signal < 66 µs
P0103	Mass or Volume Air Flow A Circuit High Input	MAF sensor signal, > 4.5 m Sec
P0106	Manifold Absolute Pressure/ BARO Sensor Range/ Performance	• Boost pressure signal sensor signal < - 13 kPa • vs. altitude sensor signal 23 kPa
P0107	Manifold Absolute Pressure/ BARO Sensor Range/ Performance	• Short to ground signal voltage < 0.20 V • Range check manifold pressure signal < 0.00 hPa
P0108	Manifold Absolute Pressure/ BARO Sensor Range/ Performance	• Short to battery / open circuit signal voltage > 4.80 V • Range check manifold pressure signal > 5119.92 hPa
P0111	Intake Air Temperature Sensor 1 Rationality Check (ULEV)	• Difference in value between IAT and ECT at engine start (depending on engine off time) > 25 - 40 K and • Difference in value between IAT and AAT at engine start (depending on engine off time) > 25 - 40 K
P0112	Intake Air Temperature Sensor 1 Circuit Low Input	Intake air temperature > 141°C
P0113	Intake Air Temperature Sensor 1 Circuit High Input	Intake air temperature < 45.75°C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0116	Engine Coolant Temperature (Sensor 1) Circuit Range/ Performance (ULEV)	Stuck high • No change of signal, < 1.5 K Stuck low: • No change of signal, < 1.5 K Stuck in range • 88.5 - 109.5 °C and • No change on signal, 1.5 K • Delta ECT < 2.25 - 3.75 K and • ECT@ engine start (depending on engine off time) > 50° C • Delta ECT < 2.25 - 3.75
P0117	Engine Coolant Temperature (Sensor 1) Circuit Low Input	Engine coolant temperature > 140°C
P0118	Engine Coolant Temperature (Sensor 1) Circuit Open	Engine coolant temperature < 43.5° C
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	• TPS 1 - TPS 2 > 6.30% and • Actual TPS 1 calculated value > actual TPS 2 calculated value or • TPS 1 calculated value > 9.00%
P0122	Throttle/Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.25 mV
P0123	Throttle/Pedal Position Sensor A Circuit High Input	Signal voltage > 4.75 V
P0130	O2 Sensor Circuit (Bank 1, Sensor 1)	O2S ceramic temperature < 640°C
P0131	O2 Sensor Circuit (Bank 1, Sensor 1) Low Voltage	Virtual mass 1.66 - 2.36 V
		Nernst voltage 1.42 - 2.1 V
		Adjustment voltage 0.3 - 1.5 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass 2.61 - 3.41 V
		Nernst voltage 3.42 - 4.62 V
		Adjustment voltage 4.75-7.25 V
P0133	O2 Circuit Slow Response (Bank 1, Sensor 1)	• O2S signal front vs. modeled O2S signal ratio ≤ 0.35 • Cycles completed ≥ 40

DTC	Error Message	Malfunction Criteria and Threshold Value
P0135	O2 Heater Circuit (Bank 1, Sensor 1)	Out of range-high • O2S ceramic temperature < 715°C and • Heater duty cycle 100% Rationality check: • O2S ceramic temperature < 715°C and • Time after O2S heater on 40 Sec.
P0136	O2 Circuit (Bank 1, Sensor 2)	• Delta voltage one step at heater switching > 2.00 V and • Cycles completed ≥ 6
P0137	O2 Circuit Low Voltage (Bank 1, Sensor 2)	• Signal voltage < 0.06 V for time > 3 Sec. and • Difference of sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) < 0.01 V
P0138	O2 Circuit High Voltage (Bank 1, Sensor 2)	Signal voltage > 1.26 V
P0139	O2 Circuit Slow Response (Bank 1 Sensor 2)	• O2S signal rear during fuel cut off > 160 mV. • O2S signal rear < 624 • O2S signal rear > 624
P013A	Oxygen Sensors rear (binary LSF)	• EWMA filtered max differential transient time at fuel cut off ≥ 0.7 Sec and • Number of checks ≥ 3.00 (initial phase and step function)
P0140	O2 Circuit No Activity Detected (Bank 1, Sensor 2)	• Signal voltage, 401 - 499 mV
P0141	O2 Heater Circuit (Bank 1, Sensor 2) Out of Range	Heater resistance, 1920 - 25920 Ω
P0142	O2 circuit (Bank 1 Sensor 3) Heater Check	• Delta voltage one step at heater switching, > 2.0 V • Number of checks, 10

DTC	Error Message	Malfunction Criteria and Threshold Value
P0143	O2 Circuit (Bank 1 Sensor 3) Short to Ground	• Cold condition, Signal voltage, < 59.6 mV • Warm condition, signal voltage < 59.6 mV • Short to B+, voltage > 1.26 V
P0144	O2 Circuit (Bank 1 Sensor 3) Short to Battery +	Signal voltage > 1.26 V
P0145	O2 Circuit Slow Response (Bank 1, Sensor 2)	• EWMA filtered transient time at fuel cut off > 0.4 Sec. • In voltage range 401.4 - 201.2 mV • Number of checks (initial phase) > 3 • Number of checks (step function) > 3
P0146	O2 circuit Bank 1 Sensor 3 Open circuit	• Signal voltage, 401.4 - 499 mV • Internal resistance, 40 KΩ
P0147	O2 circuit Bank 1 Sensor 3 heater check	Heater resistance 1056 - 11656 Ω
P0169	Incorrect Fuel Composition	• Cylinder individual interventions on injection path incorrect • Injection cut off incorrect • Comparison with fuel quantity incorrect • Internal check failed • Correction factor incorrect • Fuel quantity incorrect • ABS difference between predicted and real air mass > 8.30%
P0171	System Too Lean (Bank 1)	Adaptive value > 6.0 only
P0172	System Too Rich (Bank 1)	Adaptive value < 6.0 only
P0190	Fuel Rail Pressure Sensor A Circuit	Signal voltage > 4.8 V
P0191	Fuel Rail Control Valve, High Pressure Side	Actual pressure > 18 mPa
P0192	Fuel Rail Pressure Sensor A Circuit Low Input	Signal voltage < 0.2 V
P0201	Injector Circuit/Open - Cylinder 1	• Low side signal current < 2.1 A
P0202	Injector Circuit/Open - Cylinder 2	• Low side signal current < 2.1 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0203	Injector Circuit/Open - Cylinder 3	• Low side signal current < 2.1 A
P0204	Injector Circuit/Open - Cylinder 4	• Low side signal current < 2.1 A
P0221	Throttle/Pedal Position Sensor/Switch B Circuit Range/Performance	• TPS 1 - TPS 2 > 6.30% and • Actual TPS 1 calculated value > actual TPS 2 calculated value or • TPS 1 calculated value > 9.00%
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 > 4.75 V
P0234	Turbocharger/Supercharger Overboost Condition Rationality Check High	Modeled pressure 30 - 127 kPa
P0236	Turbocharger/Supercharger Boost Sensor A Plausibility check ULEV	• Difference boost pressure signal vs altitude sensor signal, > 230 hPa • Difference boost pressure signal vs altitude sensor signal, < 130 hPa
P0237	Turbocharger/Supercharger Boost Sensor A Circuit Low	Signal voltage < 0.2 V
P0238	Turbocharger/Supercharger Boost Sensor A Circuit High	Signal voltage > 4.88 V
P0243	Turbocharger/Supercharger Wastegate Solenoid A	Signal voltage > 4.4 - 5.6 V
P0245	Turbocharger/Supercharger Wastegate Solenoid A Low	Signal voltage < 2.15 - 3.25 V
P0246	Turbocharger/Supercharger Wastegate Solenoid A High	Signal current > 2.2 A
P0261	Cylinder 1 Injector Circuit Low	Signal current < 2.1 A
P0262	Cylinder 1 Injector Circuit High	Signal current > 14.70 A
P0264	Cylinder 2 Injector Circuit Low	Signal current < 2.1 A
P0265	Cylinder 2 Injector Circuit High	Signal current > 14.70 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0267	Cylinder 3 Injector Circuit Low	Signal current < 2.1 A
P0268	Cylinder 3 Injector Circuit High	Signal current > 14.70 A
P0270	Cylinder 4 Injector Circuit Low	Low side signal current < 2.1 A
P0271	Cylinder 4 Injector Circuit High	Signal current > 14.70 A
P0299	Turbocharger/Supercharger Underboost Rationality Check Low	Difference of set boost pressure vs. actual boost pressure value > 15 kPa
P2004	Intake Manifold Runner Control Stuck Open Bank 1	• Normal closed position, unable to reach signal voltage < 2.62 or > 4.65 V or • Normal open position, unable to reach signal voltage < 0.35 or > 2.38 V
P2008	Intake Manifold Runner Control Circuit/Open (Bank 1)	• Signal duty cycle > 80% • ECM power stage failure • Deviation vs. calculated value > 5% • ECM power stage failure
P2009	Intake Manifold Runner Control Circuit Shorted (Bank 1)	Signal voltage 2.15 - 3.25 V
P2010	Intake Manifold Runner Control Circuit Shorted to B+ (Bank 1)	Signal current > 2.20 A
P2014	Intake Manifold Runner Position Sensor/Switch Circuit (Bank 1)	Signal voltage > 4.82 V
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance (Bank 1)	• Signal duty cycle > 80% • Deviation vs. calculated value > 5%
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low (Bank 1)	Signal voltage < 0.18 V
P2088	Camshaft Position A Actuator Control Circuit Low (Bank 1) Short to Ground	Signal voltage < 2.15 - 3.25 V
P2089	Camshaft Position A Actuator Control Circuit High (Bank 1) Short to B+	Signal voltage, < 2.15 - 3.25 V
P2096	Post-Catalyst Fuel Trim System Too Lean (Bank 1)	Deviation lambda control loop < 3%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2097	Post-Catalyst Fuel Trim System Too Rich (Bank 1)	Deviation lambda control loop > 3%
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 Misfire Detected	• Emission threshold 1st interval % misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 2.5 - 20.0%
P0301	Cylinder 1 Misfire Detected	• Emission threshold 1st interval % misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 2.5 - 20.0%
P0302	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold 1st interval % misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 2.5 - 20.0%
P0303	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold 1st interval % misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 2.5 - 20.0%
P0304	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold 1st interval % misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 2.5 - 20.0%
P0321	Ignition/Distributor Engine Speed Input Circuit Range/ Performance	Counted teeth versus reference, incorrect > 1
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	Comparison with phase sensor no signal
P0324	Knock Control System Error	Zero test procedure failed
P0327	Knock Sensor 1 Circuit Low Input (Bank 1) Short to Ground, Port B	• Lower threshold < 0.70 V
P0328	Knock Sensor 1 Circuit High Input (Bank 1)	Upper threshold upper threshold 4.5 - 30.0 V
P0332	Knock Sensor 2 Circuit	Lower threshold 0.05 - 0.38 V
P0333	Knock Sensor 2 Circuit	Upper threshold 4.5 - 30.0 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0340	Camshaft Position Sensor A Circuit (Bank 1 or Single Sensor)	Cam adaption values out of range • > 20° KW • < -20° KW • Difference of adapted and actual values > 9° KW
P0341	Camshaft Position Sensor A Circuit Range/Performance (Bank 1 or Single Sensor)	Signal pattern incorrect
P0342	Camshaft Position Sensor A Circuit Low Input (Bank 1 or Single Sensor)	Signal voltage low and 12 crankshaft revs
P0343	Camshaft Position Sensor A Circuit High Input (Bank 1 or Single Sensor)	Signal voltage high and 12 crankshaft revs
P0351	Ignition Coil A Primary/ Secondary Circuit	Signal current, < 4.95 - 8.82 mA
P0352	Ignition Coil B Primary/ Secondary Circuit	Signal current, < 4.95 - 8.82 mA
P0353	Ignition Coil C Primary/ Secondary Circuit	Internal check, failed
P0354	Ignition Coil D Primary/ Secondary Circuit	Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	System Check After SAI PZEV Only	Deviation SAI pressure > 20.0 hPa
P0413	Open Circuit PZEV Only	Signal voltage 9.25 - 11.25 V
P0414	Short to Ground PZEV Only	Signal voltage < 6.00 V
P0415	Short to B+ PZEV Only	Signal current 2.20 - 4.20 A
P0418	Air Pump Relay Open Circuit PZEV Only	Signal voltage 4.50 - 5.50 V
P0420	Catalyst System (Front) Efficiency Below Threshold (Bank 1) PZEV Only	Amplitude ratio O2S < 1

DTC	Error Message	Malfunction Criteria and Threshold Value
P0420	Catalyst System (Main) Efficiency Below Threshold (Bank 1) PZEV Only	• Measured OSC / OSC of borderline catalyst value for main catalyst , < 0.90 while • Value for front catalyst, < 2.00
P0420	Catalyst System (only bin 5, ULEV) Efficiency Below Threshold (Bank 1)	Measured OSC / OSC of borderline catalyst. EWMA filter value for catalyst , < .20
P0441	Evaporative Emission System Incorrect Purge Flow	Deviation less than -6 - 9.5% lambda controller and < 30% idle controller deviation
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.95 - 2.15 Sec.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage > 4.40 - 5.40 V
P0455	Evaporative Emission System Leak Detected (Gross Leak/ No Flow)	Time for pressure drop < 0.95 Sec.
P0456	Evaporative Emission System Leak Detected (Very Small Leak)	1.85 - 2.15 < x < 4.5 - 6.5 [s]
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage < 2.15 - 3.25 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.2 A
P0491	Secondary Air System Insufficient Flow. Flow Check During Catalyst Heating. (PZEV)	SAI pressure measured with SAI pressure sensor vs modeled < 0.6 (0.62) %

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor A Range/Performance	VSS signal < 2 mph
P0501	Vehicle Speed Sensor A Range/Performance Only ULEV	VSS signal, < 4 km/h

DTC	Error Message	Malfunction Criteria and Threshold Value
P0503	Vehicle Speed Sensor A Out of Range/High	Vehicle speed > 200 km/h
P0506	Idle Air Control System - RPM Lower Than Expected	Engine speed deviation < -80 RPM
P0507	Idle Air Control System - RPM Higher Than Expected	Engine speed deviation > 80 RPM
P050A	Cold Start Monitoring	Out of range low • Engine speed deviation > 80 RPM Out of range high • Engine speed deviation < 80 RPM
P050B	Cold Start Idle Air Control System Performance	Difference between commanded spark timing vs. actual value > 18.00%
P052A	VVT Actuator Intake	Difference between target position and actual position > 12.0°CRK
P053F	Fuel Rail Control Valve High Pressure Side	• Difference between target pressure vs. actual pressure < -1.50 MPa • Difference between target pressure vs. actual pressure > 1.50 MPa

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0601	Internal Control Module Memory Check Sum Error	Internal check sum, incorrect
P0604	Internal Control Module Random Access Memory (RAM) Error	Write ability check, failed
P0605	Internal Control Module Read Only Memory (ROM) Error	Checksum incorrect
P0606	ECM Processor	Powerup calibration • EEPROM check, failed

DTC	Error Message	Malfunction Criteria and Threshold Value
P0627	Fuel Pump A Control Circuit/ Open	• Internal error fuel pump control unit • Feedback from fuel pump control unit pump blocked short circuit to battery +, ground or open circuit
P062B	Injection Valves Communication	Internal logic failure
P0638	Throttle Actuator Control Range/Performance (Bank 1)	Rationality check: • Time to close to reference point > 0.56 Sec. and • Reference point 2.88% Signal range check: • Duty cycle > 80% and • ECM power stage, no failure
P0641	Sensor Reference Voltage A Circuit/Open	Internal communication failure
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage < 4.6 - 5.0 V
P0643	Sensor Reference Voltage A Circuit High	5V supply voltage > 5.0 - 5.4 V
P0651	Sensor Reference Voltage B Circuit/Open	Internal communication failure
P0652	Sensor Reference Voltage B Circuit Low	Signal voltage < 4.6 - 5.0 V
P0653	Sensor Reference Voltage B Circuit High	5V supply voltage > 5.0 - 5.4 V
P0657	Actuator Supply Voltage A Circuit/Open	Signal voltage > 4.4 - 5.6 V
P0658	Actuator Supply Voltage A Circuit Low	Signal voltage < 2.15 - 3.25 V
P0659	Actuator Supply Voltage A Circuit High	Signal current > 1.1 A
P0685	ECM/PCM Power Relay Control Circuit/Open	• Signal voltage 2.6 - 3.7 V • Sense circuit voltage < 6 V
P0686	ECM/PCM Power Relay Control Circuit Low	• Signal voltage 2.6 - 3.7 V • Sense circuit voltage > 6 V
P0687	ECM/PCM Power Relay Control Circuit High	• Signal current > 1.4 - 0.7 A • Sense circuit voltage < 6 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0688	ECM/PCM Power Relay Sense Circuit	• Sense voltage < 3.0 V • Sense voltage > 3.0 V
P0697	Sensor Reference Voltage C Circuit/Open	Internal communication failure
P0698	Sensor Reference Voltage C Circuit Low	Signal voltage < 4.6 - 5.0 V
P0699	Sensor Reference Voltage C Circuit High	5V supply voltage > 5.0 - 5.4 V
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus	Global time out-receiving no message
U0100	Lost Communication with ECM/PCM A	• Failure of all CAN engine messages, time out more than > 490 mSec. • Failure of all CAN engine messages, but not all CAN messages, time out more than > 1010 mSec.
U0101	Lost Communication with TCM	• Checksum check failed message counter check failed • Time out check No message received by ECM
U0121	CAN ABS Brake Unit	CAN communication with ABS, time out
U0146	CAN Gateway A	CAN communication with gateway, time out
U0155	CAN Instrument Cluster	Received CAN message - no message
U0302	Software Incompatibility with Transmission Control Module	AT vehicle ECM coded as MT vehicle
U0323	CAN: Instrument Cluster Audi Only	Ambient temp value module not encoded for ambient temp sensor, 00h
U0402	CAN Communication with TCM	Data length code transmitted, incorrect-invalid

DTC	Error Message	Malfunction Criteria and Threshold Value
U0404	Invalid Data Received From Gear Shift Control Module	• If the value of message counter is permanent, constant, or change exceeds a threshold, increment an event counter • Maximum change of message counter > 5
U0415	CAN Link to Speed Sensor	Speed sensor initialization failure 327.42 MPH
U0422	CAN: Instrument Cluster	Ambient temperature value initialization, Audi 01 h
U0423	CAN: Instrument Cluster	• Received data implausible message • Ambient temperature value (initialization) 01h
U0447	CAN Gateway	CAN message incorrect
U1030	LIN Communication	Not active
U102F	LIN Communication	Time out
U102E	LIN Communication	LIN message, incorrect

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P1114	Internal Resistance Too Large (Bank 1, Sensor 2)	Heater resistance, (128-648)*(8-40)1.02-25.9 k Ω (dep. on mod. exhaust temp. and heater power)
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	• Pressure control activity > 0.25 MPa and • Fuel trim activity < 0.80
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Pressure control activity < 0.14 mPa and • Fuel trim activity > 1.5

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A4	Fuel Rail Pump Control Valve Stuck Closed	• Pressure control activity, < 6.00 mPa and • Fuel trim activity, 0.9\0 - 1.15 and • Difference between target pressure vs. actual pressure, - < 16.38 mPa
P13EA	Ignition Timing Monitor	Difference between commanded spark timing vs. actual value > 22%
P150A	Engine Off Time Performance	• Difference between engine off time and ECM after run time < -12.0 Sec. • Difference between engine off time and ECM after run time > 12.0 Sec.
P2101	Throttle Actuator Control Motor Circuit Range/ Performance	• Duty cycle >80% • ECM power stage, no failure • Deviation throttle value angles vs. calculated value > 4.00 - 50.00%
P2106	Throttle Actuator Control System Functional Check	Internal check failed
P2110	Throttle Actuator Control System - Forced Limited RPM	Engine load out of range
P2122	Throttle/Pedal Position Sensor/Switch D Circuit Low Input	Signal voltage < 0.63 V
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High Input	Signal voltage > 4.8 V
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low Input	Signal voltage < 0.29 V
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.5 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage sensor 1 vs 2, 0.12 - 0.70 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2146	Fuel Injector Group A Supply Voltage Circuit / Short to Ground	Signal current < 2.6 A
P2149	Fuel Injector Group B Supply Voltage Circuit / Short to Ground	Signal current > 14.90 A
P2177	Fuel System	Adaptive value > 26%
P2178	Fuel System	Adaptive value < 26%
P2181	Cooling System Performance	• ECT < 76.5° C and • Mass air integral 4.0 - 22.0 kg/h
P2184	Fan Control Coolant Temperature Sensor	ECT outlet > 141° C
P2185	Fan Control Coolant Temperature Sensor	ECT outlet < -43° C
P2187	Fuel System	Adaptive value > 6.00%
P2188	Fuel System	Adaptive value < 6.0%
P2195	O2 Sensor Signal Biased/ Stuck Lean (Bank 1, Sensor 1)	Lambda value > 1.08 and O2S rear signal > 0.777 V
P2196	O2 Sensor Signal Biased/ Stuck Rich (Bank 1, Sensor 1)	Lambda value < 0.92 and O2S rear signal < 0.16 V
P2231	O2 Sensor Signal Circuit Shorted to Heater Circuit	Delta O2S signal front > 190 uA
P2237	O2 Sensor Positive Current Control Circuit/Open (Bank 1, Sensor 1)	• Lambda set value < 0.97 or • Lambda value setting > 1.03 • O2S signal front O2S signal front 1.495 - 1.507 V
P2243	O2 Sensor Reference Voltage Circuit/Open (Bank 1, Sensor 1)	• O2S signal front >4.70 V and internal resistance > 1000 Ω • O2S signal front < 0.30 V And internal resistance > 1000 Ω
P2257	Air Pump Relay Short to Ground PZEV Only	Signal voltage < 3.00 V
P2258	Air Pump Relay Short to B+ PZEV Only	Signal current 0.60 - 1.20 A
P2270	O2 Circuit Slow Response (Bank 1, Sensor 2) ULEV	Rationality check, O2S signal rear, < 0.620 - 0.654 mV

DTC	Error Message	Malfunction Criteria and Threshold Value
P2270	O2 Circuit Slow Response (Bank 1, Sensor 3) ULEV	Rationality check, O2S signal rear, < 0.557 - 0.630 mV
P2271	O2 Circuit (Bank 1, Sensor 3) ULEV	• Measurement range from fuel cut-off to voltage threshold, ≤ 152.3 mV • Number of checks (initial phase), ≥ 1
P2271	O2 Circuit (Bank 1, Sensor 2) SULEV	Rationality check, O2S signal rear, < 0.557 - 0.630 mV
P2274	O2 Circuit Slow Response (Bank 1, Sensor 3) SULEV	Rationality check, O2S signal rear, < 0.620 - 0.654 mV
P2275	O2 Circuit Slow Response (Bank 1, Sensor 3) SULEV	• Measurement range from fuel cut-off to voltage threshold, ≤ 152.3 mV • Number of checks (initial phase), ≥ 1 ULEV • O2S signal rear, > 0.620 - 0.654 mV
P2279	Intake Air System Leak	• Threshold to detect a defective system > 1.33 - 1.6 and • Ratio of the tie system defective during the measurement window to the whole duration of the measurement window > 0.60
P2293	Fuel Pressure Regulator 2 Performance	• Difference between target pressure vs. actual pressure: > 1.50 mPa
P2294	Fuel Pressure Regulator 2 Control Circuit Open Circuit	Signal voltage 2.3 - 2.7 V
P2295	Fuel Pressure Regulator 2 Control Circuit Low Short to Ground	Signal voltage < 1.80 - 2.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.9 V

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Signal voltage < 0.5 - 1.0 V
P2301	Ignition Coil A Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V
P2303	Ignition Coil B Primary Control Circuit Low	Signal voltage < 0.5 - 1.0 V
P2304	Ignition Coil B Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V
P2306	Ignition Coil C Primary Control Circuit Low	Signal voltage < 0.5 - 1.0 V
P2307	Ignition Coil C Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V
P2309	Ignition Coil D Primary Control Circuit Low	Signal voltage < 0.5 - 1.0 V
P2310	Ignition Coil D Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.4 - 5.6 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.15 to 3.25 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current > 1.1 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > 1 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	> 0.36 Sec.
P2414	O2 Sensor Exhaust Sample Error (Bank 1, Sensor 1)	Signal voltage 2.5 - 3.2 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2431	Rationality check	Difference between SAI pressure and ambient pressure ≠ -25.0 - 25.0 hPa
P2432	Signal Range Check	Signal voltage < 0.40 V
P2433	Signal Range Check	Signal voltage > 4.65 V
P2440	System Check After SAI (PZEV)	SAI pressure measured with SAI pressure sensor vs. modeled while SAI valve closed < 0.55%
P2539	Low Pressure Fuel System Sensor Circuit	Signal voltage > 4.9 V
P2540	Low Pressure Fuel System Sensor Circuit Range/ Performance	Actual pressure deviation < 800 kPa < 80 kPa
P2541	Low Pressure Fuel System Sensor Circuit Low	Signal voltage < 0.2 V
P2568	RIS Sensor Wrong Signal PZEV Only	• Signal of sensor mismatched with radiator or • Measured temp. gradients during 3 measure windows always, < 0.25 K/2s
P2569	RIS Sensor Signal Low PZEV Only	Signal voltage < 0.2 V
P2570	RIS Sensor Signal Always High PZEV Only	Signal voltage > 5.0 V
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 3.2 V

DTC CHART

Engine Code – 2.5L CEPB

Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	“Intake Camshaft Position Slow Response (Bank 1)	Adjustment angle difference < 9° CA/s
P000B	Exhaust Camshaft Position Slow Response Bank 1	Adjustment angle difference < 7° CA/s
P008A	Fuel pressure out of range	Actual pressure < 0.8 MPa
P008B	Fuel pressure out of range	Actual pressure > 0.8 MPa
P0010	Intake Camshaft Position Actuator Circuit Open (Bank 1)	Signal voltage > 4.740 - 5.60 V
P0011	Intake Camshaft Position Timing - Over-Advanced (Bank 1)	Adjustment angle difference < 3.2° CA
P0013	Exhaust Camshaft Position Actuator Circuit Open (Bank 1)	Signal voltage > 4.4 - 5.6 V
P0014	Exhaust Camshaft Position Actuator Circuit Stuck Check (Bank 1)	Adjustment angle difference > 3° CA
P0016	Camshaft Position Sensor Angular Offset Check	Adaptive vs. target values > 20° CA
P0017	Camshaft Position Sensor Angular Offset Check	Adaptive vs. target values > 20° CA
P025A	Fuel Pump Open circuit	Signal voltage > 4.40 - 5.60 V
P025C	Fuel Pump Short to ground	Signal voltage< 2.15 - 3.25 V
P025D	Fuel Pump Short to B+	Signal current > 1.10 A
P0030	HO2S Heater Control Circuit (Bank 1 Sensor 1)	Heater voltage 4.4 - 5.6 V
P0031	HO2S Heater Control Circuit Low (Bank 1 Sensor 1)	Heater voltage < 2,15 - 3,25 V
P0032	HO2S Heater Control Circuit High (Bank 1 Sensor 1)	Heater current > 2.2 A
P0036	HO2S Heater Control Circuit (Bank 1 Sensor 2)	Heater voltage 4.40 to 5.60 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0037	HO2S Heater Control Circuit Low (Bank 1, Sensor 2)	Heater voltage < 2.15 - 3.25 V
P0038	O2 Sensor Heater Control Circuit High (Bank 1 Sensor 2)	Heater voltage > 3 A
P0042	O2 Sensor Heater Control Circuit (Bank 1 Sensor 3) (CBUA ONLY)	Heater voltage 2.34 to 3.59 V
P0043	O2 Sensor Heater Control Circuit (Bank 1 Sensor 3) Low (CBUA ONLY)	Heater voltage < 2.34 V
P0044	O2 Sensor Heater Control Circuit (Bank 1 Sensor 3) High (CBUA ONLY)	Heater voltage > 3.59 V
P0070	Ambient Air Temperature Sensor Circuit	Open circuit • Ambient air temp < -40.5 °C
P0071	Ambient Air Temperature Sensor Range/Performance	• Ambient temperature minus engine temperature @ engine start and • Ambient temperature minus intake air temperature @ engine start • = 40 - 25K
P0072	Ambient Air Temperature Sensor Circuit Low	Short to ground • Ambient air temp > 78° C
P0087	Fuel Rail/System Pressure - Too Low	• Pressure control activity, > 1.2 mPa and • Fuel trim activity, 0 - 1.3
P0089	Fuel Pressure Regulator 1 Performance	Actual pressure deviation • < 100 kPa • > 100 kPa
P0097	Intake Air Temperature Sensor 2 Circuit High Input	Short to battery • Intake air temperature > 4.47 V
P0098	Intake Air Temperature Sensor 2 Circuit low Input	Short to ground • Intake air temperature < 0.15 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0106	Manifold Absolute Pressure to Barometric Pressure Range Circuit 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 • Boost pressure sensor signal vs. altitude sensor signal > 22 kPa - <22 kPa
P0107	Manifold Absolute Pressure Circuit Low Input	• Signal voltage < 0.2V Range check: • Manifold pressure signal < 100.00 hPa Cross check: • Difference manifold pressure to average value of all pressure sensors @ start < -60.00 hPa
P0108	Manifold Absolute Pressure Circuit High Input	• Signal voltage > 4.86 V Range check: • Manifold pressure signal > 2950 hPa Cross check: • Difference manifold pressure to average value of all pressure sensors @ start > 60.00 hPa
P0111	Intake Air Temperature Circuit Range/Performance	• IAT minus engine temperature @ engine start and • IAT minus ambient air temperature @ engine start • ≥ 40 - 25 K
P0112	Intake Air Temperature Sensor 1 Circuit Low Input	IAT < 0.15 V
P0113	Intake Air Temperature Sensor 1 Circuit High Input	IAT > 4.47 V
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	Delta ECT < 2.25 - 3.75 K

DTC	Error Message	Malfunction Criteria and Threshold Value
P0117	Engine Coolant Temperature Sensor 1 Circuit Low Input	ECT < -45° C
P0118	Engine Coolant Temperature Sensor 1 Circuit High Input	ECT > 141° C
P0121	Accelerator Pedal Position Sensor A Circuit Range/ Performance	• TPS 1 - TPS 2 > 5.10 to 6.30% • TPS 1 calc. value > 9.00%
P0122	Accelerator Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.176V
P0123	Accelerator Pedal Position Sensor A Circuit High Input	Signal voltage > 4.83 V
P013A	O2 Sensor Slow Response - Rich to Lean (Bank 1 Sensor 2)	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)	• O2S ceramic temp. < 640° C or • Internal resistance > 950°
P0131	O2 Sensor Circuit (Bank 1, Sensor 1) Low Voltage	Virtual mass < 2.0V
		Nernst voltage < 1.75 V
		Adjustment voltage < 0.30 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass > 3.25 V
		Nernst voltage > 4.0 V
		Adjustment voltage > 1.5 V
P0133	O2 Sensor Circuit Slow Response (Bank 1 Sensor 1)	• Lower value of both area ratios R2L and L2L in case of symmetric fault < 0.3 and • Lower value of both counters for area ratio R2L and L2R ≥ 6
P0135	O2 Heater Circuit (Bank 1 Sensor 1)	• Heater duty cycle 100% • 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)	• Delta O2S rear signal > 2.00 V • Number of heater coupling faults > 4

DTC	Error Message	Malfunction Criteria and Threshold Value
P0137	O2 Circuit Low Voltage (Bank 1, Sensor 2)	• Cold condition: Signal voltage < 0.06 V for > 3 Sec • Cold condition: Signal voltage > 0.06 V for > 3 Sec.
P0138	O2 Circuit High Voltage (Bank 1, Sensor 2)	Signal voltage > 1.08 V
P0139	O2 Circuit Slow Response (Bank 1, Sensor 2)	Transient time at fuel cut off > 0.6 Sec.
P0140	O2 Circuit No Activity Detected (Bank 1, Sensor 2)	• Signal voltage .461 to .499 V for > 3 Sec. • Exhaust gas temperature > 600° C • and internal resistance > 40000 Ω
P0141	O2 Sensor Heater Circuit (Bank 1, Sensor 2) Malfunction	Internal resistance > 0.59 - 1.9 kΩ
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 Low Voltage (Bank 1 Sensor 3)	• 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 High Voltage (Bank 1 Sensor 3)	Signal voltage > 1.08 V for > 5 Sec.
P0145	O2 Sensor Circuit Slow Response (Bank 1 Sensor 3)	• EWMA filtered transient time at fuel cut off > 1.5 Sec. • O2 voltage between 201 - 401 mV
P0146	O2 Sensor Circuit No Activity Detected (Bank 1 Sensor 3)	• 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

DTC	Error Message	Malfunction Criteria and Threshold Value
P0169	Incorrect Fuel Composition	Fuel quantity out of limit or incorrect
P0171	System Too Lean (Bank 1) Additive	• Adaptive value > 5.0 only
P0171	System Too Lean (Bank 1) Multiplicative	Adaptive value > 20.0 only
P0172	System Too Rich (Bank 1) Additive	Adaptive value < 5.0 only
P0172	System Too Rich (Bank 1) Multiplicative	Adaptive value < 20.0 only
P0190	Fuel Rail Pressure Sensor A Circuit	Signal voltage > 4.8 V
P0191	Fuel Rail Control Valve, high Pressure Side	Actual pressure >17.5 mPa
P0192	Fuel Rail Pressure Sensor A Circuit Low Input	Signal voltage < 0.2 V
P0201	Injector Circuit Open Cylinder 1	Signal current < 2.1 A
P0202	Injector Circuit Open Cylinder 2	Signal current < 2.1 A
P0203	Injector Circuit Open Cylinder 3	Signal current < 2.1 A
P0204	Injector Circuit Open Cylinder 4	Signal current < 2.1 A
P0205	Injector Circuit Open Cylinder 5	Signal current < 2.1 A
P0221	Accelerator Pedal Position Sensor B Circuit Range/ Performance	• TPS 1 to TPS 2, > 5.10 to 6.3% • TPS 2 – calc position > 9 %
P0222	Accelerator Pedal Position Sensor B Circuit Low Input	Signal voltage < 0.156 V
P0223	Accelerator Pedal Position Sensor B Circuit High Input	Signal voltage > 4.84 V
P0234	Turbocharger/Supercharger Overboost Condition Rationality Check High	Difference actual pressure - set point pressure > 30 - 125 kPa
P0236	Turbocharger/Supercharger Boost Sensor Range/ Performance	Difference. boost pressure sensor vs. altitude sensor

DTC	Error Message	Malfunction Criteria and Threshold Value
P0237	Turbocharger/Supercharger Boost Sensor A Circuit Low	• Signal voltage < 0.2 V Cross check: • Difference pressure in front of throttle to average value of all pressure sensors @ start < -30.00 hPa
P0238	Turbocharger/Supercharger Boost Sensor A Circuit High	• Signal voltage > 4.80 V Cross check: • Difference pressure in front of throttle to average value of all pressure sensors @ start < -30.00 hPa
P0243	Turbocharger/Supercharger Wastegate Solenoid A	Signal voltage > 5.6 .. 4.4 V
P0245	Turbocharger/Supercharger Wastegate Solenoid A Low	Signal voltage < 3.25 .. 2.15 V
P0246	Turbocharger/Supercharger Wastegate Solenoid A High	Signal current > 2.2 A
P0261	Cylinder 1 Injector Circuit Low	Signal current < 2.1 A
P0262	Cylinder 1 Injector Circuit High	Signal current > 14.7 A
P0264	Cylinder 2 Injector Circuit Low	Signal current < 2.1 A
P0265	Cylinder 2 Injector Circuit High	Signal current > 14.7 A
P0267	Cylinder 3 Injector Circuit Low	Signal current < 2.1 A
P0268	Cylinder 3 Injector Circuit High	Signal current > 14.7 A
P0270	Cylinder 4 Injector Circuit Low	Signal current < 2.1 A
P0271	Cylinder 4 Injector Circuit High	Signal current > 14.7 A
P0273	Cylinder 5 Injector Circuit Low	Signal current < 2.1 A
P0274	Cylinder 5 Injector Circuit High	Signal current > 14.7 A
P0299	Turbocharger/Supercharger Underboost Rationality Check Low	Difference actual pressure - set point pressure >30 kPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	Signal range check @ upper mechanical stop • Normal closed position unable to reach • Signal voltage < 2.62 or > 4.65 V Signal range check @ lower mechanical stop • Normal closed position unable to reach • Signal voltage< 0.35 or > 2.38 V
P2006	Intake Manifold Runner Control Stuck Closed (Bank 1)	Signal range check @ upper • Normal open position unable to reach • Signal voltage < 0.35 or > 2.38 V Signal range check @ lower mechanical stop • Normal closed position unable to reach • Signal voltage < 0.35 or > 2.38 V
P2008	Intake Manifold Runner Control Circuit/Open Bank 1	Voltage > 4.4 V - 5.6 V
P2009	Intake Manifold Runner Control Circuit/Short to Ground (Bank 1)	Voltage < 2.15 V - 3.25 V
P2010	Intake Manifold Runner Control Circuit/Short to Battery (Bank 1)	• > 2.2 A
P2014	Intake Manifold Runner Position Sensor/Switch Circuit (Bank 1)	Signal voltage < 0.2 V
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance (Bank 1)	• Signal duty cycle > 80% • Deviation vs. calculated value > 5%
P2017	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance Bank 1	• Signal voltage > 4.8 V
P2088	Camshaft Position Actuator Control Circuit Low (Bank 1)	Signal voltage < 2.15 - 3.25 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2089	Camshaft Position Actuator Control Circuit High (Bank 1)	Signal current, > 2.2 A
P2090	Exhaust Camshaft Position Actuator Circuit short to ground Bank 1	Signal voltage < 2.15 - 3.25 V
P2091	Exhaust Camshaft Position Actuator Circuit short to Batt+ Bank 1	Signal current > 2.2 A
P2096	Post Catalyst Fuel Trim System Too Lean (Bank 1)	Deviation lambda control < -0.03%
P2097	Post Catalyst Fuel Trim System Too Rich (Bank 1)	Deviation lambda control > 0.03%
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 Misfire Detected	• Emission threshold misifre rate (MR) > 2% • Calibrated threshold misifre rate (MR) > 1.4% • Catalyst damage misifre rate (MR) > 4 - 17%
P0301	Cylinder 1 Misfire Detected	• Emission threshold misifre rate (MR) > 2% • Calibrated threshold misifre rate (MR) > 1.4% • Catalyst damage misifre rate (MR) > 4 - 17%
P0302	Cylinder 2 Misfire Detected	• Emission threshold misifre rate (MR) > 2% • Calibrated threshold misifre rate (MR) > 1.4% • Catalyst damage misifre rate (MR) > 4 - 17%
P0303	Cylinder 3 Misfire Detected	• Emission threshold misifre rate (MR) > 2% • Calibrated threshold misifre rate (MR) > 1.4% • Catalyst damage misifre rate (MR) > 4 - 17%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0304	Cylinder 4 Misfire Detected	• Emission threshold misifre rate (MR) > 2% • Calibrated threshold misifre rate (MR) > 1.4% • Catalyst damage misifre rate (MR) > 4 - 17%
P0305	Cylinder 5 Misfire Detected	• Emission threshold misifre rate (MR) > 2% • Calibrated threshold misifre rate (MR) > 1.4% • Catalyst damage misifre rate (MR) > 4 - 17%
P0321	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	Engine Speed Input Circuit No Signal	Comparison with phase sensor-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 A Circuit Range/Performance	Signal voltage low 4
P0342	Camshaft Position Sensor Circuit Low Input	Signal voltage permanently low 4 Revs
P0343	Camshaft Position Sensor Circuit High Input	Signal voltage permanently high

DTC	Error Message	Malfunction Criteria and Threshold Value
P0351	Ignition Coil A Primary/ Secondary Circuit	Signal current < 4.95 - 8.82 mA
P0352	Ignition Coil B Primary/ Secondary Circuit	Signal current < 4.95 - 8.82 mA
P0353	Ignition Coil C Primary/ Secondary Circuit	Signal current < 4.95 - 8.82 mA
P0354	Ignition Coil D Primary/ Secondary Circuit	Signal current < 4.95 - 8.82 mA
P0355	Ignition Coil E Primary/ Secondary Circuit	Signal current < 4.95 - 8.82 mA
P0366	Camshaft Position Sensor A Circuit Range/Performance	Signal voltage no altering @ reference gap
P0367	Camshaft Position Sensor A Circuit Low Input	Signal voltage low 4 rev
P0368	Camshaft Position Sensor A Circuit Low Input	Signal voltage high 4 rev

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	Secondary Air Injection System	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 Control Circuit	Signal voltage 4.70 to 5.40 V
P0420	Catalyst System Efficiency Below Threshold	Oxygen storage capacity (OSC) vs OSC value of borderline catalyst < 0.2
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	• Deviation lambda control -4 - 4% and • Deviation idle control < 20%
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.95 - 2.15 Sec (depending on altitude and IAT)
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage 4.4 - 5.6 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	Evaporative Emission System Leak Detected (Gross Leak)	Time for pressure drop < 0.95 Sec.
P0456	EVAP Emission Control System Leak Detected (Very Small Leak)	Time for pressure drop 1.85 - 2.15 < x < 4.5 - 6.5 [s] (depending on altidude and IAT)
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage < 3.25 - 2.15 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current, > 2.2 A
P0491	Secondary Air Injection System Insufficient Flow	• SAI pressure vs. modeled SAI < 50 - 72% or • Absolute deviation of raw pressure signal from filtered signal mean value < 8.98 hPa
P04DB	Positive Crankcase Ventilation	Signal voltage > 3.4 V

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor Range/ Performance	Vehicle speed < 4 km/h
P0503	Vehicle Speed Sensor 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	• Eengine speed deviation > 80 - 200 rpm • Idle controller at min. value 7%
P050A	Cold Start Idle Air Control System Performance	• Engine speed deviation < 150 RPM • RPM controller value 0 - 8% or • Engine speed deviation > 150 RPM • RPM controller min. value 7%
P050B	Cold Start Ignition Timing Performance	Difference between commanded spark timing vs. actual value > 20%
P052A	Cold Start Camshaft Position Timing Over-Advanced	Difference between actual and target position > 5° CRK rev.
P054A	Cold Start Monitoring VVT exhaust	Difference between target position vs. actual position > 6° CA

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0601	Internal Control Module Memory Check Sum Error	Internal check sum, incorrect
P0604	Internal Control Module Random Access Memory (RAM) Error	Write ability check, failed
P0605	Internal Control Module Read Only Memory (ROM) Error	Checksum Incorrect
P0606	ECM/PCM Processor	• Internal hardware/voltage check - failed • Communication CPU - Sensor IC - failed • EEPROM Check failed
P062B	Injection Valves Communication	SPI communications check Identifier not active / correct

DTC	Error Message	Malfunction Criteria and Threshold Value
P0627	Fuel Pump Control Circuit Open/Shorted to Ground	• Signal voltage 4.50 to 5.50 V (open circuit) • Signal voltage < 3.00 V (grounded circuit)
P0629	Fuel Pump Control Circuit High	Signal current 0.60 to 1.20 A
P0638	Throttle Actuator Control Range/Performance (Bank 1)	• Time to open over reference point + 12% > 0.14 Sec • Time to close below reference point + 3% > 0.56 Sec or • TPS 1 signal voltage not (0.42 - 0.77) V • or TPS 2 signal voltage not (4.26 - 4.58) V
P0641	Sensor Reference Voltage “A” Circuit Open	Internal communication failure
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage < 4.6 - 5 V
P0643	Sensor Reference Voltage A Circuit High	Signal voltage > 5 - 5.4 V
P0651	Sensor Reference Voltage “B” Circuit/Open	Internal communication failure
P0652	Sensor Reference Voltage A Circuit Low	Signal voltage < 4.6 .. 5 V
P0653	Sensor Reference Voltage A Circuit High	Signal voltage > 5 .. 5.4 V
P0657	Actuator Supply Voltage A Circuit / Open	Signal voltage > 4.4 .. 5.6 V
P0658	Actuator Supply Voltage A Circuit Low	Signal voltage < 2.15 - 3.25 V
P0659	Actuator Supply Voltage “A” Circuit High	Signal current > 1.1 A
P0685	ECM/PCM Power Relay Control Circuit/Open	• Control voltage 2.6 - 3.7 V • Sense circuit voltage < 6.0 V
P0686	ECM/PCM Power Relay Control Circuit Low	• Control voltage 2.6 - 3.7 V • Sense circuit voltage > 6.0 V
P0687	ECM/PCM Power Relay Control Circuit High	• Signal current > 0.7 - 1.4 A • Sense circuit voltage < 6.0 V
P0697	Sensor Reference Voltage “C” Circuit Open	Internal communication failure

DTC	Error Message	Malfunction Criteria and Threshold Value
P0698	Sensor Reference Voltage A Circuit Low	Signal voltage < 4.6 - 5 V
P0699	Sensor Reference Voltage A Circuit High	Signal voltage > 5 - 5.4 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
U0323	CAN: Instrument Cluster Audi Only	Receiving fault value = -50° C
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
U0423	Invalid Data Received from Instrument Panel Control (IPC) Module	Temperature received from CAN = 49.5 °C
U0447	Invalid Data Received from Gateway Module	CAN message incorrect

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P117A	Fuel System Out of Range	l - portion of 3rd lambda control loop > 0.03)
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	• Pressure control activity, > 2.50 and • Fuel trim activity, <0.80
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Pressure control activity, < 0.14 mPa and • Fuel trim activity, >1.5
P12A4	Fuel Rail Pump Control Valve Stuck Closed	• Pressure control activity, < 6.00 mPa and • Fuel trim activity, > 0.9\0 - 1.15
P150A	Comparing Engine Off Time From Instrument Cluster Control Unit with Engine after Run Time	• Difference between engine-off-time and ECM after run-time < 12 • Difference between engine-off-time and ECM after run-time > 12 Sec
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	Signal range check • Duty cycle >80% • ECM power stage no failure Rationality check • Deviation throttle value angles vs calculated value > 4 to 50%
P2106	Throttle Actuator Control System Forced Limited Power	• Duty cycle > 80 % • ECM power stage failure
P2122	Throttle/Pedal Position Sensor/Switch D Circuit Low Input	Signal voltage < 0.63 V
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High Input	Signal voltage > 4.8 V
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low Input	Signal voltage < 0.29 V
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.5 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage sensor 1 vs. 2 > 0.12 to 0.70 V
P2146	Fuel Injector Group A Supply Voltage Circuit / short to ground	Short to battery plus • Signal current < 2.6 A Short to ground • Signal current > 14.9 A
P2149	Fuel Injector Group B Supply Voltage Circuit / Short to ground	Short to battery plus • Signal current < 2.6 A Short to ground • Signal current > 14.9 A
P2152	Fuel Injector Group “C” Supply Voltage Circuit/Open	Short to battery plus • Signal current < 2.6 A Short to ground • Signal current > 14.9 A
P2177	System Too Lean Off Idle	• Adaptive value > 28%
P2178	System Too Rich Off Idle	• Adaptive value < 20%
P2181	Cooling System Performance	• ECT too low after sufficient mass air flow interval = 76.5 °C and • Mass air integral 4.0 - 17.0 kg
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)	Trim control post catalyst < - 6%
P2196	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 1)	Trim control post catalyst < - 6%
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 Open (Bank 1 Sensor 1)	• O2S signal front > 4.70 V and internal resistance > 950 Ω • O2S signal front < 0.20 V and internal resistance > 950 Ω

DTC	Error Message	Malfunction Criteria and Threshold Value
P2251	O2 Sensor Negative Current Control Circuit Open	O2S signal front 1.47 to 1.53 V and > 950 Ω
P2257	Secondary Air Injection System Control 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 < 0.649d • Enrichment after stuck lean 1%
P2271	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 2)	• O2S signal rear not oscillating at reference > .0649 mV and enrichment after stuck rich 15% • Enrichment after stuck rich 1% Response time check • Response time > 2.5 Sec
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) > 1500 to 3000 mg with ≥ 1 check
P2279	Intake Air System Leak	• Offset value throttle mass flow > 19 kg/h • Correction factor > 0.95
P2293	Fuel Rail	Difference between MPa actual pressure - target pressure ≥ 1.3 <-3 MPa
P2294	Fuel Rail	Signal voltage 2.3 - 2.7 V
P2295	Fuel Rail	Signal voltage 1.8 - 2.2 V
P2296	Fuel Rail	Signal voltage > 3.9 V

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Short to ground signal voltage < 0.5 - 1.0 V
P2301	Ignition Coil A Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V
P2303	Ignition Coil B Primary Control Circuit Low	Short to ground signal voltage < 0.5 - 1.0 V
P2304	Ignition Coil B Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V
P2306	Ignition Coil C Primary Control Circuit Low	Signal current > 24.0 mA
P2307	Ignition Coil C Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V
P2309	Ignition Coil D Primary Control Circuit Low	Signal current > 24.0 mA
P2310	Ignition Coil D Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V
P2312	Ignition Coil E Primary Control Circuit Low	Signal current > 24.0 mA
P2313	Ignition Coil E Primary Control Circuit High	Signal voltage > 5.2 - 6.0 V

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 > 4.40 to 5.60 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.74 to 3.26 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current > 3 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > 1 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	High signal voltage > 0.36 Sec.
P2407	Evaporative Emission System Leak Detection Pump Sense Circuit Intermittent/Erratic	• Fluctuation of EVAP pump current during reference measurement > 1 mA • Drop of EVAP pump current during pump phase > 6 mA for ≥ 3 Sec.
P2414	02 Sensor Exhaust Sample Error, (Bank 1 Sensor 1)	Signal Voltage 2.5 to 3.06 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 Sensor Circuit Low	Signal voltage < 0.5 V
P2433	Secondary Air Injection System Air Flow/Pressure Sensor Circuit High	Signal voltage > 4.5 V
P2440	Secondary Air Injection System Switching Valve Stuck Open	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
P2539	Fuel System	“Signal range check out of range high” signal voltage “> 4.9 > 4.8” V
P2541	Fuel System	“Signal range check out of range low” signal voltage “< 0.2 < 0.2” V
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 3.1V (lean)

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