2013

A4/S4

Quick Reference Specification Book

Audi
Truth in Engineering

2013 Audi A4/S4
Quick Reference Specification Book

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GENERAL INFORMATION

Decimal and Metric Equivalents

Distance/Length

To calculate: mm x 0.03937 = in.

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

Tightening Specification

N·m-to-lb·ft (ft·lb)

To calculate: N·m x 0.738 = lb·ft

N·m	lb·ft (ft·lb)	N·m	lb·ft (ft·lb)	N·m	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

N·m-to-lb·in (in·lb), kg·cm

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

N·m	lb·in (in·lb)	kg·cm	N·m	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 Specification 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.

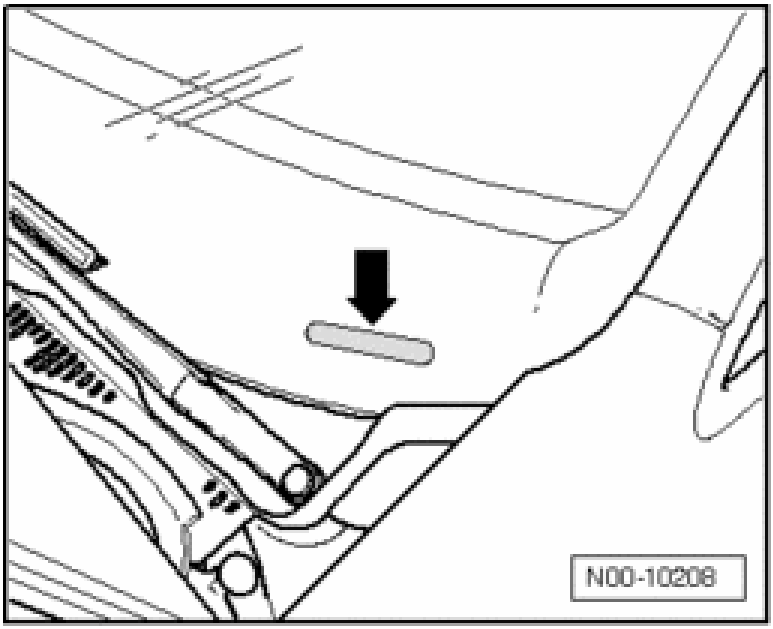
(CAUTIONS cont'd on next page)

CAUTIONS *(cont'd)*

- Always make sure the ignition is off before disconnecting battery.
- 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.

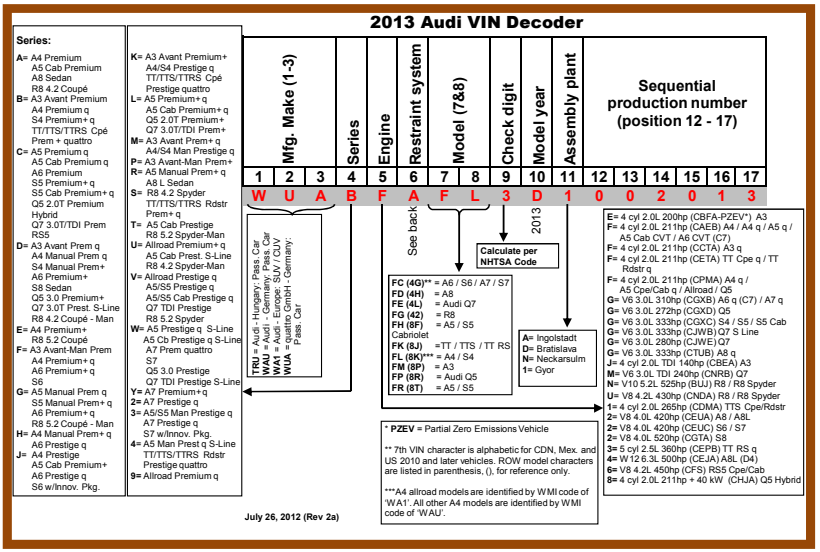
VEHICLE IDENTIFICATION

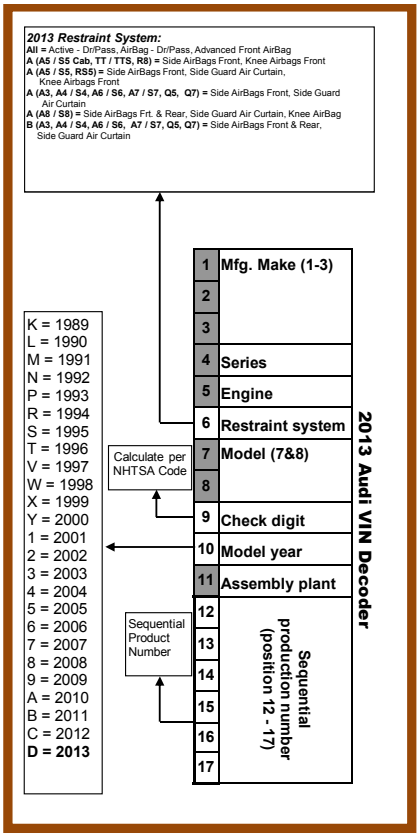
VIN on Lower Edge of Front Window



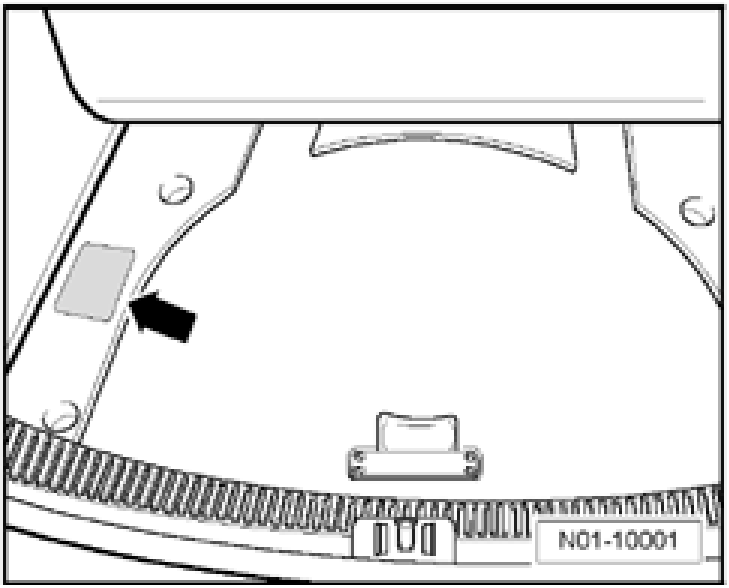
The VIN ➡ is on the left side of the vehicle in the area of the windshield wiper mount. It is visible from outside.

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
A6 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
WVW = Volkswagen - 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) S6 / S7
2= V8 4.0L 520hp (CGTA) S8
3= 5 cyl 2.5L 360hp (CEPB) TT RS q
4= W 12 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 Sticker



The vehicle data sticker ➡ is located in the left rear of vehicle in the spare wheel well under the foam storage tray. The vehicle data sticker can also be found in the customer's service schedule.

SALES CODES

Engine Codes

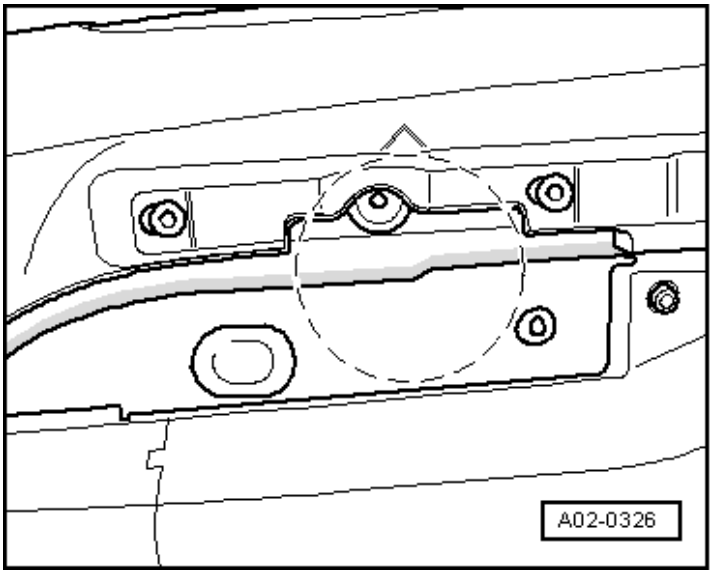
CAEB, CPMA	2.0L 4-cylinder
CGXC	3.0L 6-cylinder

Transmission Codes

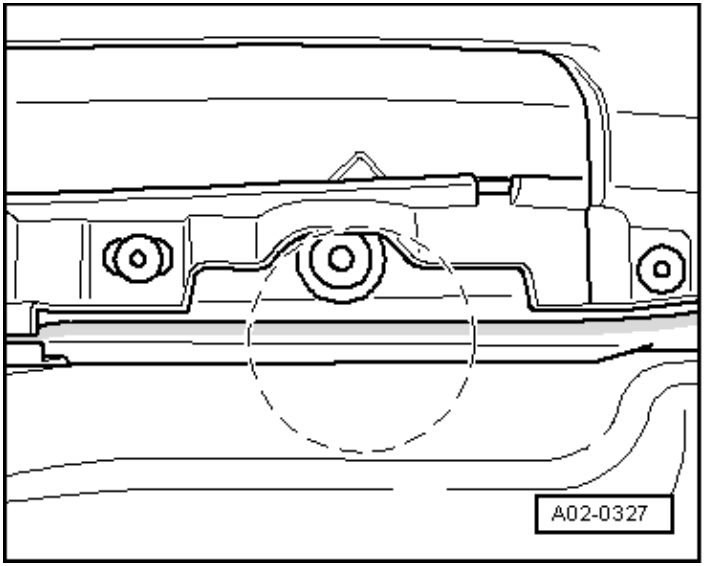
0AW	Continuously variable automatic transmission
0B2, 0B4	6-speed manual transmission
0B5	7-speed direct shift automatic transmission
0BK	8-speed automatic transmission

VEHICLE LIFTING

Lifting Points for Lifting Platform and Trolley Jack



Front: At the side member vertical reinforcement area. Marking is for the onboard vehicle jack.



Rear: At the side member vertical reinforcement area.
Marking is for the onboard vehicle jack.

ENGINE MECHANICAL – 2.0L CAEB, CPMA

General, Technical Data – 2.0L CAEB, CPMA

Engine Number Location

The engine number (engine code and serial number) is located at the front of the engine/transmission joint. In addition, a sticker with the engine code and serial number is affixed to the toothed belt guard. The engine code is also included on the vehicle data plates.

Engine Data

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

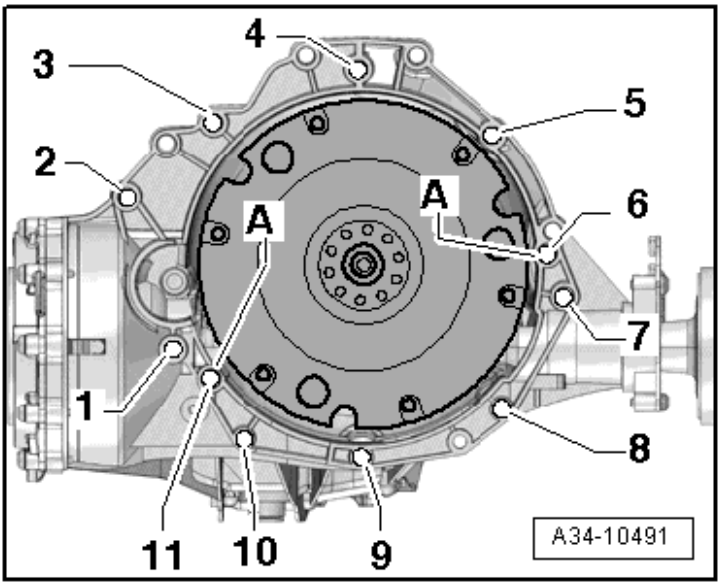
[1)] Unleaded RON 91 is also permitted, but performance is reduced.

Engine Assembly – 2.0L CAEB, CPMA

Fastener Tightening Specifications

Component	Bolt Size	Nm
Bolts and nuts	M6	9
	M8	20
	M10	40
	M12	60
Bracket for the hydraulic line, nut	-	9
Engine mount (always replace)	-	90 plus an additional 90° (¼ turn)
Engine support	-	40
Heat shield	-	10
Retaining plate for the engine mount	-	20
Subframe	-	65

Securing Engine to Transmission



Item	Bolt	Nm
1 [1]	M10 x 50 [2]	65
2 [1], 7	M12 x 100 [3]	30 plus an additional 90° (¼ turn)
3 [4], 6	M12 x 75 [3]	30 plus an additional 90° (¼ turn)
4, 5 [4]	M12 x 120 [3]	15 plus an additional 90° (¼ turn)
8, 10	M10 x 75 [3]	15 plus an additional 90° (¼ turn)
11 [5]	M12 x 50 [3]	30 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	

[1] Also secures the starter.
[2] Bolt strength rating 10.9, there is no limit to the number of times steel bolts can be used.
[3] Replace bolts.
[4] With a bracket for the wires.
[5] Installed from the engine side.

Aluminum bolts 2 through 11 can only be used twice. After using the bolts once, use a chisel and mark the bolts with two notches (X). To prevent damaging the bolts when marking them, do not clamp them in a vise. Use a ½" drive 14 mm socket and extension clamped into a vice. Do not use bolts that have been marked with an X.

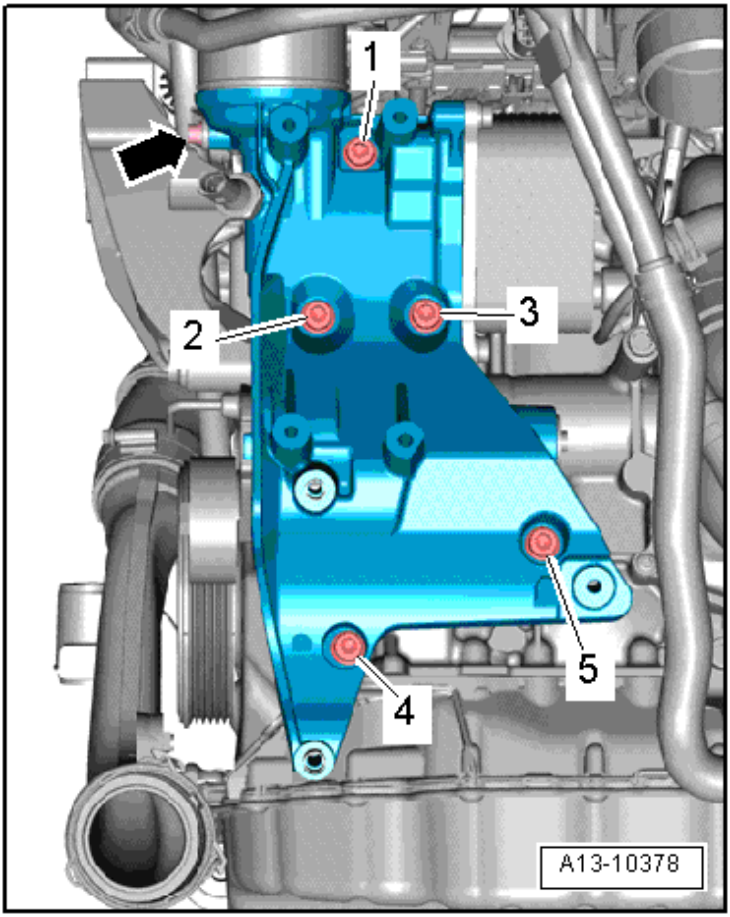
Crankshaft, Cylinder Block – 2.0L CAEB, CPMA

Fastener Tightening Specifications

Component	Nm
Connecting rod bearing cap (always replace) [1)]	45 plus an additional 90° (¼ turn)
Drive plate (always replace)	60 plus an additional 90° (¼ turn)
Idler roller	20
Pressure relief valve	27
Sensor wheel (always replace)	10 plus an additional 90° (¼ turn)
Ribbed belt tensioning damper	40
Vibration damper (always replace)	150 plus an additional 90° (¼ turn)

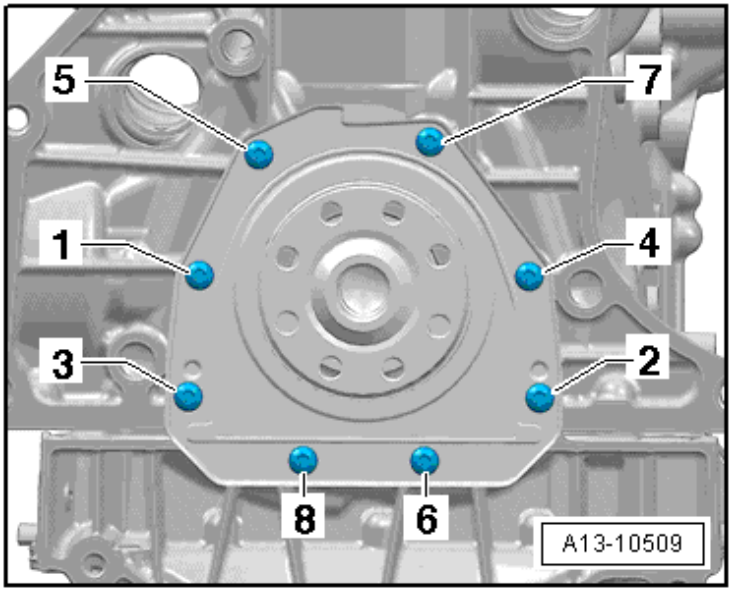
[1)] Lubricate the thread and contact surface.

Accessory Assembly Bracket Tightening Specifications



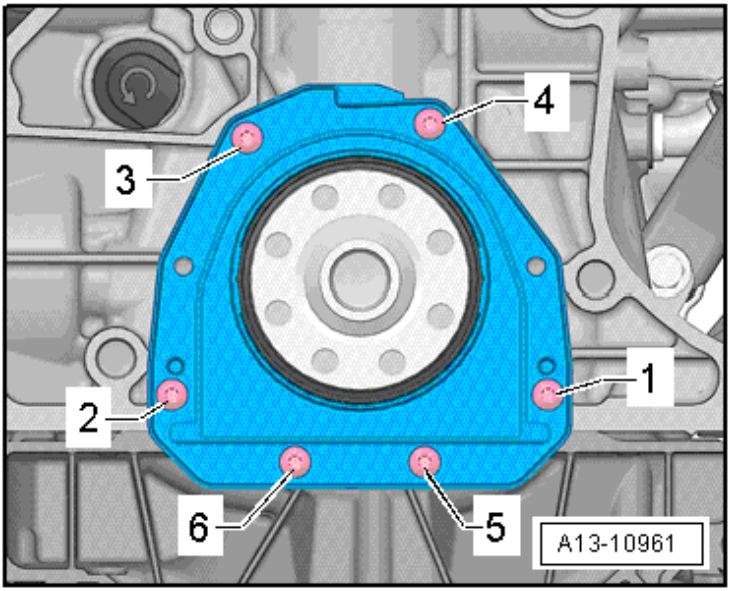
Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	Hand-tighten
2	Tighten bolts 1 through 5 in sequence	20
3	Tighten bolts 1 through 5 in sequence	an additional 90° (¼ turn)

Transmission Side Sealing Flange - Tightening Sequence, with 8 Bolts Specifications



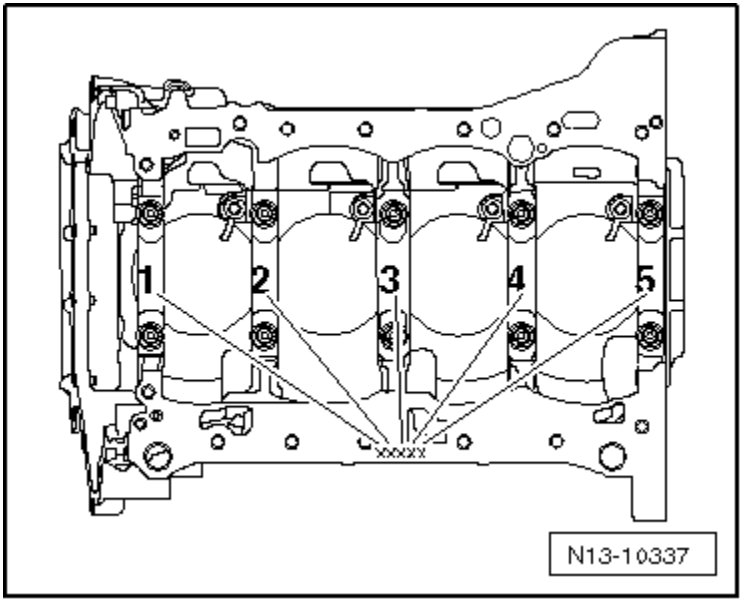
Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	Hand-tighten
2	Tighten bolts 1 through 8 in sequence	9

Transmission Side Sealing Flange - Tightening Sequence, with 6 Bolts Specifications

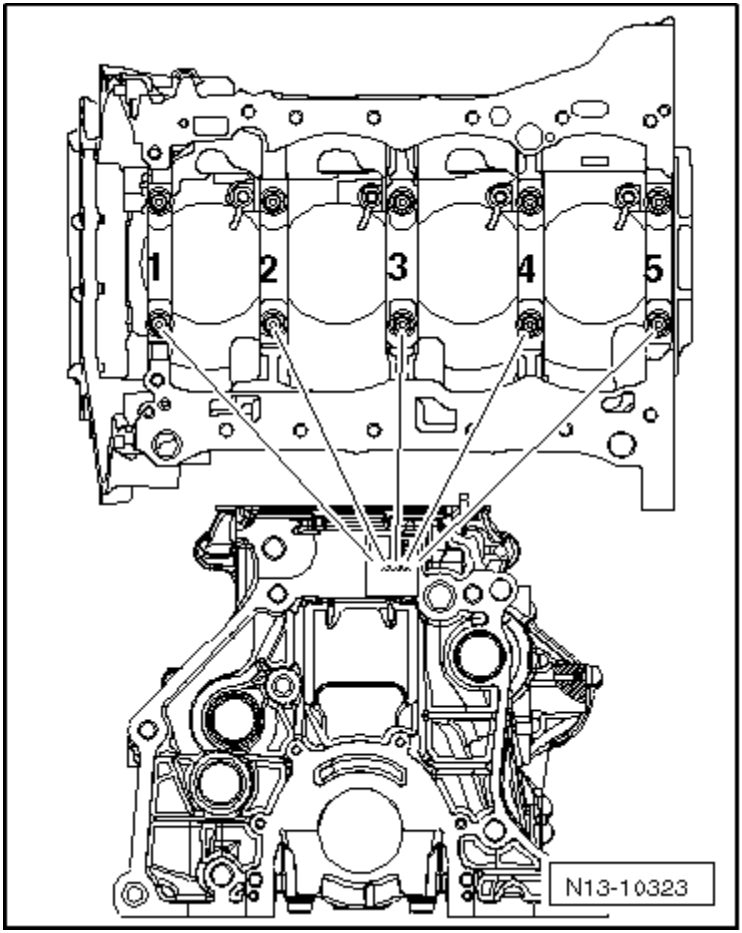


Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence	Hand-tighten
2	Tighten bolts 1 through 6 in sequence	4 an additional 45° (⅛ turn)

Cylinder Block Bearing Shell Identification

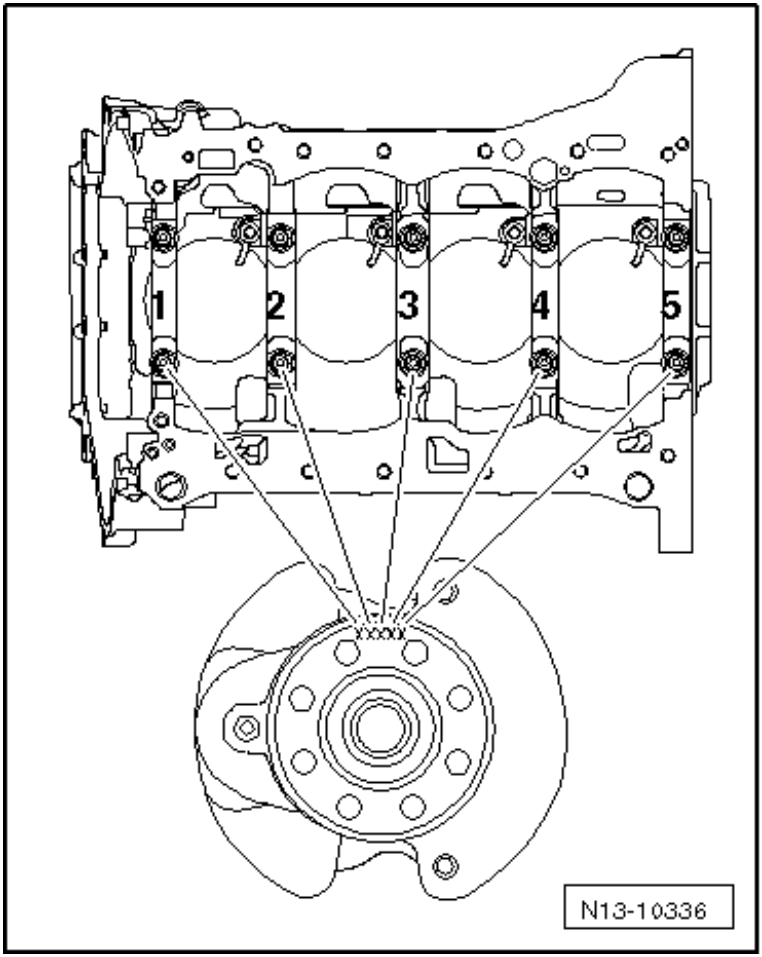


The cylinder block bearing shell identification is located either on the oil pan sealing surface or on the top (transmission side) of the cylinder block.



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

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

Piston Ring End Gaps

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

Piston Ring Clearance

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

Piston and Cylinder Dimensions

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

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

Piston and Connecting Rod Tightening Specifications

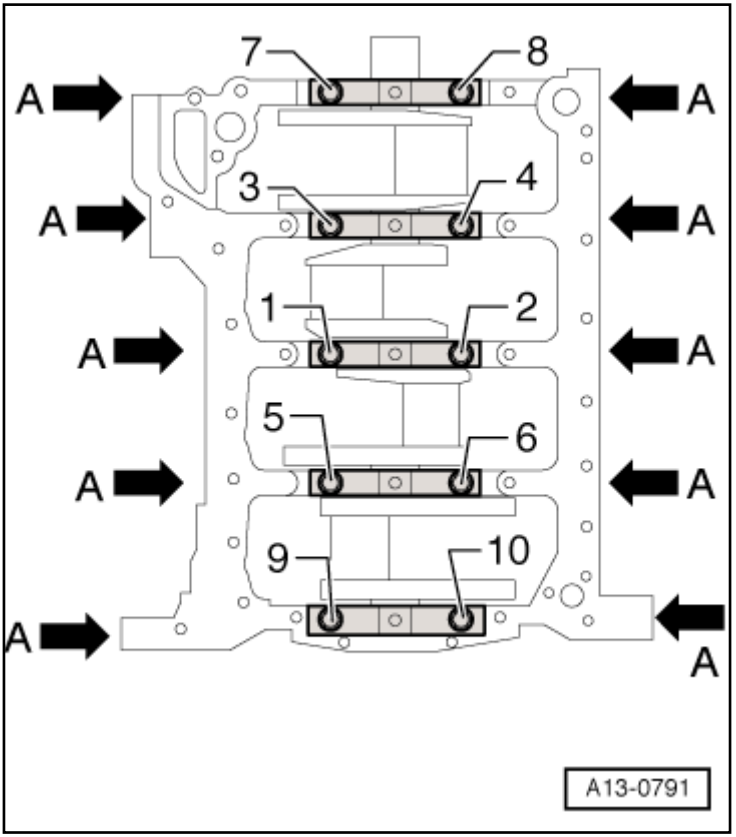
Component	Nm
Connecting rod bearing cap bolts	45 plus an additional 90° (¼ turn)
Pressure relief valve-to-oil spray jet	27

Crankshaft Dimensions

Reconditioning Dimension [1)]		Crankshaft Bearing Pin Diameter	Connecting Rod Bearing Pin Diameter
Basic dimension	mm	58.00 [1)]	47.80

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

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 [1]	an additional 90° (¼ turn)
4	Tighten bolts A ➡	20
5	Tighten bolts A ➡ [1]	an additional 90° (¼ turn)

[1] Use a rigid wrench

Cylinder Head, Valvetrain – 2.0L CAEB, CPMA

Fastener Tightening Specifications

Component	Nm
Balance shaft for exhaust side [2]	9
Balance shaft for intake side [2]	9
Bearing bracket [1, 2]	9
	20 plus an additional 90° (¼ turn)
Camshaft adjuster actuator to cylinder head	5
Camshaft Position (CMP) sensor	9
Camshaft timing chain guide rail, guide pins	20
Chain tensioner [4]	9
Chain tensioner [3]	85
Control valve-to-camshaft housing	35
Cylinder head with screwdriver access [2, 5]	
Tighten in 3 stages: - Tighten to 40 Nm. - Tighten 90° further using a rigid wrench. - Tighten 90° further using a rigid wrench.	
Tighten in 2 stages: - Tighten to 8 Nm - Tighten 90° further using a rigid wrench.	
Glide track for the balance shaft timing chain to engine	20
Guide rail for balance shaft timing chain	20
Guide rail for timing chain	20
Heat shield	20
Mounting plate	9
Oil dipstick guide tube	9
Plug with ball head for the engine cover	5
Retaining plate-to-connection	9
Sealing plugs with ball head for the engine cover	5
Timing chain tensioning rail	20
Timing chain tensioning rail, guide pins	20

Fastener Tightening Specifications *(cont'd)*

Component	Nm
Timing chain guide rail	20
Transport bracket	25

[1)] For bolt tightening clarification, refer to *Elsaweb under Camshaft Timing Chain Overview and see items 5 and 7.*

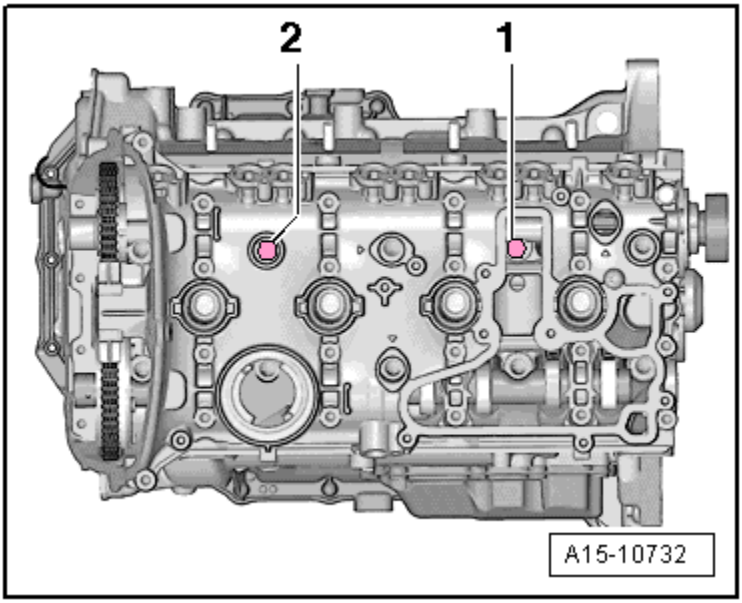
[2)] Always replace.

[3)] For bolt tightening clarification, refer to *Elsaweb under Balance Shaft Timing Chain Overview* and see item 4.

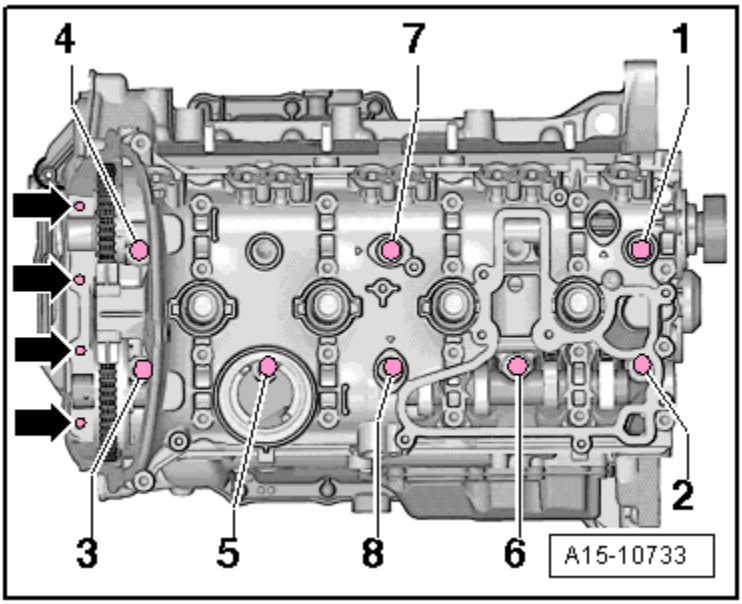
[4)] For bolt tightening clarification, refer to *Elsaweb under Camshaft Timing Chain Overview* and see item 2.

[5)] For bolt tightening clarification, refer to *Elsaweb under Cylinder Head Overview, with Screwdriver Access* and see items 4 and 6.

Cylinder Head, with Wrench Access – Removal Sequence

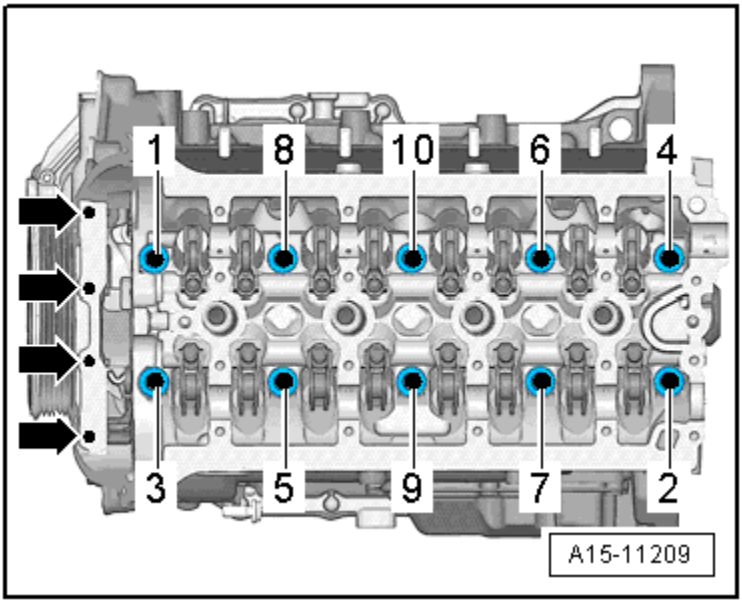


Remove cylinder head bolts 1 and 2 in sequence.



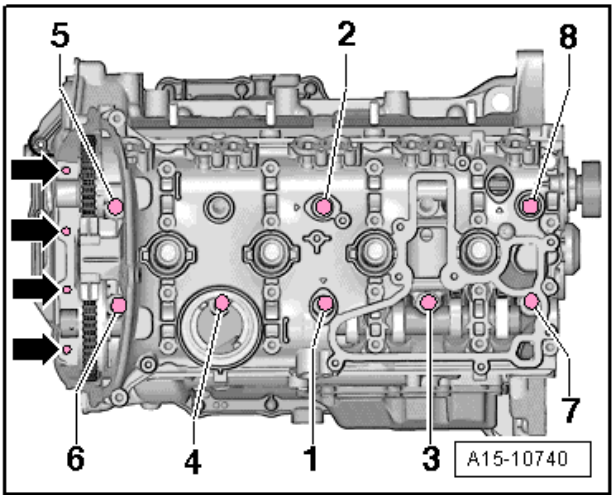
Remove cylinder head bolts 1 through 8 in sequence.

Cylinder Head, without Wrench Access – Removal Sequence

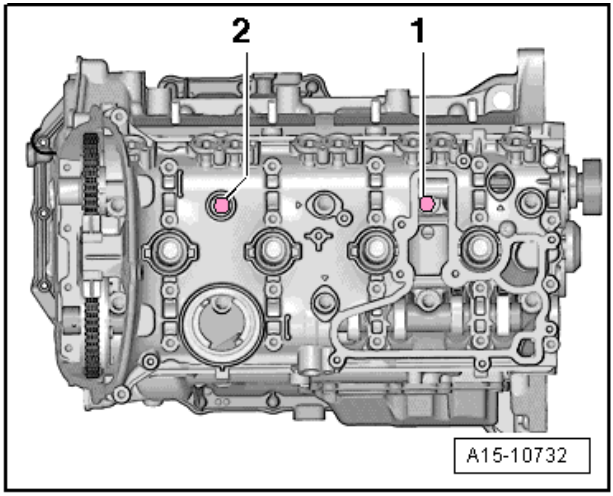


Step	Component
1	Remove bolts ➡
2	Remove bolts 1 and 10 in sequence

Cylinder Head, with Wrench Access – Tightening Specifications

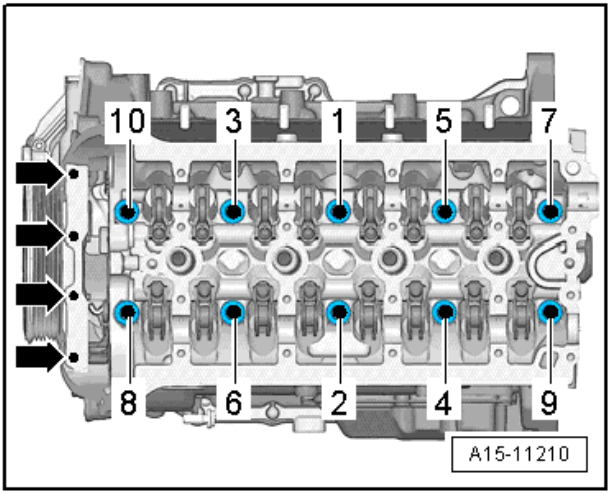


Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	40
2	Tighten bolts 1 through 8 in sequence	an additional 90° (¼ turn)
3	Tighten bolts 1 through 8 in sequence	an additional 90° (¼ turn)



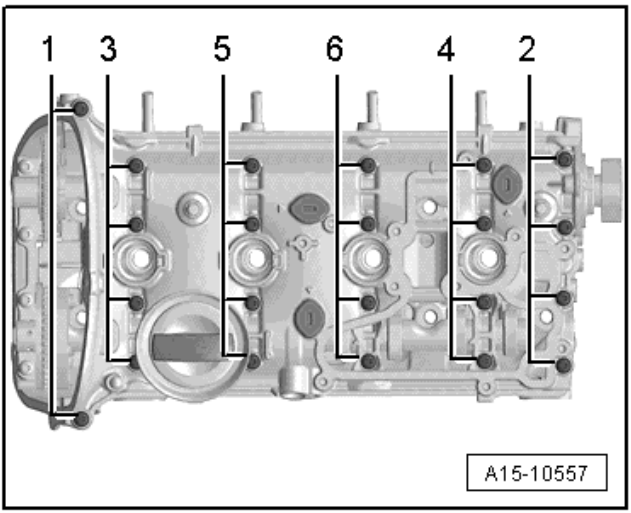
Step	Component	Nm
1	Tighten bolts 1 and 2 in sequence	40
2	Tighten bolts 1 and 2 in sequence	an additional 90° (¼ turn)
3	Tighten bolts 1 and 2 in sequence	an additional 90° (¼ turn)

Cylinder Head, without Wrench Access – Specifications



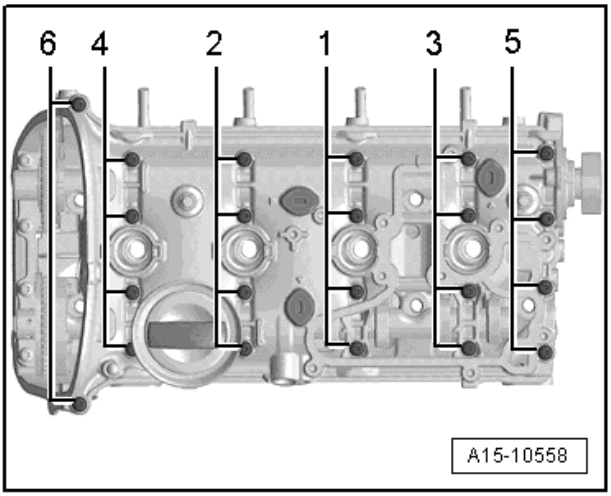
Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence in several stages	40
2	Tighten bolts 1 through 10 in sequence (using a torque wrench)	an additional 90° (¼ turn)
3	Tighten bolts 1 through 10 in sequence (using a rigid wrench)	an additional 90° (¼ turn)
4	Tighten bolts ➡	8
5	Tighten bolts 1 through 10 in sequence (using a rigid wrench)	an additional 90° (¼ turn)

Cylinder Head Cover with Integrated Camshaft Bearings Loosening Sequence



Loosen the cylinder head cover bolts 1 through 6 in sequence.

Cylinder Head Cover with Integrated Camshaft Bearings Tightening Specifications

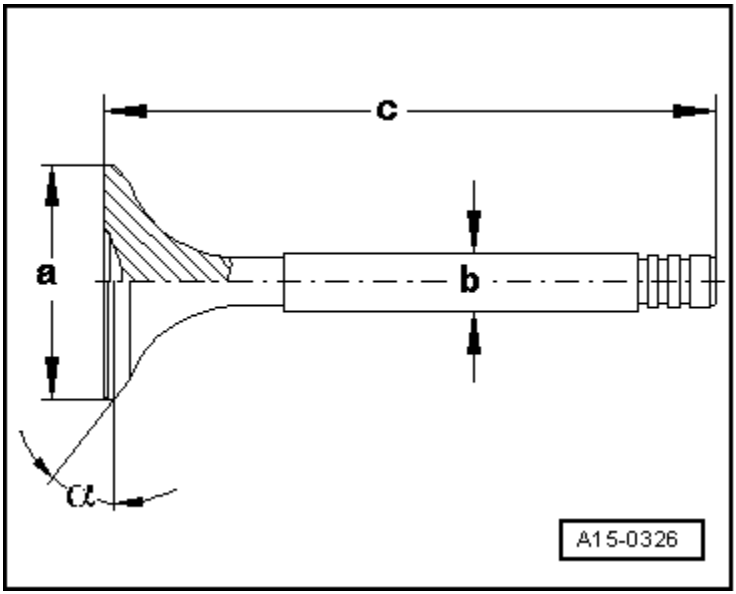


Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence in several stages	Hand-tighten
2	Tighten bolts 1 through 6 in sequence	8
3	Tighten bolts 1 through 6 in sequence	an additional 90° (¼ turn)

Compression Pressures

New Bar Positive Pressure	Wear Limit Bar Positive Pressure	Difference Between Cylinders Bar Positive Pressure
11.0 to 14.0	7.0	Max. 3.0

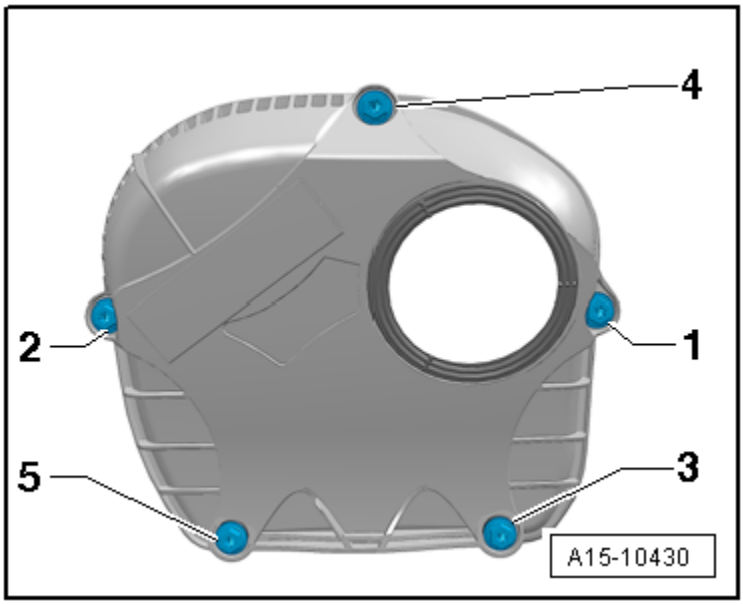
Valve Dimensions



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

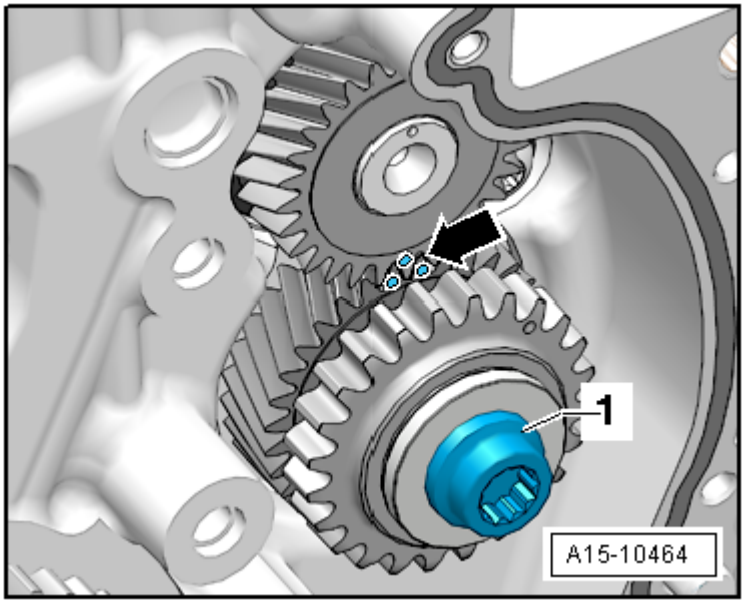
Intake and exhaust valves must not be refaced by grinding. Only lapping is permitted.

Upper Timing Chain Cover Tightening Specification



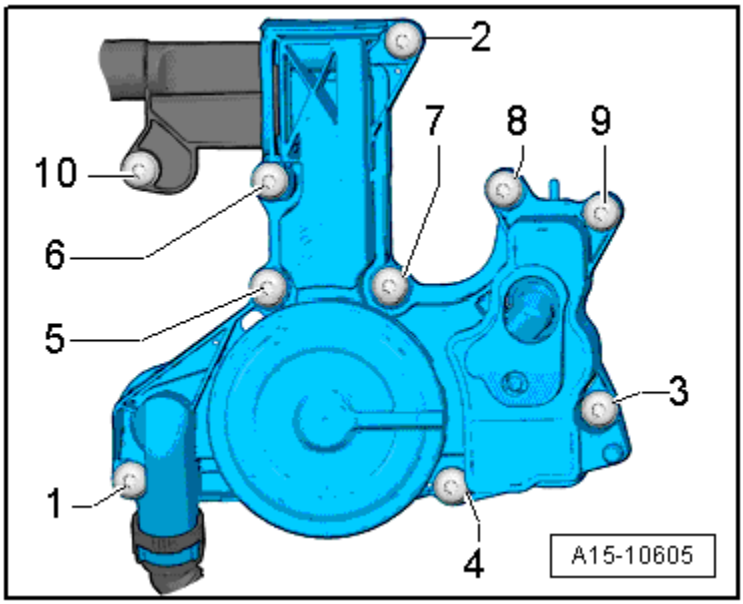
Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	9

Intermediate Sprocket Tightening Sequence



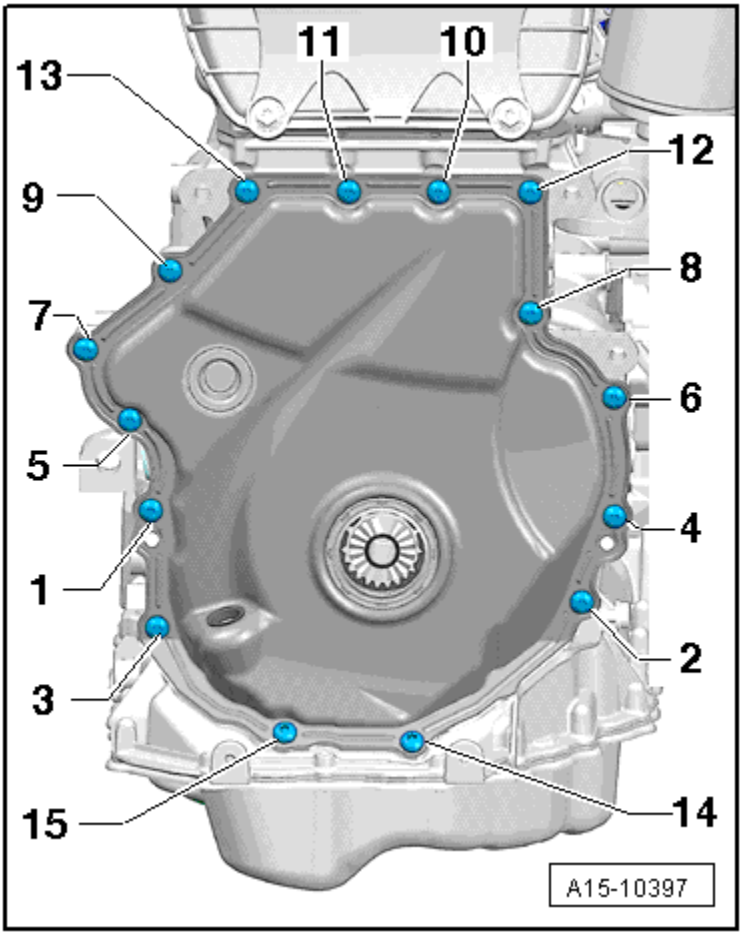
Step	Component	Nm
1	Tighten with a new bolt	
2	Tighten bolt	10
3	The intermediate sprocket must not have any play. Loosen and tighten it again if necessary.	
4	Tighten bolt (using a torque wrench)	25
5	Tighten bolt (using a rigid wrench)	an additional 90° (¼ turn)

Crankcase Ventilation, Tightening Sequence



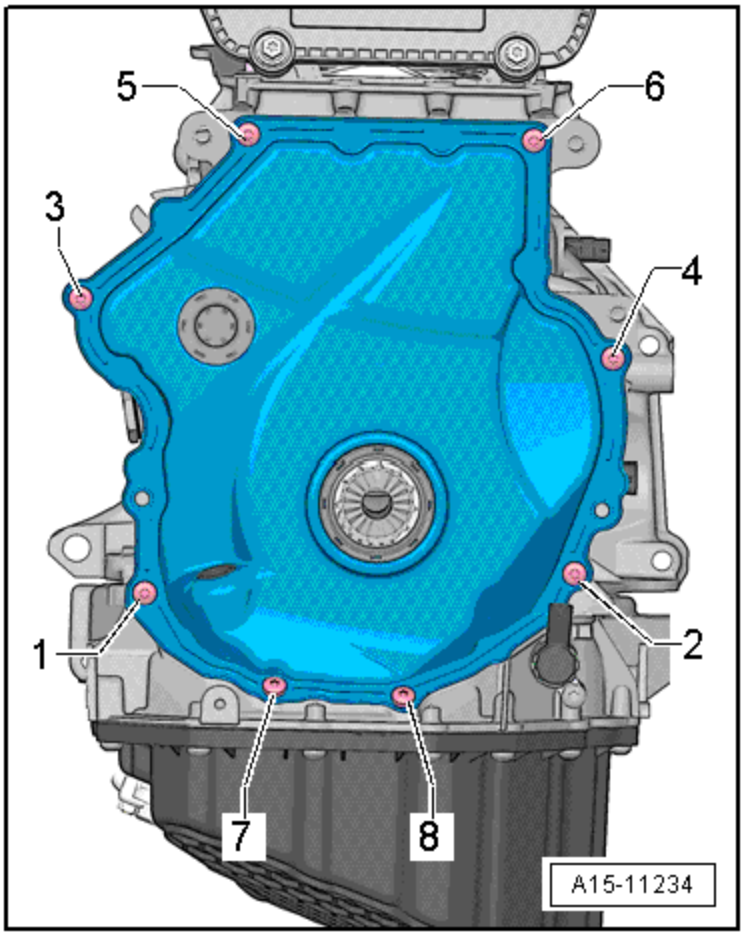
Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	11

Lower Timing Chain Guard - Tightening Sequence for 15 Bolts Specifications



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

Lower Timing Chain Guard - Tightening Sequence for 8 Bolts Specifications



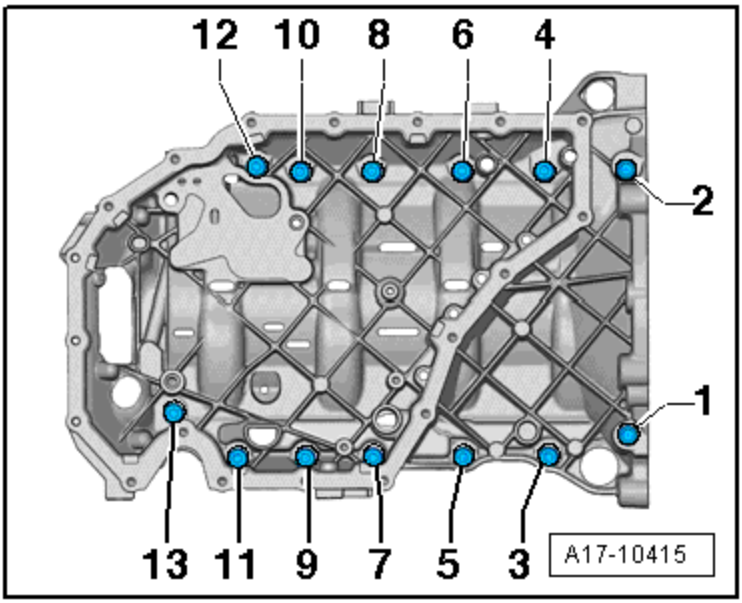
Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	4
2	Tighten bolts 1 through 8 in sequence	an additional 45° (⅛ turn)

Engine Lubrication – 2.0L CAEB, CPMA

Fastener Tightening Specifications

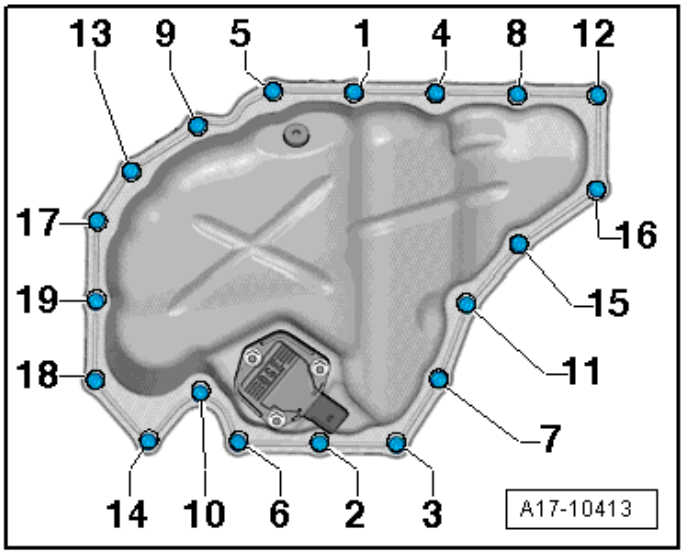
Component	Nm
Chain tensioner to engine	9
Engine oil cooler to auxiliary components bracket	23
Oil baffle to upper oil pan	9
Oil drain plug (always replace)	30
l level thermal sensor to lower oil pan, nut	9
Oil pump to upper oil pan	20
Oil pressure regulation valve	9
Oil pressure switch to auxiliary components bracket	20
Reduced oil pressure switch to auxiliary components bracket	20
Suction line to oil pump	9

Oil Pan Upper Section Tightening Specifications



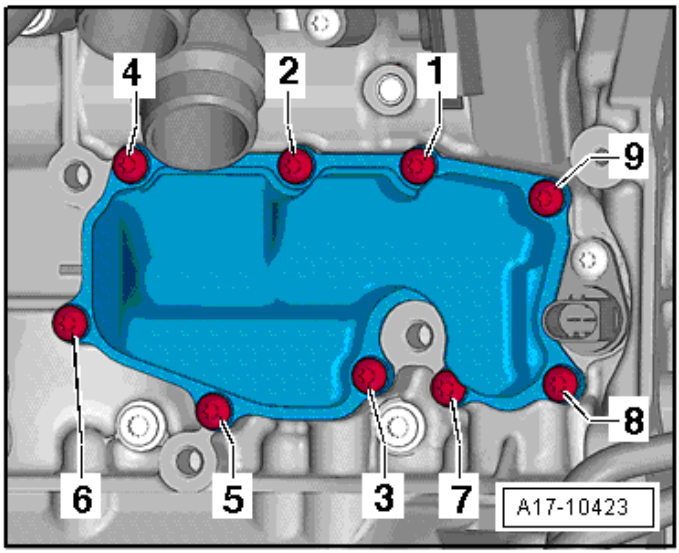
Step	Component	Nm
1	Tighten bolts 1 through 13 in sequence	15
2	Tighten bolts 1 through 13 in sequence	an additional 90° (¼ turn)

Oil Pan Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 19 in sequence	8
2	Tighten bolts 1 through 19 in sequence	an additional 45° (⅛ turn)

Oil Separator Tightening Specification



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

Oil Filter and Cooler Assembly Tightening Specifications

Component	Nm
Oil cooler bolts	23
Oil pressure switch F22	20
Reduced oil pressure switch F378	20

Fuel Injection and Ignition – 2.0L CAEB, CPMA

Fuel Injection System Data

Engine code		**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 as needed by an electric fuel pump in the fuel tank	3.0 to 10.5 bar pressure
	Fuel high pressure produced by a mechanical single-piston pump at approximately 85 degree coolant temperature	30 to 150 bar pressure

Fastener Tightening Specifications – Fuel Injection

Component	**Nm**
Adapter between connecting piece and high pressure fuel line	40
Air duct to lock carrier	2
Cold Start Injector	10
E-Box Cover	3.5
Engine Speed (RPM) sensor	4.5
Fuel pressure sensor	27
Fuel Rail to Intake Manifold	10
Fuel supply line connectors (always replace)	40
Fuel supply line connection on the fuel rail (always replace)	40
Fuel supply line, union nut	20
High pressure fuel line	27
High Pressure Fuel Line to Adapter	20
High pressure pump (first tighten the bolts diagonally hand-tight)	
then to	5
and then to	20
Intake air temperature sensor	9
Intake manifold	9
Intake manifold support	
Nut	10
Bolt	23

Component	Nm
Knock Sensor (KS)	20
Oxygen Sensors (O2S)	55
Retaining clip	10
Throttle valve control module	7

Fastener Tightening Specifications – Ignition

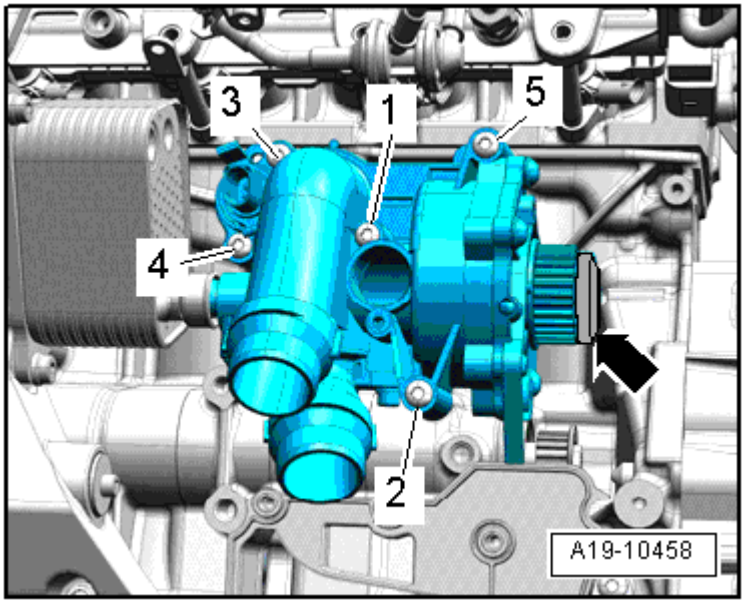
Component	Nm
Camshaft Position (CMP) sensor	10
Knock Sensor (KS)	20
Spark plug	30

Engine Cooling – 2.0L CAEB, CPMA

Fastener Tightening Specifications

Component	Nm
After-run coolant pump V51 clamp bracket bolt	4
Bracket	9
Connecting piece	9
Coolant Fan Control (FC) control module	2.5
Toothed belt drive gear (always replace)	10 plus an additional 90° (¼ turn)
Fan rib-to-coolant fan	5
Front coolant pipe	9
Radiator-to-bracket bolt	3.5
Radiator bracket-to-frame	5.5
Retaining plate	4
Small coolant pipe	6
Toothed belt guard	9

Coolant Pump Tightening Specifications



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

Fuel Supply System – 2.0L CAEB, CPMA

Fastener Tightening Specifications

Component	Nm
Accelerator pedal module mounting bolt	8
Carrier plate	20
EVAP canister mounting bolt [1]	4
	16
Fuel delivery unit union nut [2]	
Fuel filler neck to body mounting bolt	
Fuel pump control module mounting bolt	
Fuel tank heat shield mounting nut	
Leak detection pump air filter mounting to body nut	
Component	**Nm**
Locking flange cover mounting bolt	1.5
Protective plate for fuel filler tube	8

[1] For bolt tightening clarification, refer to *Elsaweb under Evaporative Emission Canister and Leak Detection System Overview and see items 4 and 5*

[2] Always replace.

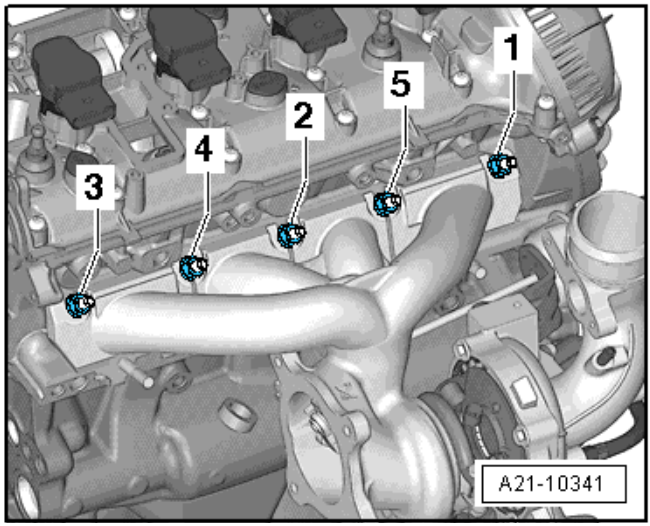
Turbocharger – 2.0L CAEB, CPMA

Fastener Tightening Specifications

Component	Nm
Air guide pipe, nut	9
Air guide pipe-to-bracket	10
Brace-to-turbocharger	30
Bracket-to-brace	30
Charge Air Cooler (CAC)	7
Charge air pressure sensor	5
Clamping strip, nut (always replace)	30
Connection-to-turbocharger	9
Coolant return line bracket bolts	9
Coolant return line banjo bolts	35
Hose clamp	5.5
Line for crankcase ventilation	9
Oil supply line with O-ring flange bolt	9
Oil supply line bracket bolts	9
Oil supply line banjo bolt-to-turbocharger	30
Right air guide pipe-to-oil pan	10
Turbocharger recirculating valve	7
Turbocharger vacuum diaphragm	
- Turbocharger vacuum diaphragm nut [1)]	9
- Turbocharger vacuum diaphragm bolt	10
Wastegate bypass regulator valve	3

[1)] 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 CAEB

Exhaust System Tightening Specifications

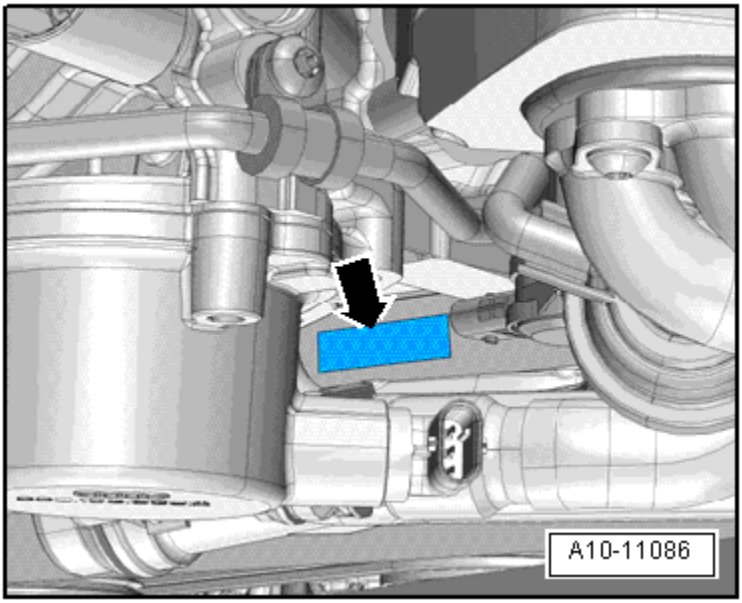
Component	Nm
Bracket for retaining loop	23
Catalytic converter, nuts (always replace)	25
	40 [1]
Exhaust tailpipe clamp	60
Front clamping sleeve, nut	25
Rear clamping sleeve, nut	25
Suspended mount (always replace)	23

[1] Coat turbocharger stud bolts with hot bolt paste.

ENGINE MECHANICAL – 3.0L CGXC

General, Technical Data – 3.0L CGXC

Engine Number Location



The engine number (engine code and serial number) is located on the top front of the cylinder block, below the right cylinder head ➡. Engine codes beginning with C are four-digit. The first 3 digits of the engine code indicate the displacement and the mechanical structure of the engine. They are stamped in the cylinder block including the serial number. The fourth digit describes the engine output and torque and depends on the engine control module.

Engine Data

Code letters		**CGXC**
Displacement	liter	2.995
Output	kW at RPM	245/5500 to 7000
Torque	Nm at RPM	440/2900 to 5300
Bore	diameter mm	84.5
Stroke	mm	89.0
Compression ratio		10.5
RON	at least	98 [1)]
Fuel injection and ignition system		Simos

Engine Data *(cont'd)*

Code letters	CGXC
Ignition sequence	1-4-3-6-2-5
Exhaust Gas Recirculation (EGR)	No
Supercharger	Supercharger
Knock Sensor (KS)	2 sensors
Charge Air Cooler (CAC)	Yes
Oxygen Sensor (O2S) regulation	2 sensors before catalytic converter 2 sensors after catalytic converter
Variable valve timing	Intake
Variable intake manifold	No
Secondary Air Injection (AIR) system	Yes
Valve per cylinder	4

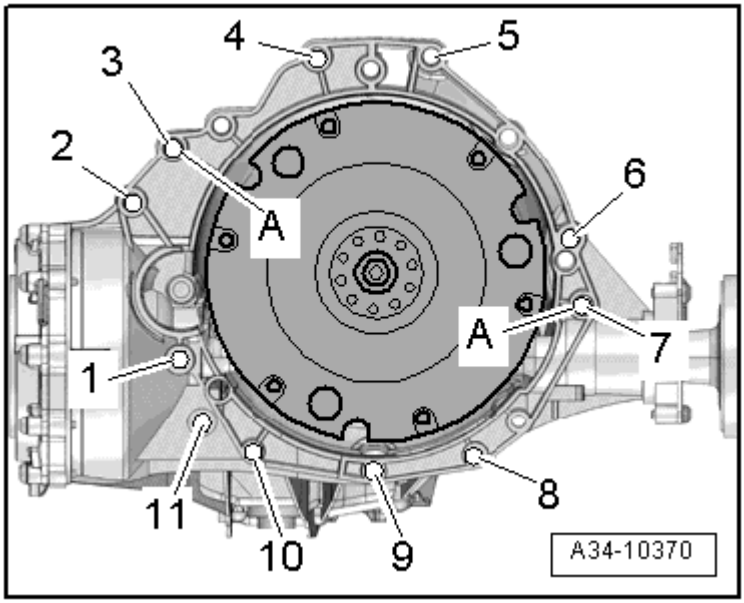
[1] Regular unleaded RON 91 is permitted although with reduced engine power.

Engine Assembly – 3.0L CGXC

Fastener Tightening Specifications

Component	Bolt Size	Nm
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Engine mount (always replace)	-	90 plus an additional 90° (¼ turn)
Engine support	-	40
Ground bolt-to-strut tower	-	9
Ground wires-to-longitudinal member	-	9
Heat shield	-	10
Hydraulic oil hose bracket	-	9
Mounting plate	-	20
Subframe	-	55

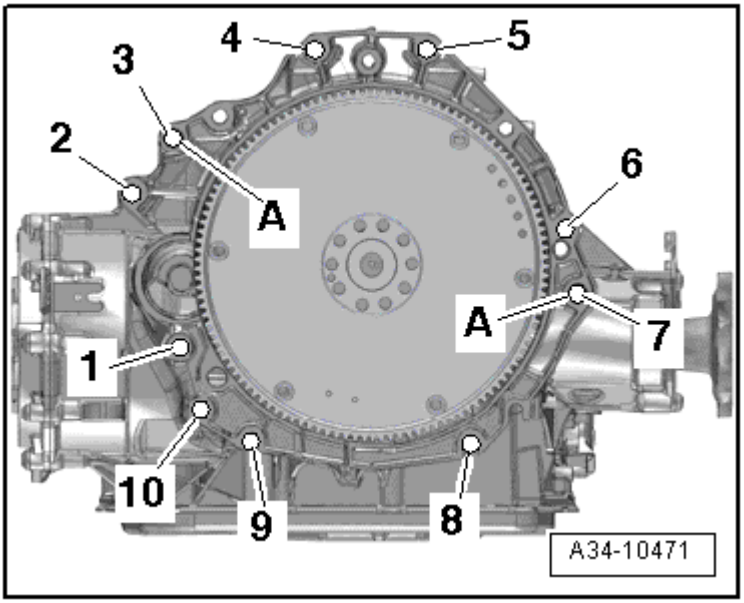
Engine to Manual Transmission Fastener Tightening Specifications



Component	Bolt Size	Nm
1	M10 x 50 [1]	65
2 through 6	M12 x 100 [2]	30 plus an additional 90° (¼ turn)
7	M12 x 125 [2]	30 plus an additional 90° (¼ turn)
8, 11	M10 x 60 [2]	15 plus an additional 90° (¼ turn)
9, 10	M10 x 95 [2]	15 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	

[1] Bolt class 10.9, the steel bolt may be used again unlimited number of times.
[2] The aluminum bolts can be used 2 times.

Engine to S-Tronic Transmission 0B5 Fastener Tightening Specifications



Component	Bolt Size	Nm
1	M10 x 50 [1)]	65
2 through 6	M12 x 100 [2)]	30 plus an additional 90° (¼ turn)
7	M12 x 125 [2)]	30 plus an additional 90° (¼ turn)
8	M10 x 60 [2)]	15 plus an additional 90° (¼ turn)
9, 10	M10 x 95 [2)]	15 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	

[1)] Bolt class 10.9, the steel bolt may be used again unlimited number of times.
[2)] The aluminum bolts can be used 2 times.

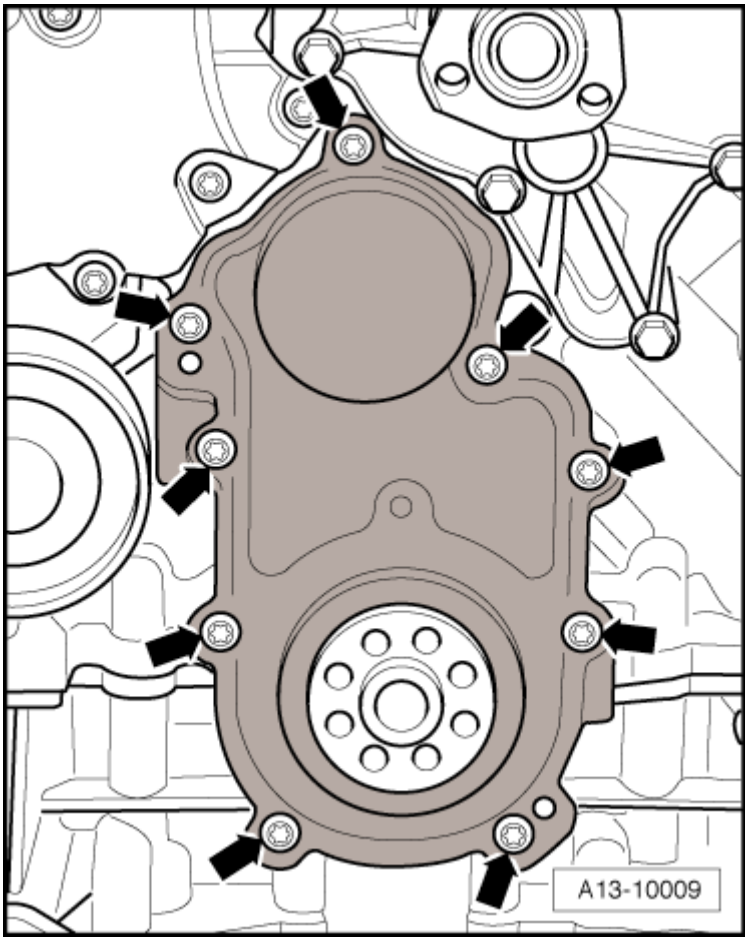
Crankshaft/Cylinder Block – 3.0L CGXC

Fastener Tightening Specifications

Component	Nm
Connecting rod [1]	50 plus an additional 90° (¼ turn)
Drive plate [1]	60 plus an additional 90° (¼ turn)
Idler roller for ribbed belt [3]	42
Idler roller for ribbed belt [2]	40
Oil spray jet for piston cooling [4]	9
Oil pressure regulation valve	9
Ribbed belt tensioning damper	40
TDC marking locking bolt	14
Vibration damper [1]	20 plus an additional 90° (¼ turn)

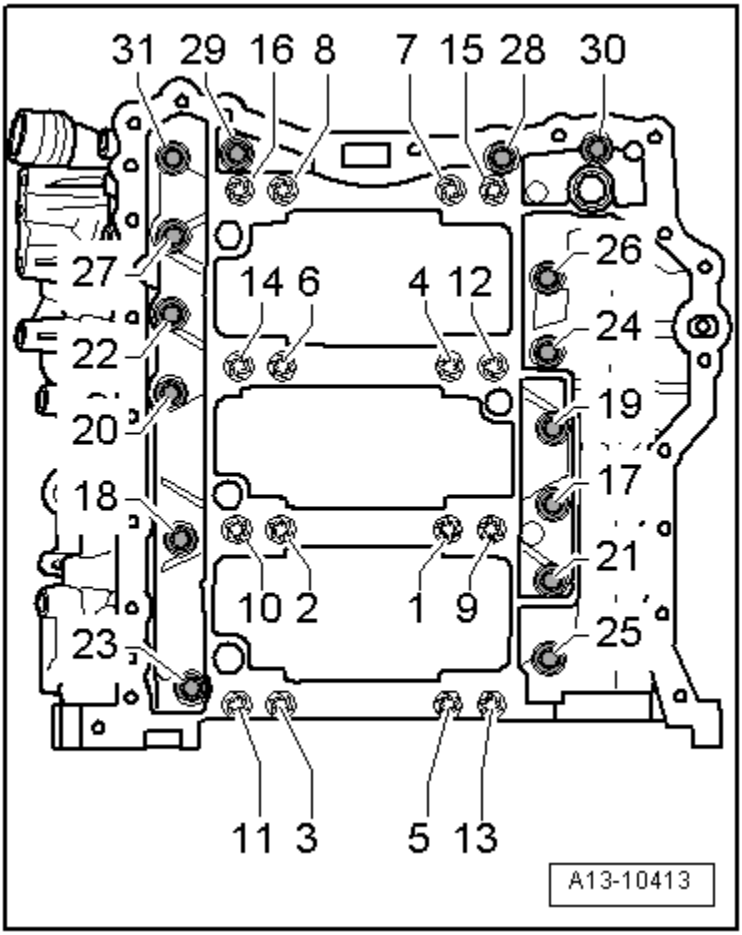
[1] Always replace
[2] For bolt tightening clarification, refer to ElsaWeb under *Ribbed Belt Drive, Vehicles with Hydraulic Power Steering Overview"and see item -6-*
[3] For bolt tightening clarification, refer to ElsaWeb under *Supercharger Ribbed Belt Drive Overview and see item -2-*
[4] Insert bolt with locking compound

Ribbed Belt Pulley Side Sealing Flange Tightening Specifications



Tighten the bolts ➡ in a diagonal sequence in stages to 9 Nm.

Crankshaft Assembly Guide Frame Tightening Specifications



Replace bolts that are tightened to the specification. Insert the long bolts in the inner row of the guide frame. Tighten the bolts in 3 steps in the sequence shown:

Component	Nm
Tighten bolts 1 through 16 in the sequence	50
Tighten bolts 1 through 16 in the sequence	an additional 90° (¼ turn)
Tighten bolts 17 through 31 in sequence for the guide frame sealing surfaces on cylinder block	23

Crankshaft Dimensions

Honing dimension In mm	Crankshaft bearing pins-diameter		Crankshaft connecting rod journal- diameter	
Basic dimension	65.000	– 0.022	56.000	– 0.022
		– 0.042		– 0.042

Crankshaft Axial Play

Component	mm
Axial clearance	0.15 to 0.25

Crankshaft Radial Play

Component	mm
Radial clearance new	0.015 to 0.055
Radial clearance wear limit	0.080

Connecting Rod Radial Clearance

Component	mm
New	0.010 to 0.052
Wear limit	0.120

Piston Ring End Gap Dimensions

Honing dimension in mm	Piston Diameter	Cylinder Bore Diameter
1st Compression ring	0.20 to 0.30	84.51
2nd Compression ring	0.50 to 0.70	0.80
Oil scraping ring	0.25 to 0.50	- [1]
[1] Not determined yet.		

Piston Ring Side Clearance Dimensions

Honing dimension in mm	Piston Diameter	Cylinder Bore Diameter
1st Compression ring	0.04 to 0.08	0.20
2nd Compression ring	0.03 to 0.07	0.20
Oil scraping ring	0.02 to 0.06	0.15

Piston and Cylinder Dimensions

Honing dimension in mm	Piston Diameter	Cylinder Bore Diameter
Basic dimension	84.49 [1]	84.51

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

Cylinder Head, Valvetrain – 3.0L CGXC

Fastener Tightening Specifications

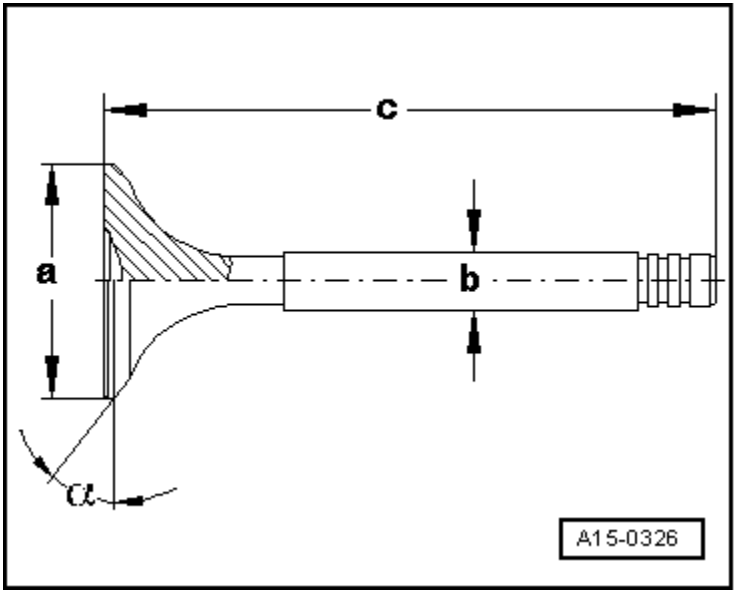
Component	Nm
Balance shaft belt pulley side	60
Balance shaft chain sprocket [1]	15 plus an additional 90° (¼ turn)
Balance shaft transmission side	60
Camshaft adjuster for intake camshaft [1]	80 plus an additional 90° (¼ turn)
Camshaft adjustment solenoid valve	5
Camshaft chain sprocket for the exhaust camshaft [1]	80 plus an additional 90° (¼ turn)
Chain tensioner [2]	9
Chain tensioner with glide track [1] [3]	10 plus an additional 45° (⅛ turn)
Drive chain sprocket bearing plate	8 plus an additional 45° (⅛ turn)
Drive sprocket for oil pump [1]	30 plus an additional 90° (¼ turn)
Drive sprocket pivot pin (left) [1]	5 plus an additional 60° (⅙ turn)
Drive sprocket pivot pin (right) [1]	30 plus an additional 60° (⅙ turn)
Gear carrier	13
Guide rail [1]	10 plus an additional 90° (¼ turn)
Left camshaft timing chain tensioner	9
Oil dipstick guide tube	9
Right camshaft timing chain tensioner	9

[1] Always replace.

[2] For bolt tightening clarification, refer to ElsaWeb under *Timing Mechanism Drive Chain Overview and see items -7-*.

[3] For bolt tightening clarification, refer to ElsaWeb under *Power Take-Off Drive Chain* Overview“ and see items -8-

Valve Dimensions



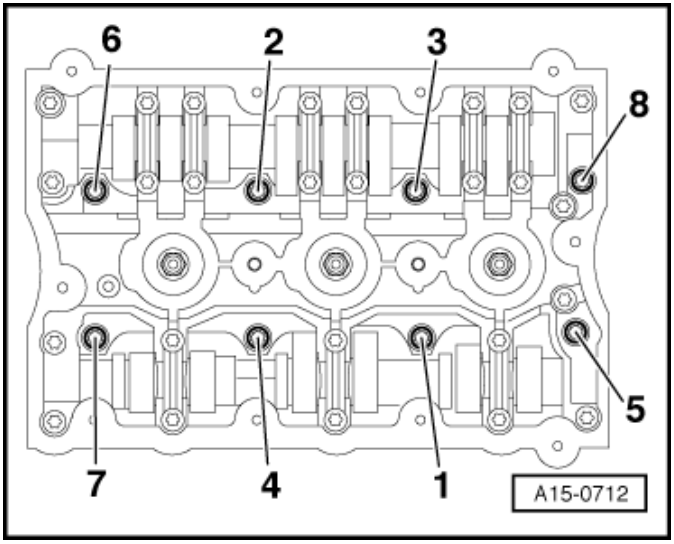
Dimension		Intake Valve	Exhaust Valve
Diameter a	mm	33.85 ± 0.10	28.0 ± 0.1
Diameter b	mm	5.98 ± 0.01	5.96 ± 0.01
c	mm	104.0 ± 0.2	101.9 ± 0.2
α	∠°	45	45

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

Compression Pressures

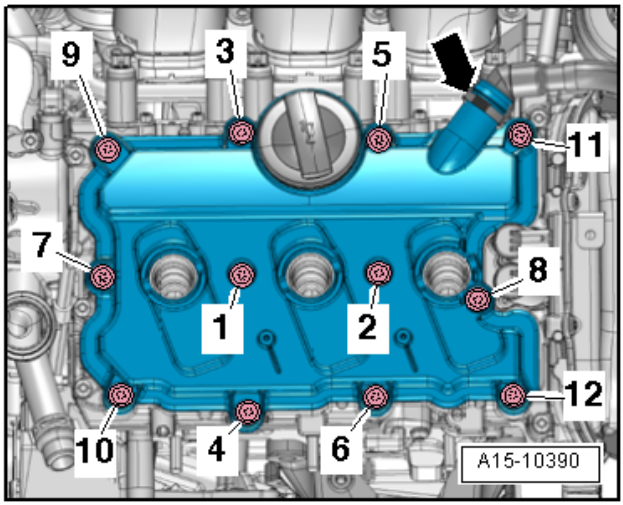
Compression pressure	Bar pressure
New	11.0 to 14.0
Wear limit	10.0
Difference between cylinders	Max. 3.0

Cylinder Head Tightening Specifications



Step	Component	Nm
1	Install bolts by hand	Hand-tighten
2	Tighten bolts 1 through 8 in sequence	40
3	Tighten bolts 1 through 8 in sequence	an additional 90° (¼ turn)
4	Tighten bolts 1 through 8 in sequence	an additional 90° (¼ turn)

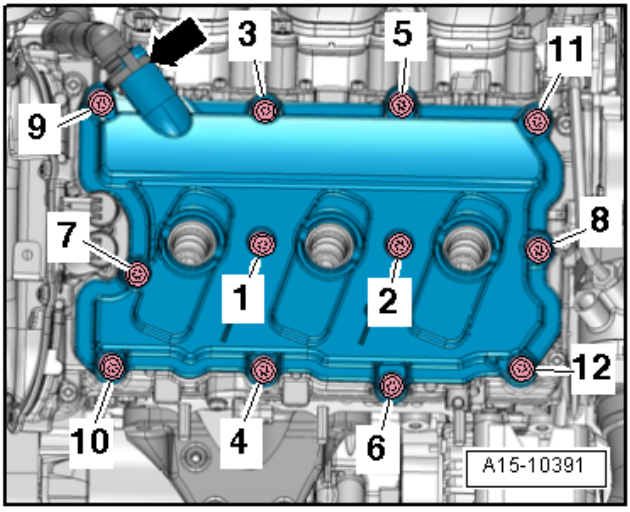
Left Cylinder Head Cover Tightening Specification



Loosen the left cylinder head cover bolts in reverse order 12 to 1.

Component	Nm
Tighten bolts 1 through 12 in sequence	9

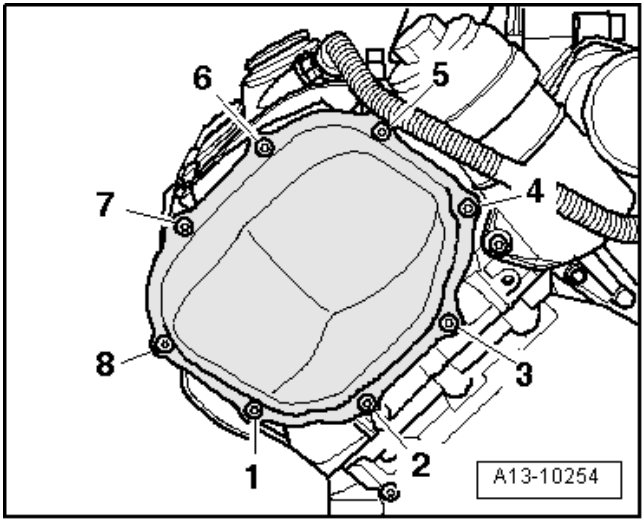
Right Cylinder Head Cover Tightening Specification



Loosen the right cylinder head cover bolts in reverse order 12 to 1.

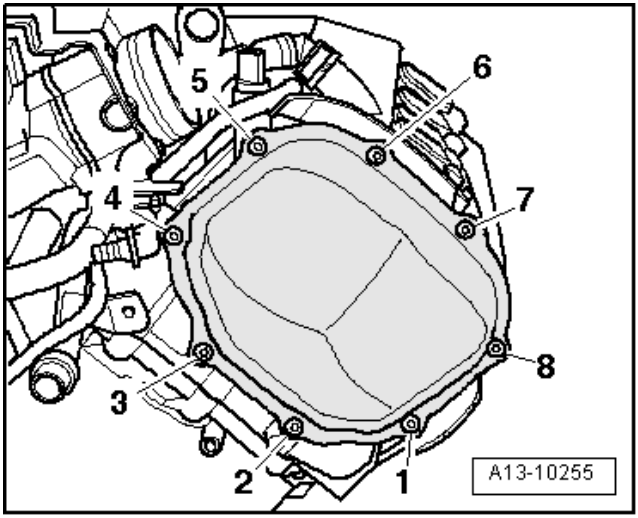
Component	Nm
Tighten bolts 1 through 12 in sequence	9

Left Timing Chain Cover Tightening Specifications



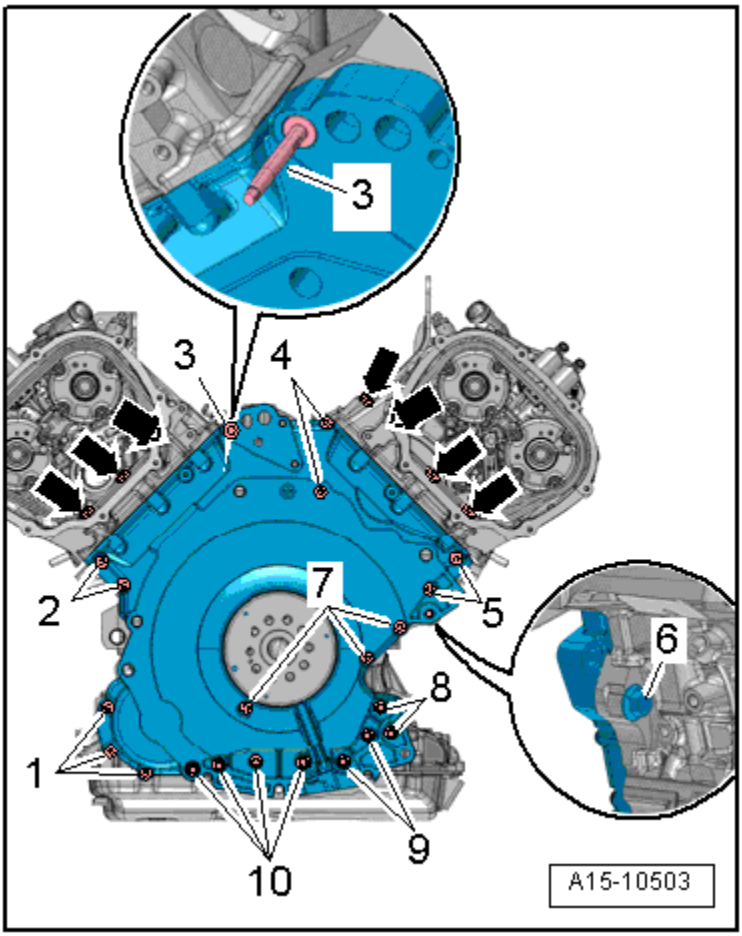
Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	5
2	Tighten bolts 1 through 8 in sequence	an additional 90° (¼ turn)

Right Timing Chain Cover Tightening Specifications



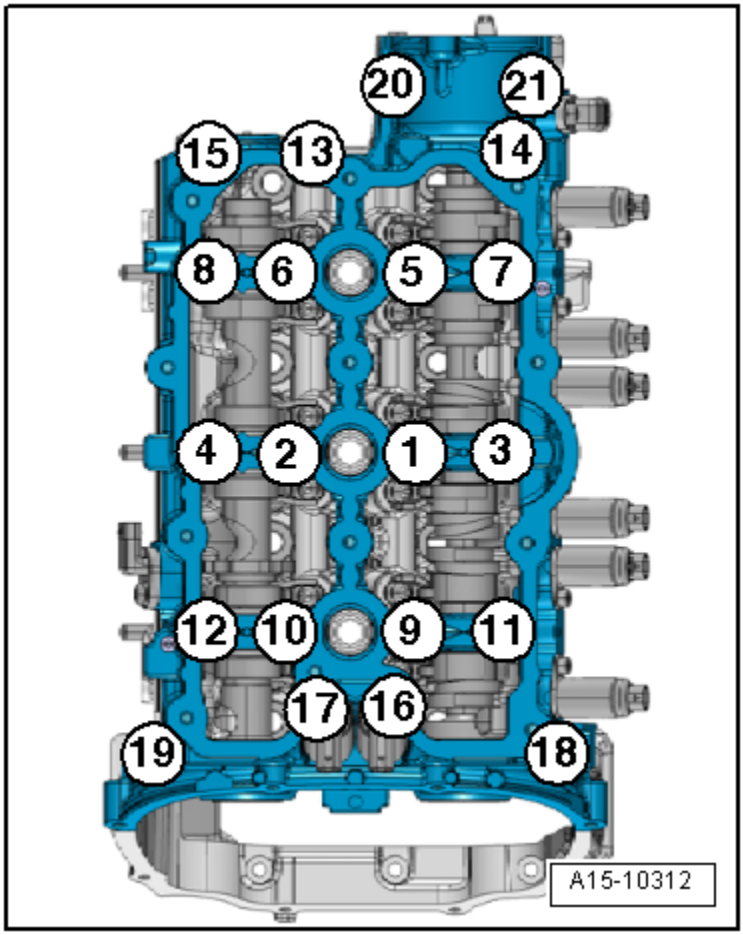
Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	5
2	Tighten bolts 1 through 8 in sequence	an additional 90° (¼ turn)

Lower Timing Chain Cover Tightening Specifications



Step	Bolts	Tightening Specification/ Additional Angle of Rotation
1	➡	3 Nm
2	1 through 10	3 Nm in a diagonal sequence
3	1, 2, 4, 5, 7 and ➡	Tighten an additional 90° (¼ turn)
4	8, 9, 10	8 Nm
5	8, 9, 10	Tighten an additional 90° (¼ turn)
6	3	16 Nm
7	6	20 Nm
8	6	Tighten an additional 90° (¼ turn)

Camshaft Guide Frame Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 21 in sequence (The guide frame must be in contact with the entire contact surface of the cylinder head)	Hand-tighten
2	Tighten bolts 1 through 21 in sequence	8
3	Tighten bolts 1 through 21 in sequence	an additional 90° (¼ turn)

Engine Lubrication – 3.0L CGXC

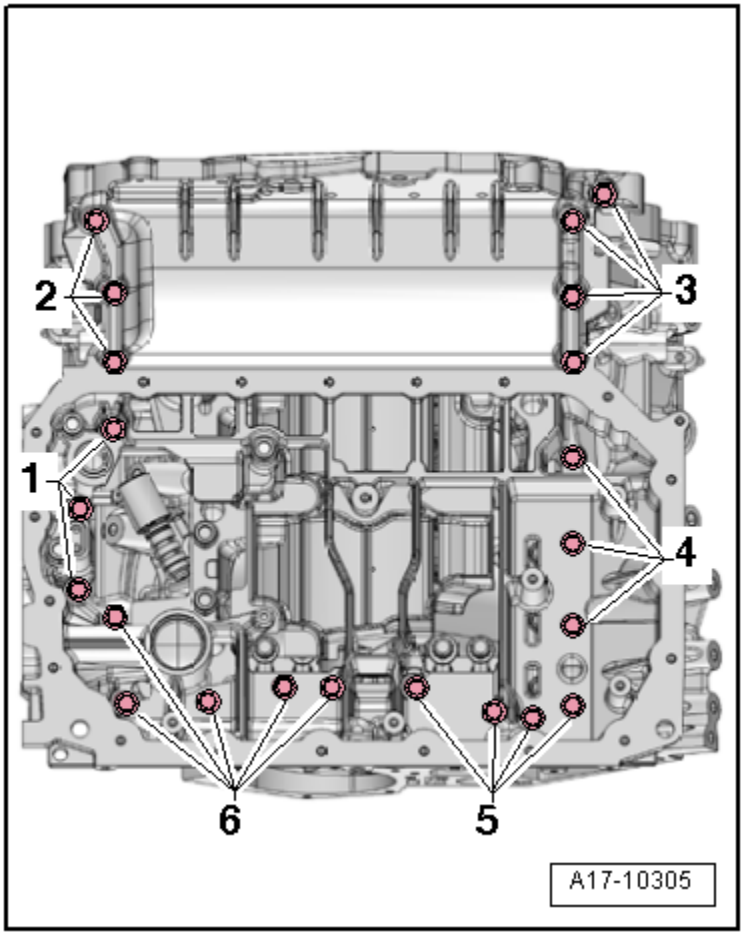
Fastener Tightening Specifications

Component	Nm
Bracket for driveshaft for oil pump	9
Chain sprocket for oil pump [1]	30 plus an additional 90° (¼ turn)
Cover with oil separator	9
Crankcase ventilation hose	3
Engine oil cooler	9
Lower oil baffle [1]	3 plus an additional 90° (¼ turn)
Oil drain plug	30
Oil filter housing [2]	
	13
Union nut	13
	9
Oil check valve	20
Oil filter housing cap	25
Oil level thermal sensor, nut	9
Oil pressure switch	20
Oil pump	20
Reduced oil pressure switch	20
Union nut	13
	9
Upper oil baffle	9

[1] Always replace

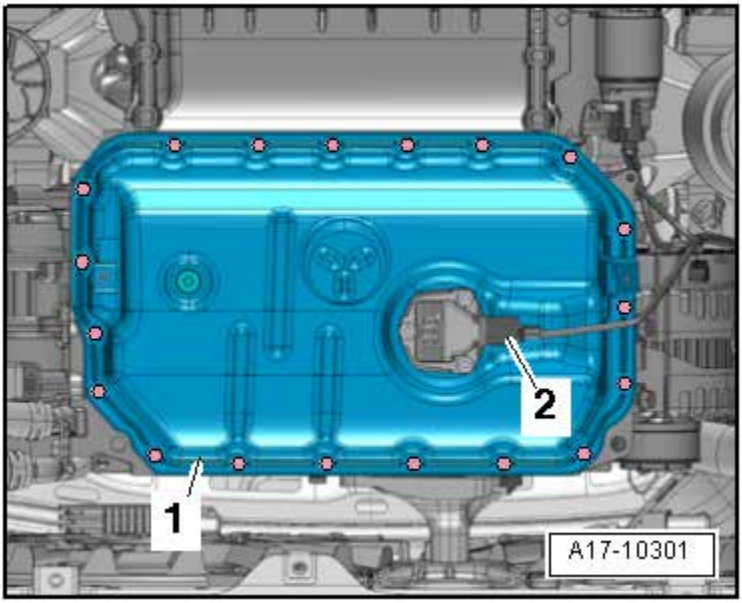
[2] For bolt tightening clarification, refer to ElsaWeb under *Oil Filter Housing and Oil Pressure Switch Overview, items 1, 4, 5, and 13.*

Upper Oil Pan Tightening Specifications



Step	Bolts	Tightening Specification/ Additional Turn
1	1 through 6	8 Nm in a diagonal sequence
2	1 through 6	an additional 90° (¼ turn) in a diagonal sequence

Lower Oil Pan Tightening Specifications



Replace any bolts that were tightened with an additional turn.
Tighten bolts in 2 stages as follows:

Step	Tightening Specification/Additional Turn
1	3 Nm in a diagonal sequence
2	an additional 90° (¼ turn) in diagonal sequence

Fuel Injection – 3.0L CGXC

Fuel Injection System Test Data

3.0L TFSI engine	
Engine idle speed	Cannot be adjusted, it is regulated by idle stabilization
Fuel pressure before high pressure pump	3.0 to 6.0 bar pressure
Fuel pressure after high pressure pump	30 to 125 bar pressure

Fastener Tightening Specifications

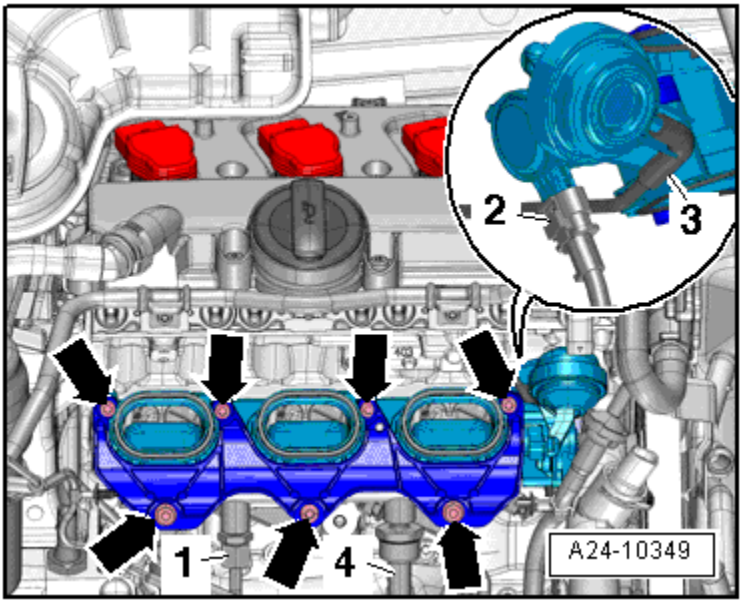
Component	Nm
Bracket for high-pressure lines	9
Camshaft Position (CMP) sensor	9
Double bolt	9
E-box cover	3.5
Engine Speed (RPM) sensor	9
Fuel pressure sensor [2)]	22
Fuel rail threaded connection	40
High pressure fuel line	27
High pressure lines	9
High pressure pump [3)]	20
Intake manifold runner position sensor	2.5
Low fuel pressure sensor	15
Oxygen Sensor (O2S)	55
Protective plate for high pressure line, nut	9
Retaining bracket for fuel rail [1]	
	2.5
	9
Threaded support for high pressure pump	27
Throttle valve control module	10

1) For bolt tightening clarification, refer to ElsaWeb under *Lower Intake Manifold Section Overview and see items -10, 11 and 12-*

2) Oil the threads

3) Tighten by hand in a diagonal sequence and then tighten to 5 Nm

Lower Intake Manifold Tightening Specification



Component	Nm
Tighten the lower intake manifold bolts and nuts ➡ diagonally in steps	10

Ignition – 3.0L CGXC

Ignition System Test Data

Engine code		**3.0L TFSI engine**
Engine idle speed		Cannot be adjusted, it is regulated by idle stabilization
Ignition timing		Not adjustable, regulated by the control module
Ignition/Glow Plug System		Single coil ignition system with 6 ignition coils (output stages integrated) that are connected directly to spark plugs via the ignition cables.
Spark plugs	Names	Refer to Data sheets for exhaust emission test.
	Tightening Specifications	Refer to Maintenance Procedures Rep. Gr. 03.
Ignition sequence		1-4-3-6-2-5

Fastener Tightening Specifications

Component	**Nm**
Camshaft adjustment valve	5
Camshaft Position (CMP) sensor	9
Engine Speed (RPM) sensor	9
Knock Sensor (KS)	20
Wiring harness	5

Fuel Supply System – 3.0L CGXC

Fastener Tightening Specifications

Component	**Nm**
Accelerator pedal module mounting bolt	8
Carrier plate	20
EVAP canister mounting bolt	16
Fuel delivery connection protective plate	8
Fuel delivery unit union nut (always replace)	120
Fuel filler neck-to-body mounting bolt	20
Fuel pump control module mounting bolt	2.5
Fuel tank heat shield mounting nut	2
Fuel tank securing strap mounting bolt	20
Leak detection pump air filter mounting nut	5
Leak detection pump-to-EVAP canister mounting bolt [1)]	4
	16
Locking flange cover mounting bolt	1.5

1) For bolt tightening clarification, refer to ElsaWeb under *EVAP Canister and Leak Detection System Assembly Overview, items 4 and 5*.

Engine Cooling – 3.0L CGXC

Fastener Tightening Specifications

Component	Nm
After-run coolant pump	4
After-run coolant pump bracket	9
Bracket for front left coolant pipes	22
Bracket for left charge air cooling circuit radiator, nut	9
Charge Air Coolant (CAC) pump bracket, nut	9
Coolant hose connecting piece	9
Coolant thermostat	9
Coolant pump	9
Fan shroud, version 1	4.5
Fan shroud, version 2	3.5
Front charge air cooling circuit radiator	4.5
Front coolant pipe	9
Idler roller for ribbed belt	42
Left front coolant pipes	9
Lower coolant pipe on the supercharger	5
Radiator bracket [1]	4.5
	5
Ribbed belt pulley for coolant pump	20
Upper coolant pipe	9
Upper coolant pipe on the compressor	5

[1] For bolt tightening clarification, refer to ElsaWeb under *Radiator and Coolant Fan Overview and see items -22 and 23-.*

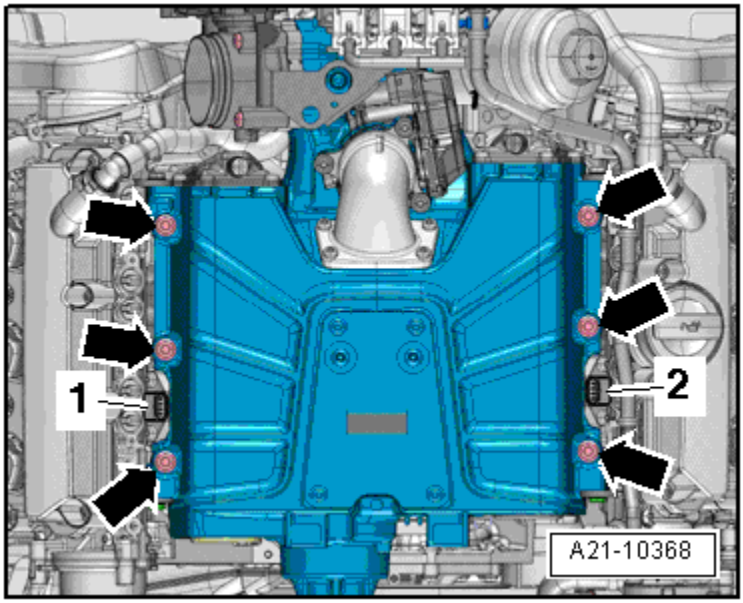
Supercharger – 3.0L CGXC

Fastener Tightening Specifications

Component	Nm
Bleeder screw	1.5 to 3.0
Changeover valve bracket	9
Charge air pressure sensor [1]	10
Drive head [1]	25
Engine lifting eye	27
Insulation plate	5
Left charge air cooler [1]	10
Right charge air cooler [1]	10
Structure Borne Sound Control Module -J869-, nuts	5
Structure-Borne Sound Actuator -R214-, nut	5

[1] Always replace

Supercharger Tightening Specifications



Component	Nm
Threaded pin	17
Nuts (tighten diagonally in stages)	20

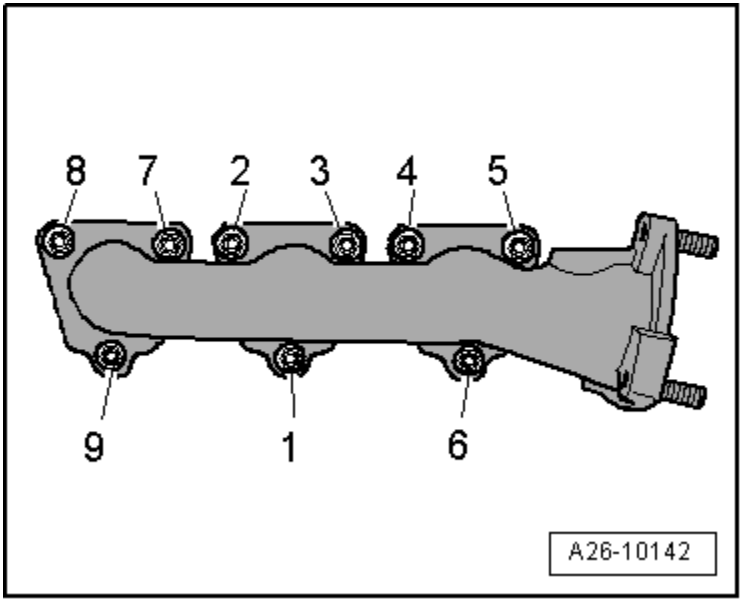
Exhaust System – 3.0L CGXC

Fastener Tightening Specifications

Component	Nm
Catalytic converter, nut [1) 4)]	23
Center muffler, nut [1)]	23
Front clamping sleeve, nut	23
Heat shield	10
Left Secondary Air Injection (AIR) combination valve	9
Rear clamping sleeve, nut	23
Right Secondary Air Injection (AIR) combination valve	9
Secondary air combination valve heat shield	9
Secondary air hose	9
Secondary Air Injection (AIR) hose bracket	9
Secondary Air Injection (AIR) pump motor bracket, nut and bolt	9
Suspended mount [2)]	23
Suspended mount [1) 3)]	20

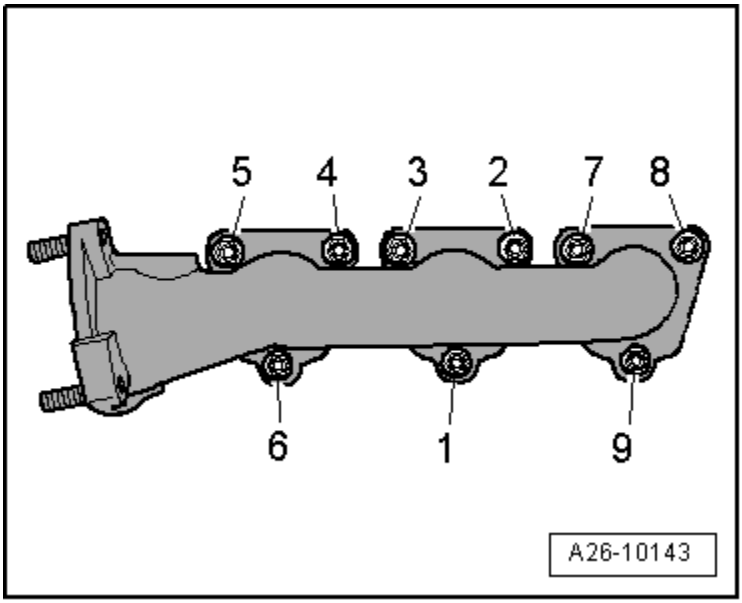
1) Always replace.
2) For bolt tightening clarification, refer to ElsaWeb under *Muffler Overview" and see items -2 and 22-*
3) For bolt tightening clarification, refer to ElsaWeb under *Muffler Overview" and see items -16-*
4) Coat the thread with hot bolt paste

Left Exhaust Manifold Tightening Specifications



Stage	Nuts	Tightening Specifications
1	-1 through 9-	Install all the way in by hand.
2	-1 through 9-	15 Nm
3	-1 through 9-	25 Nm

Right Exhaust Manifold Tightening Specifications

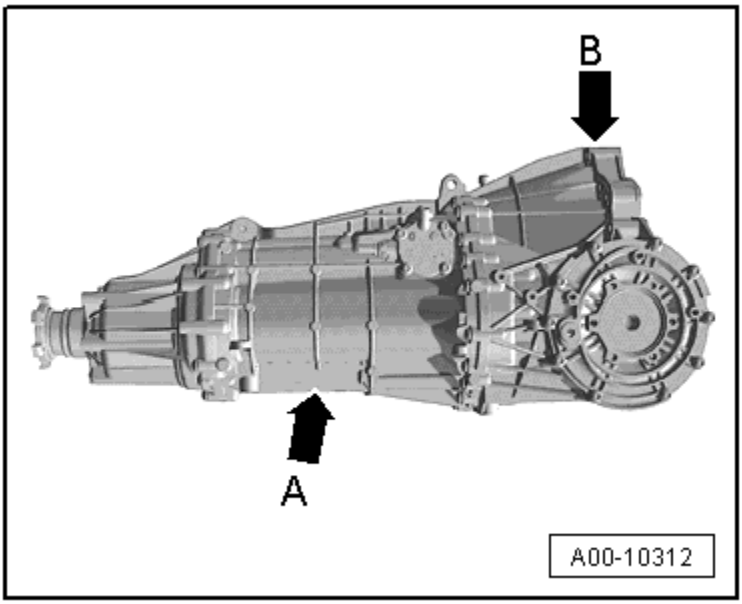


Stage	Nuts	Tightening Specifications
1	-1 through 9-	Install all the way in by hand.
2	-1 through 9-	15 Nm
3	-1 through 9-	25 Nm

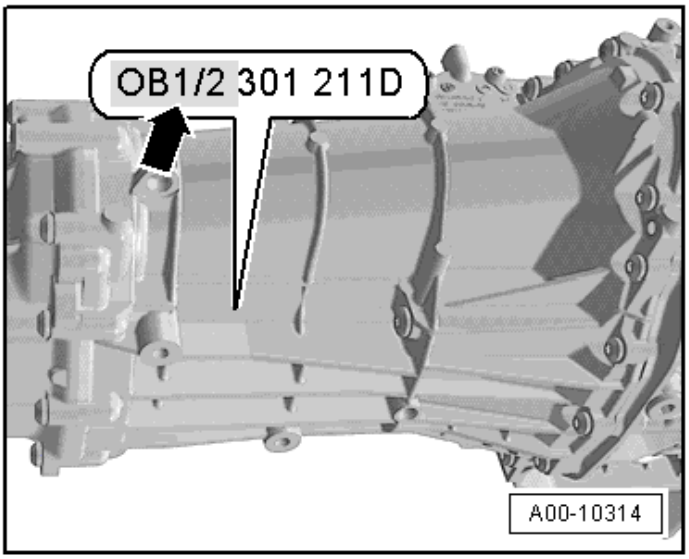
MANUAL TRANSMISSION – 0B2

General, Technical Data – 0B2

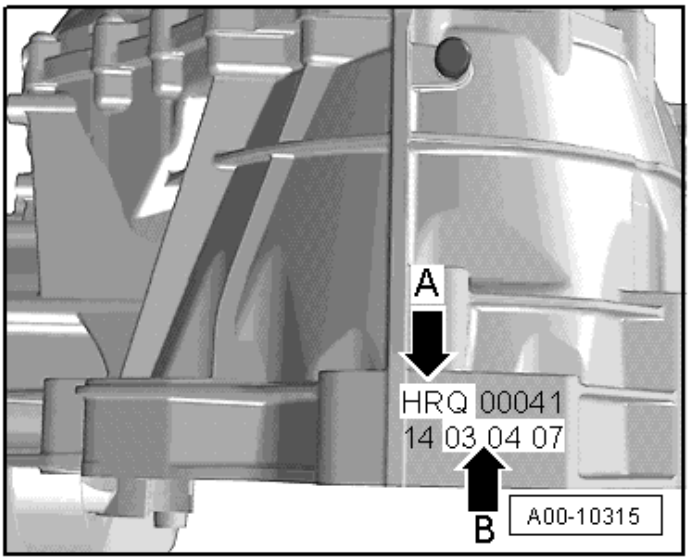
Transmission Identification



A ➡ - Manual transmission 0B1/2.
B ➡ - Code letters and production date.



0B1 = Front wheel drive transmission.
0B2 = All wheel drive transmission.



Transmission Code - A ➡ and Production Date - B ➡.

Example:	HRQ	03 04 07
	Identification code	Production date: 04.03.2007

The transmission code letters are also listed on the vehicle data stickers.

Code Letters, Assembly Allocation, Ratios, Capacities

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

- Production date
- Transmission fluid specification
- The individual gear ratios
- Flange shaft allocation
- The dual mass flywheel allocation
- Clutch disc and pressure plate allocation
- Rear final drive allocation using code and PR number

Manual Transmission		**6-Speed 0B2 AWD**		
Identification codes		KCA	LLT	LRY
Allocation	Type	Audi A4 from MY 2008	Audi A4 from MY 2008	Audi A4 from MY 2008
	Engine	2.0L - 155 kW	2.0L - 155 kW	2.0L- 155 kW
Ratio	Final drive	38:11 = 3.455	38:11 = 3.455	38:11 = 3.455
	Intermediate drive	31:29 = 1.069	31:29 = 1.069	31:29 = 1.069
Capacity		4.5 liters		

Manual Transmission		**6-Speed 0B2 AWD**		
Identification codes		MRR	NSN	NSP
Allocation	Type	Audi A4 from MY 2008	Audi A4 from MY 2008	Audi A4 allroad from MY 2008
	Engine	2.0L - 155 kW	2.0L- 155 kW	2.0L - 155 kW
Ratio	Final drive	38:11 = 3.455	38:11 = 3.455	29:8 = 3.625
	Intermediate drive	31:29 = 1.069	31:29 = 1.069	31:29 = 1.069
Capacity		4.5 liters		

Manual Transmission		**6-Speed 0B2 AWD**		
Identification codes		KVS	LLY	LSC
Allocation	Type	Audi A4 from MY 2008	Audi A4 from MY 2008	Audi A4 allroad from MY 2008
	Engine	2.0L - 155 kW	2.0L- 155 kW	2.0L - 155 kW
Ratio	Final drive	38:11 = 3.455	38:11 = 3.455	29:8 = 3.625
	Intermediate drive	31:29 = 1.069	31:29 = 1.069	31:29 = 1.069
Capacity		4.5 liters		

Manual Transmission		6-Speed 0B2 AWD	
Identification codes		MRS	MVV
Allocation	Type	Audi A4 allroad from MY 2008	Audi A4 allroad from MY 2008
	Engine	2.0L - 155 kW	2.0L - 155 kW
Ratio	Final drive	29:8 = 3.625	29:8 = 3.625
	Intermediate drive	31:29 = 1.069	31:29 = 1.069
Capacity		4.8 liters	

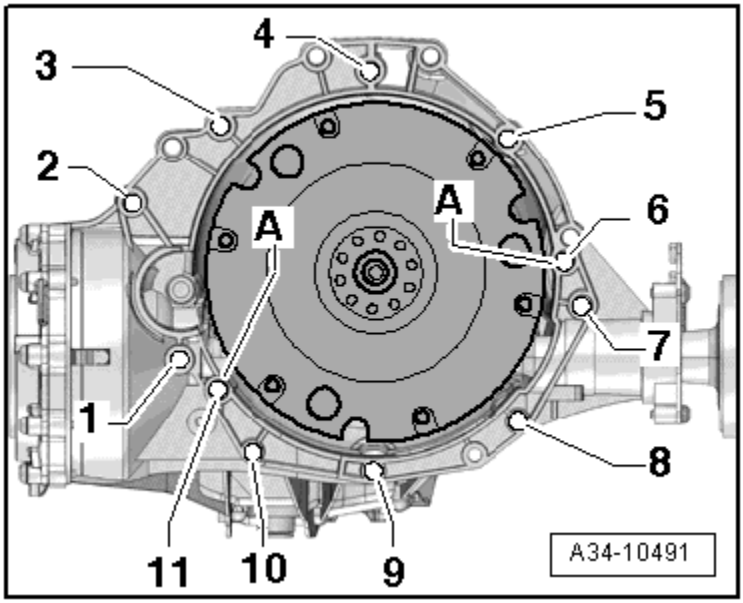
Transmission Specifications

Manual transmission		6 speed 0B2 AWD
Identification code		KCA
Manufactured	from	06.08
	to	
Allocation	Model	Audi A4 from MY 2008
	Engine	2.0L - 155 kW
Gear ratios	Final drive	38:11 = 3.455
	Intermediate drive	31:29 = 1.069
$Z_2 : Z_1 = i$	1st gear	34:9 = 3.778
	2nd gear	41:20 = 2.050
	3rd gear	37:28 = 1.321
	4th gear	32:33 = 0.970
	5th gear	30:37 = 0.811
	6th gear	27:39= 0.692
	Reverse gear	30:9 = 3.333
Total in top gear		2.557
Capacities		4.8 liters
Specification		Transmission oil G 052 911 A SAE 75 W 90 (synthetic oil)
Hydraulic		Hydraulic

Obtain the following information from the Electronic Parts Catalog ETKA:

- Flange shaft allocation
- The dual mass flywheel allocation
- Clutch disc and pressure plate allocation
- Rear final drive allocation using code and PR number

Securing Transmission to Engine



Item	Bolt	Nm
1 [3]	M10 x 50 [1]	65
2 [3], 7	M12 x 100 [2]	30 plus an additional 90° (¼ turn)
3 [4], 6	M12 x 75 [2]	30 plus an additional 90° (¼ turn)
4 and 5 [4]	M12 x 120 [2]	30 plus an additional 90° (¼ turn)
8 through 10	M10 x 75 [2]	15 plus an additional 90° (¼ turn)
11	M12 x 50 [2]	30 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	

1) Steel bolt - do not replace.
2) Replace.
3) Also secures the starter.
4) Also secures the wiring bracket.

Aluminum bolts 2 through 10 can only be used twice. After using the bolts once, use a chisel and mark the bolts with two notches (X). To prevent damaging the bolts when marking them, do not clamp them in a vise. Use a ½" drive 14 mm socket and extension clamped into a vice. Do not use bolts that have been marked with an X.

Clutch – 0B2

Fastener Tightening Specifications

Component	Nm
Ball studs	25
Bleeder screw	5.5
Clutch module	60
Clutch slave cylinder-to-transmission	20
Guide sleeve securing plate	8
Pressure plate (always replace)	22 plus an additional 90° (¼ turn)
Transmission pipe line bracket	20

Fastener Tightening Specifications – Internal Components

Component	Nm
Ball studs	25
Guide sleeve securing plate	8
Pressure plate (always replace)	22 plus an additional 90° (¼ turn)

Controls, Housing – 0B2

Fastener Tightening Specifications

Component	Bolt Size	Nm
Center differential housing (always replace) [1)]	M8 x 35	10 plus an additional 90° (¼ turn)
	M8/M8 x 38	15 plus an additional 90° (¼ turn)
	M8 x 55	15 plus an additional 90° (¼ turn)
Clamping plate	-	23
Connecting rod	-	20
Gearshift lever (always replace)	-	20
Joint piece between the selector rod and shift lever		
Bolt	-	23
Nut	-	10
Push rod	-	20

Fastener Tightening Specifications *(cont'd)*

Component	Bolt Size	Nm
Sealing boot	-	4
Selector shaft cover (always replace)	-	10 plus an additional 45° (⅛ turn)
Shift lever support	-	23
Shift lever support mount	-	8
Transmission fluid filler plug	-	45
Transmission mount lower stop (always replace)	-	20 plus an additional 90° (¼ turn)
Transmission neutral position sensor (always replace)	-	10 plus an additional 45° (⅛ turn)
Transmission range gear recognition switch	-	20
Transmission shift lever (always replace)	-	20
Tunnel crossmember		
Bolt	-	70
Nut	-	20
Tunnel support		
Bolt	-	40
Nut	-	20
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

1) For bolt tightening clarification, refer to ElsaWeb under Center Differential and Center Differential Housing Overview, items 2, 3, and 4.

Fastener Tightening Specifications – Internal Components

Component	Bolt Size	Nm
Ball studs		25
Bearing bracket to the transmission cover	M8 x 30	20 plus an additional 30° (1/12)
Center differential housing (always replace) 2)		
Bolt	-	10 plus an additional 90° (¼ turn)
Double bolt	-	15 plus an additional 90° (¼ turn)

Component	Bolt Size	Nm
Bolt	-	15 plus an additional 90° (¼ turn)
Cover for final drive	M8 x 38	20 plus an additional 90° (¼ turn)
Flange shaft, left	M8 x 25	15 plus an additional 45° (⅛ turn)
Oil drain plug	-	45
Oil fill plug	-	45
Output shaft	-	200
Sealing cap 1	M8 x 22	10 plus an additional 45° (⅛ turn)
Securing plate		8
Selector shaft with selector cover (always replace)	M8 x 22	10 plus an additional 45° (⅛ turn)
Side shaft (always replace)	-	150 plus an additional 90° (¼ turn)
Transmission cover	M8 x 50	15 plus an additional 90° (¼ turn)
	M8 x 33 (always replace)	10 plus an additional 90° (¼ turn)
Transmission neutral position sensor (always replace)	M8 x 22	10 plus an additional 45° (⅛ turn)
Transmission range gear recognition switch	-	20
Vibration damper	-	15 plus an additional 90° (¼ turn)

[1] For bolt tightening clarification, refer to ElsaWeb under Center Differential Housing and Center Differential Assembly Overview, items 2, 3, and 4.

Gears, Shafts – 0B2

Fastener Tightening Specifications

Component	Nm
Input shaft	200
Output shaft	200
Shift fork group-to-bearing bracket	20 plus an additional 45° (⅛ turn)

Rear Final Drive, Differential – 0B2

Fastener Tightening Specifications

Component	Bolt Size	Nm
Final drive cover [1) 2)]		
- Aluminum bolts	M8 x 35	10 plus an additional 90° (¼ turn)
- Aluminum bolts	M8/M8 x 38	15plus an additional 90° (¼ turn)
- Steel bolts	M8 x 55	15 plus an additional 90° (¼ turn)
Drive axle heat shield to transmission	-	23
Final drive cover to transmission	M8 x 38	24

1) Always replace

2) For bolt tightening clarification, refer to ElsaWeb under *Center Differential and Center Differential Housing Overview" and see items -2, 3 and 4-.*

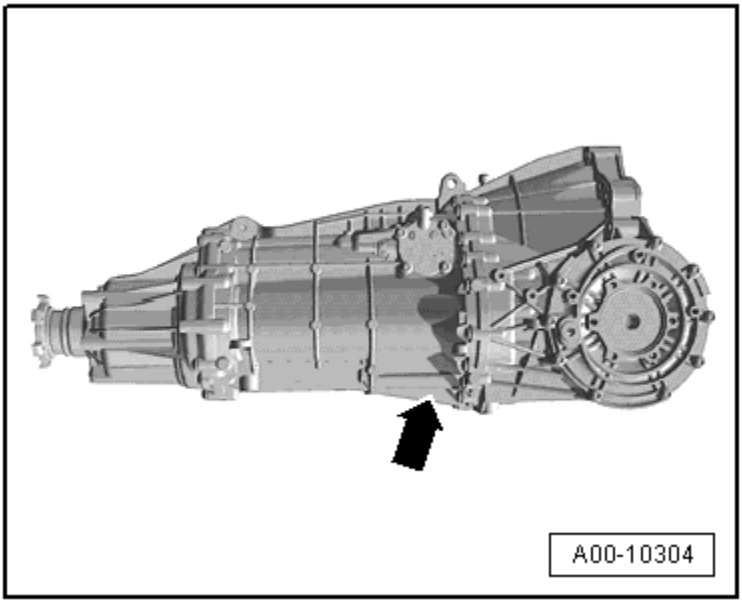
Fastener Tightening Specifications – Internal Components

Component	Bolt Size	Nm
Final drive cover	M8 x 38	20 plus an additional 90° (¼ turn)
Flange shaft, left	M8 x 25	15 plus an additional 45° (⅛ turn)

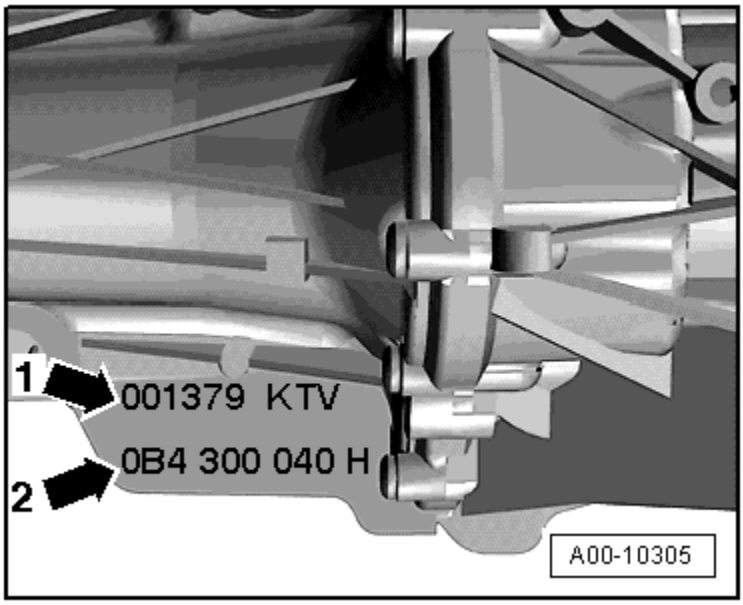
MANUAL TRANSMISSION – 0B4

General, Technical Data – 0B4

Transmission Identification



Transmission code, serial number and transmission part number ➡.



Transmission code letters and serial number (1 ➡).

Example:	001379	KTV
	Serial number	Identification codes

Manual transmission 0b4 with transmission part number.
For example: 0B4 300 040 H (2 ➡).

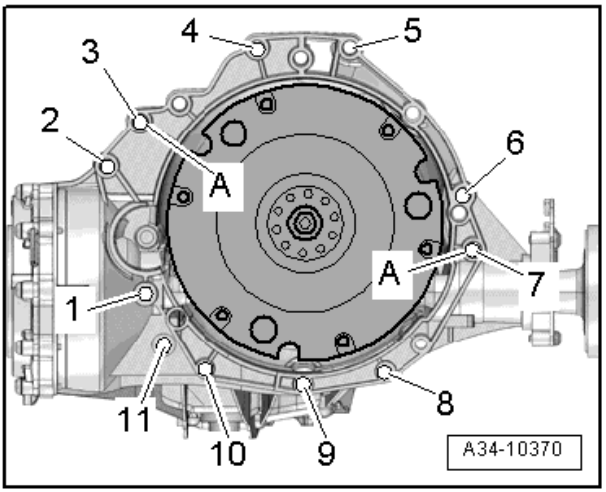
Engine Codes, Transmission Allocation, Ratios and Capacities

The following information can be found in the Electronic Parts Catalog ETKA.

- Transmission fluid specification
- Flange shaft allocation
- The dual mass flywheel allocation
- Clutch disc and pressure plate allocation
- Rear final drive allocation using code and PR number

Manual Transmission		**6-speed 0B4 AWD**	
Identification codes		KMR	LPE
Manufactured	from	01.09	03.10
	through	03.10	
Allocation	Type	Audi A4 2008 ►	Audi A4 2008 ►
	Engine	3.0L TFSI - 245 kW S4	3.0L TFSI - 245 kW
Ratio	Final drive	31:9 = 3.444	31:9 = 3.444
	Intermediate drive	31:29 = 1.069	31:29 = 1.069
$Z_2:Z_1=i$	1st Gear	33:9 = 3.667	33:9 = 3.667
	2nd Gear	41:19 = 2.158	41:19 = 2.158
	3rd Gear	38:25 = 1.520	38:25 = 1.520
	4th Gear	34:30 = 1.133	34:30 = 1.133
	5th Gear	34:37 = 0.919	34:37 = 0.919
	6th Gear	35:45 = 0.778	35:45 = 0.778
	Reverse gear	29:9 = 3.222	29:9 = 3.222
iges in the highest gear		2.864	2.864
Capacity		3.8 liters	

Securing Transmission to Engine



Item	Bolt	Nm
1 [1)]	M10 x 50 [2)]	65
2 [1)]	M12 x 100 [3) 4)]	30 plus an additional 90° (¼ turn)
3 to 6	M12 x 100 [3) 4)]	30 plus an additional 90° (¼ turn)
7	M12 x 125 [3) 4)]	30 plus an additional 90° (¼ turn)
8, 11	M10 x 60 [3) 4)]	15 plus an additional 90° (¼ turn)
9, 10	M10 x 95 [3) 4)]	15 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	

1) Also secures the starter.
2) Bolt strength rating 10.9. There is no limit to the number of times steel bolts may be used.
3) Audi A4 through VIN 8K-9-066499, Audi A5 through VIN 8T-9-007999: Replace the aluminum bolts.
4) Audi A4 from VIN 8K-9-066500, Audi A5 from VIN 8T-9-008000: The aluminum bolts may be used twice. Check the aluminum bolts (2 through 11) to see whether they can be reused (below).

Audi A4 from VIN 8K-9-066500, Audi A5 from VIN 8T-9-008000: The aluminum bolts (refer to figure) may be used twice. After using the bolts once, use a chisel and mark the bolts with two notches (X). To prevent damaging the bolts when marking them, do not clamp them in a vise. Use a ½" drive 14 mm socket and extension clamped into a vice. Do not use bolts that have been marked with an X. Audi A4 through VIN 8K-9-066499: Always replace the aluminum bolts. Audi A5 through VIN 8T-9-007999: Always replace the aluminum bolts. There is no limit to the number of times the steel bolt can be used.

Clutch – 0B4

Fastener Tightening Specifications

Component	Nm
Clutch slave cylinder bleeder screw	5.5
Clutch slave cylinder-to-transmission	20
Mounting the dual flywheel-to-drive plate (always replace)	60
Transmission pipe line bracket	20

Fastener Tightening Specifications – Internal Components

Component	Nm
Ball studs	25
Guide sleeve securing plate 1)	8
Sac pressure plate (always replace)	22 plus an additional 90° (¼ turn)

1) Different bolt lengths

Controls, Housing – 0B4

Fastener Tightening Specifications

Component	Bolt Size	Nm
Base block for the shift lever support nut	-	8
Center differential housing 1)		
Aluminum bolts (always replace)	-	10 plus an additional 90° (¼ turn)
Steel bolts	-	24
Clamping plate	-	23
Connecting rod	-	20
Driveshaft heat shield-to-center differential housing	-	25
Gearshift lever (always replace)	-	20
Joint piece between the selector rod and shift lever		
Nut	-	10
Bolt	-	23
Shift lever support mount, nut	-	8
Transmission mount lower stop (always replace)	-	20 plus an additional 90° (¼ turn)

Fastener Tightening Specifications *(cont'd)*

Component	Bolt Size	Nm
Transmission support		
Nut	-	20
Bolt	-	40
Oil filler plug	-	40
Push rod	-	20
Sealing boot	-	4
Shift lever support	-	23
Transmission fluid filler plug	-	40
Transmission range gear recognition switch F208 to the transmission	-	20
Transmission shift lever nut	-	20
Selector shaft cover	-	24
Tunnel crossmember		
Nut	-	20
Bolt	-	70
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

1) For bolt tightening clarification, refer to ElsaWeb under *Center Differential and Center Differential Housing Overview, items 1 and 3.*

Fastener Tightening Specifications – Internal Components

Component	Bolt Size	Nm
Ball studs transmission housing	-	25
Bearing bracket to the transmission cover steel bolts (30 mm long) 1)	M8	27
Cap steel bolts (25 mm long) 1)	M8	24
Center differential housing		
Steel bolts (63 mm long)	M8	24
Aluminum bolts (42 mm long) (always replace)	M8	10 plus an additional 90° (¼ turn)
Clutch release lever with release bearing and spring 1)	-	8
Final drive cover steel bolts (42 mm long)	M8	24
Left flange shaft steel bolts (25 mm long)	M8	24
Oil drain plug	-	40
Oil fill plug	-	40
Output shaft (always replace)	-	110

Component	Bolt Size	Nm
Plate [1)]	-	24
Reverse shaft-to-transmission cover	-	24
Securing plate	-	8
Selector shaft with selector cover, steel bolts (25 mm long) [1)]	M8	24
Transmission cover, steel bolts (42 mm long)	M8	24
Transmission neutral position sensor, steel bolt (25 mm long) [1)]	M8	24
Transmission range gear recognition switch	-	20
Vibration damper [1)]	-	24

1) Insert with locking fluid AMV 185 101 A1

Gears, Shafts – 0B4

Fastener Tightening Specifications

Component	Nm
Bearing bracket steel bolts (M8; 45 mm long) [1)]	24

1) Insert with locking fluid AMV 185 101 A1

Rear Final Drive, Differential – 0B4

Fastener Tightening Specifications

Component	Bolt Size	Nm
Final drive cover	M8	24
Drive axle heat shield to transmission	-	23

Fastener Tightening Specifications – Internal Components

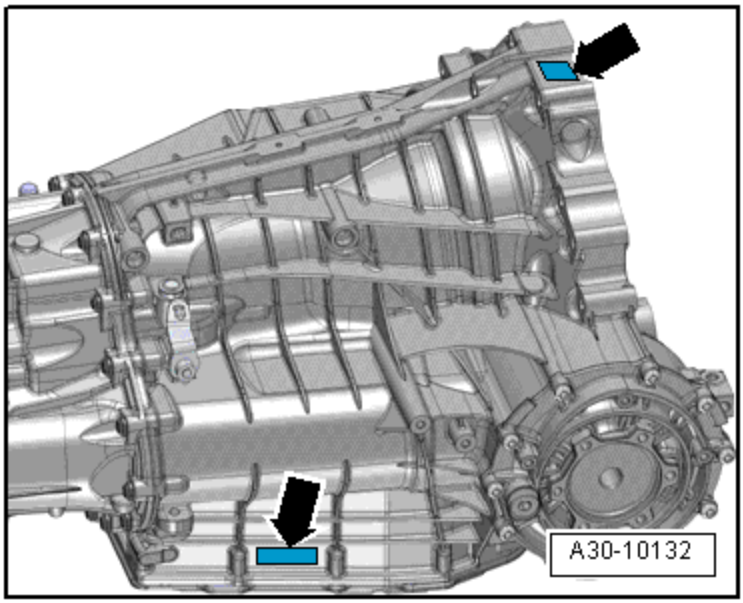
Component	Bolt Size	Nm
Final Drive Cover, Steel Bolts (42 mm long)	M8	24
Left Flange Shaft, Steel Bolts (25 mm long) [1)]	M8	24

1) Insert with locking fluid

DIRECT SHIFT TRANSMISSION, S TRONIC – 0B5

General, Technical Data – 0B5

Transmission Identification



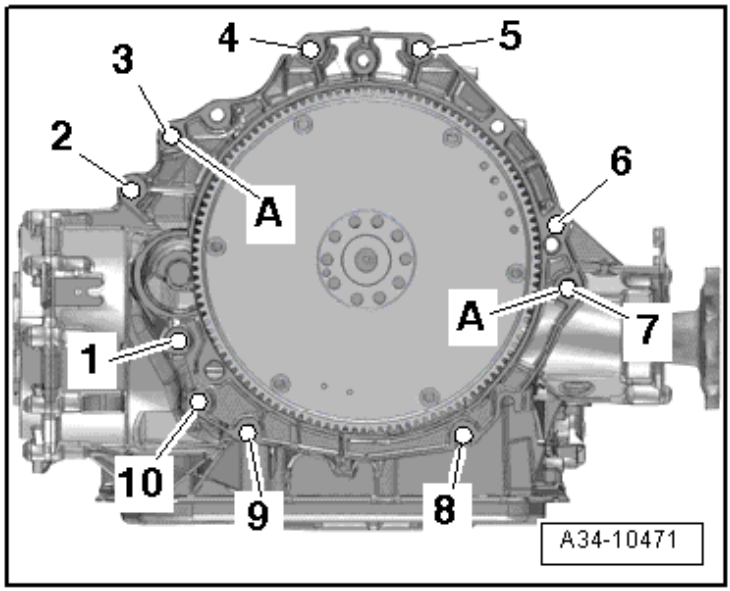
The following details can be found on the transmission housing: ➡.

LHF	Transmission code
D04	Manufacturer key
0026	Serial number
K100808	Factory: K = Kassel Production date: 100808 = 10.08.2008

Code Letters, Transmission Allocations, Ratios and Equipment

DSG transmission			0B5 AWD	
Transmission	Identification codes		LHK	LJD
	Month of production	from	11.2008	11.2008
		to		
Allocation	Model		Audi A4 from MY 2008	Audi A4 from MY 2008
	Engine		3.0L TFSI 245 kW	3.0L TFSI 245 kW
Gear Ratios	1st gear		48:13 = 3.692	48:13 = 3.692
	2nd gear		47:21 = 2.238	43:20 = 2.150
	3rd gear		53:34 = 1.559	45:32 = 1.406
	4th gear		47:40 = 1.175	41:40 = 1.025
	5th gear		43:47 = 0.915	37:47 = 0.787
	6th gear		38:51 = 0.745	30:48 = 0.625
	7th gear		37:60 = 0.617	27:52 = 0519
	Reverse gear		53:18 = 2.944	53:18 = 2.944
Gear wheel			31:29 = 1.069	31:29 = 1.069
Bevel gear	Front axle		29:8 = 3.625	29:8 = 3.625
	Rear axle		37:9 = 4.111	37:9 = 4.111
Total ratio “i”	Front axle		3.875	3.875
	Rear axle		2.390	2.011
Spread			6.0	6.0

Securing Transmission to Engine



Item	Bolt	Nm
1 [1]	M10 x 50 [2]	65
2 [3], 4 to 6	M12 x 100 [4]	30 plus an additional 90° (¼ turn)
7	M12 x 125 [4]	30 plus an additional 90° (¼ turn)
8	M10 x 60 [4]	15 plus an additional 90° (¼ turn)
9, 10	M10 x 95 [4]	15 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	

[1] Also secures the starter.
[2] Bolt strength rating 10.9. There is no limit to the number of times steel bolts maybe used.
[3] Also secures the starter.
[4] The bolts may be used twice.

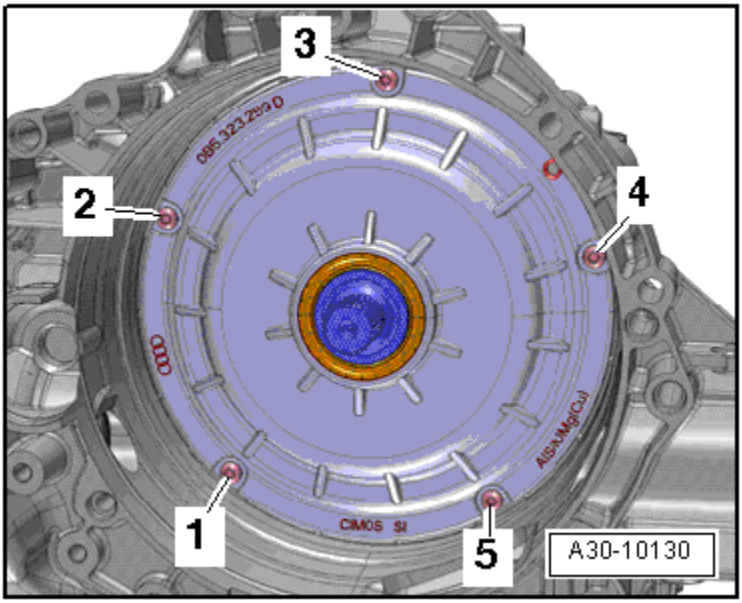
Aluminum bolts 2 through 10 can only be used twice. After using the bolts once, use a chisel and mark the bolts with two notches (X). To prevent damaging the bolts when marking them, do not clamp them in a vise. Use a ½" drive 14 mm socket and extension clamped into a vice. Do not use bolts that have been marked with an X.

Clutch – 0B5

Fastener Tightening Specification

Component	Nm
Dual mass flywheel	60

Tightening Specification and Sequence for the Dual Clutch and Clutch Cover



Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence by hand evenly until the bolt head contacts the clutch cover	Hand-tighten
2	Tighten one after the other in 90° steps until the clutch cover contacts the transmission housing	an additional 90° (¼ turn)
3	Tighten bolts 1 through 5 in sequence	8

Controls, Housing – 0B5

Fastener Tightening Specifications

Component	**Bolt Size**	Nm
Air guide to transmission	-	3
Automatic Transmission Fluid (ATF) drain plug	-	45
ATF fill and inspection plug	-	45
ATF pipe filter to transmission		
Bolt	-	20
Union nut	-	29
ATF pipe - hose line - supply to ATF cooler		
Bolts	-	5
Bolts	-	9
Union nut	-	29
ATF return pipe 1		
Bolt	-	9
Bolt	-	20
ATF supply pipe		
Bolt	-	9
Union nut	-	29
ATF supply pipe/hose/line assembly to ATF cooler	-	5
Cable mounting bracket to transmission	-	8
Drive axle Heat Shield to front final drive	-	23
Filter Housing to transmission	-	10
Lower stop to Transmission Mount	-	20
Securing the Shift Mechanism to the Body, Nut	-	10
Selector Lever Cable adjustment to the selector mechanism function unit	-	13
Transmission Fluid (MTF) Drain Plug	-	45
Transmission mount	-	20
Transmission Support to Transmission	-	40
Transmission Support to Transmission Mount Nut	-	20

Tunnel crossmember		
Bolt	-	70
Nut	-	20
Union nut	-	29
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

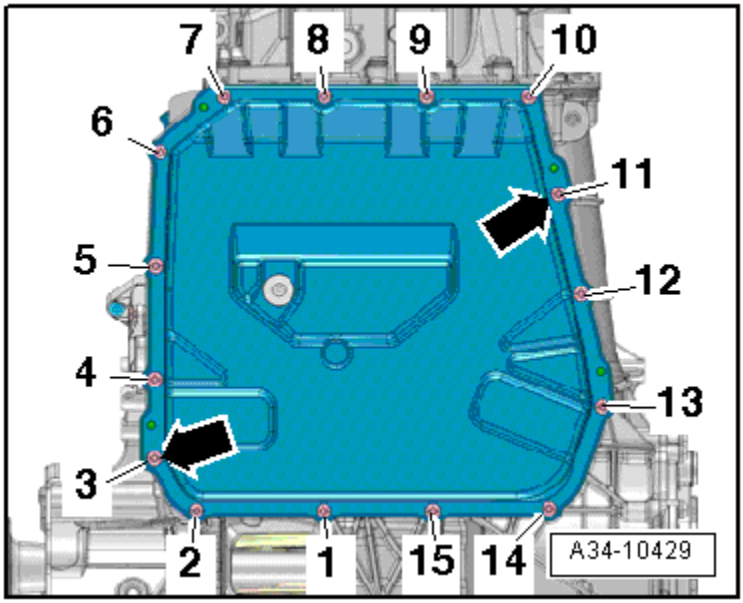
[1)] For bolt tightening clarification, refer to ElsaWeb ujnder *ATF Cooler, ATF Pipes and ATF Filter Overview" and see items -12 and 14-.*

Gears, Shafts – 0B5

Fastener Tightening Specifications

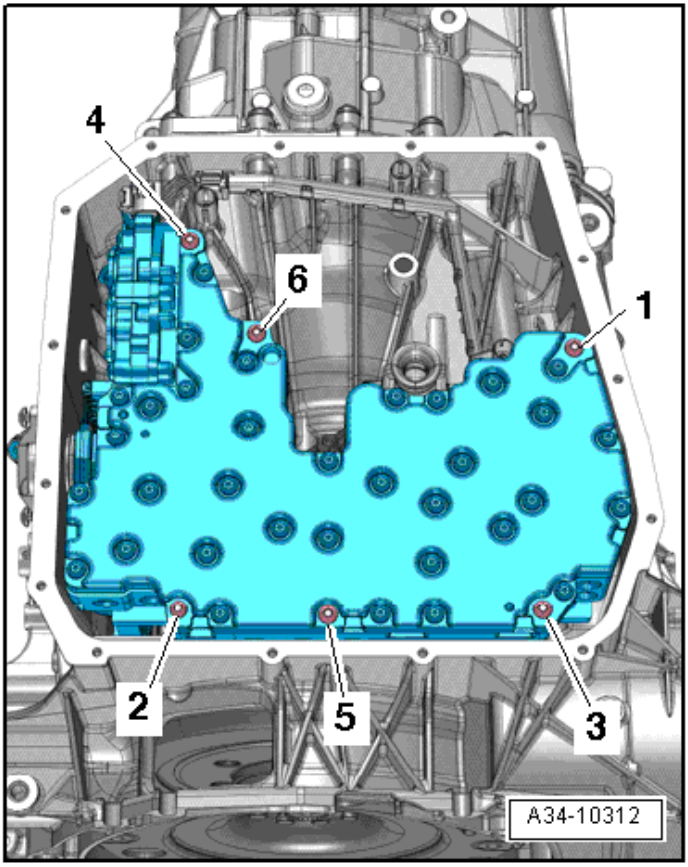
Component	Nm
ATF filter cover to ATF filter housing	8
ATF filter housing to transmission housing	10
ATF pipe connection to transmission housing	10
Cable guide for the RPM sensors to transmission	8
Connector housing to transmission housing	8
Oil pump to transmission housing	8
Retaining plate to ATF pressure pipes	10
Sensor module to transmission intermediate housing	8
Side shaft to transmission intermediate housing	150 an additional 90° (¼ turn)
Suction jet pump to transmission housing	4.5
Wiring set	8

ATF Oil Pan Tightening Specifications



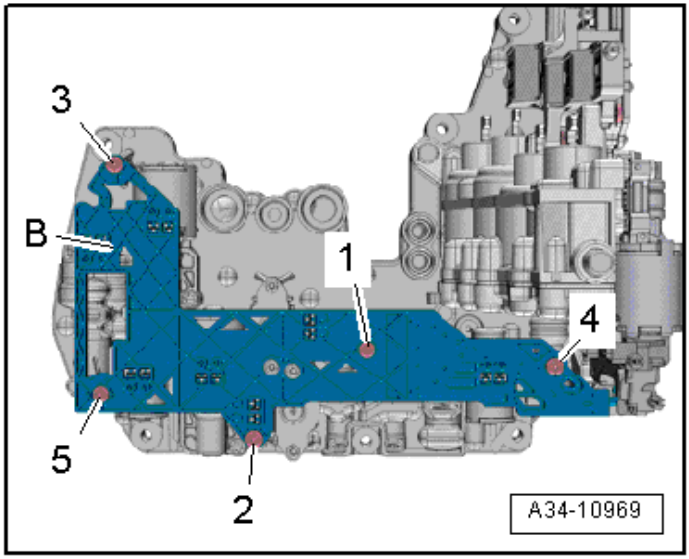
Component	Nm
Install bolts ➡	Hand-tighten
Tighten bolts 1 through 15 diagonally and in steps	10

Mechatronic Tightening Specification



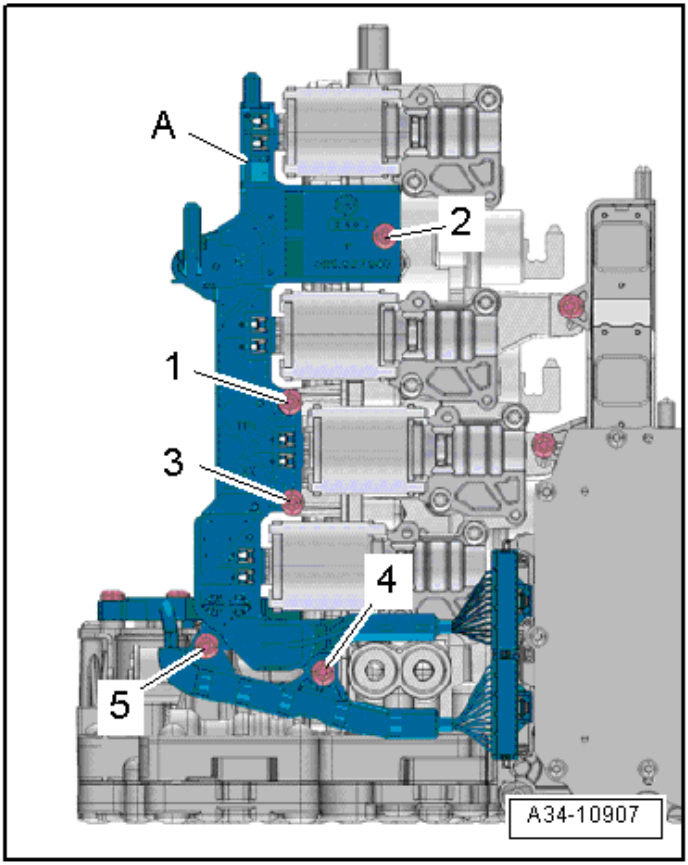
Component	Nm
Tighten bolts 1 through 6 in sequence	10

Circuit Board 1 Tightening Specification



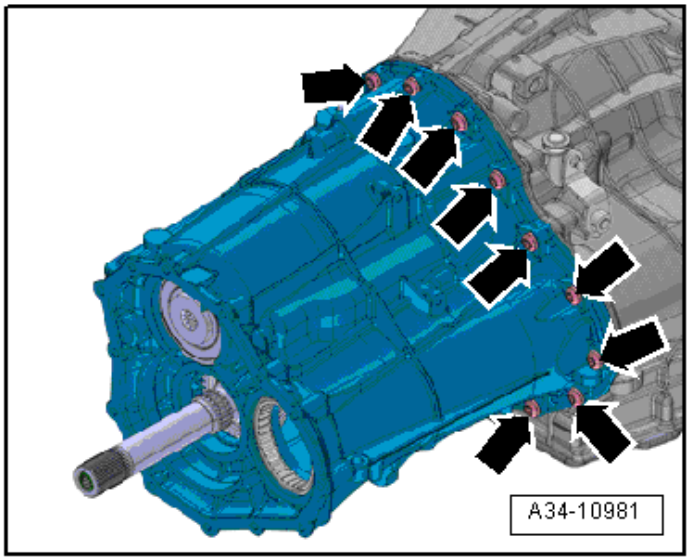
Component	Nm
Tighten bolts 1 through 5 in sequence	3

Circuit Board 2 Tightening Specification



Component	Nm
Tighten bolts 1 through 5 in sequence	3

Transmission Intermediate Housing Tightening Specification



Step	Component	Tightening Specification/Additional Turn
1	-Arrows-	8 Nm diagonally
2	-Arrows-	120° additional turn, diagonally

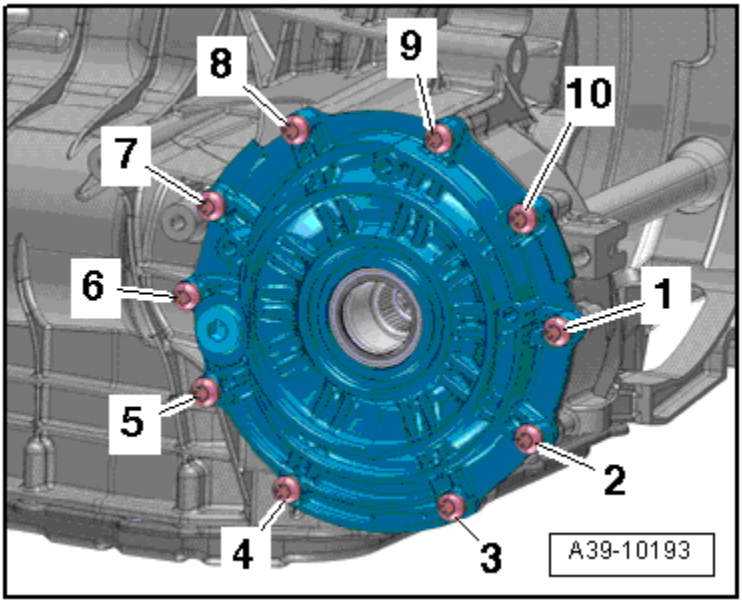
Rear Final Drive, Differential – 0B5

Fastener Tightening Specifications

Component	Nm
Balance weight to center differential housing	20 an additional 90° (¼ turn)
Bracket to the left flange shaft with the bearing	10 plus an additional 45° (⅛ turn)
Transmission fluid (MTF) drain plug	45
Transmission fluid (MTF) fill and check plug	45

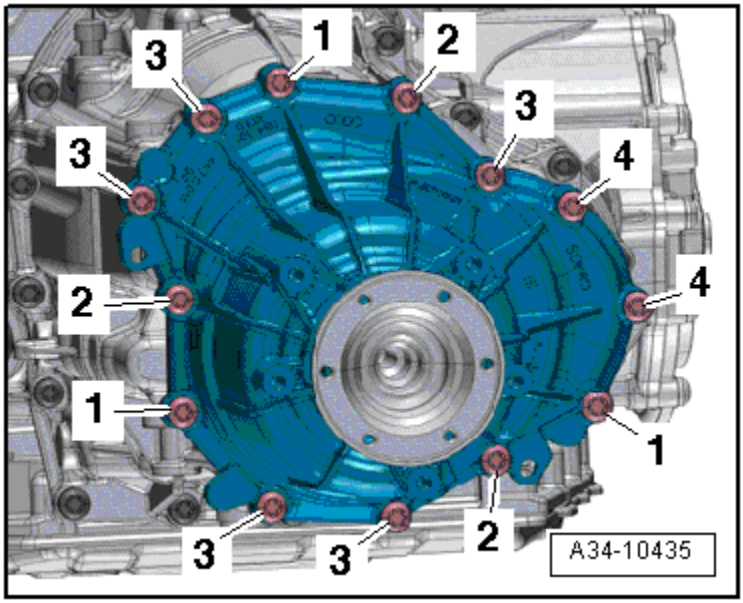
[1] Replace

Front Final Drive Cover Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	3
2	Tighten bolts 1 through 10 in sequence	20
3	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)

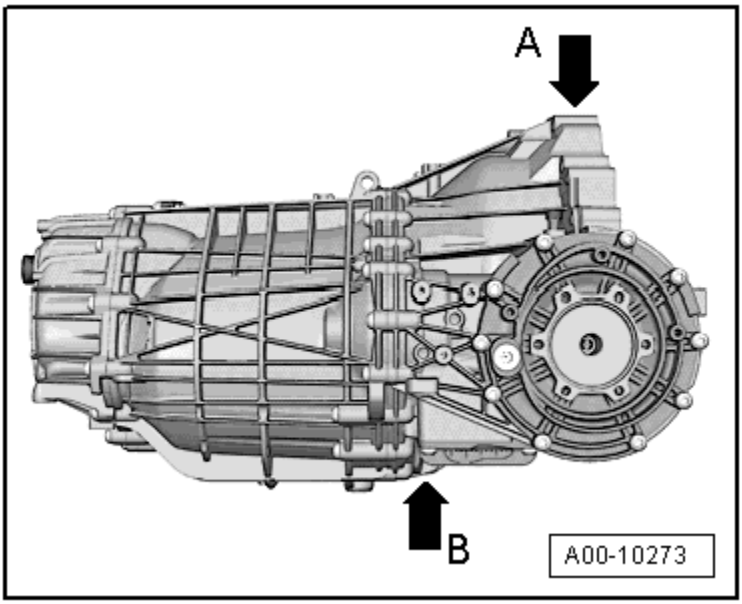
Center Differential Housing Tightening Specifications



Step	Bolts	Nm
1	Aluminum bolts -1-	8 Nm
2	Aluminum bolts -2-	Tighten the bolt hand-tight.
3	Aluminum bolts -1-	Loosen again and then install all the way hand-tight
4	Aluminum bolts -3-	Tighten the bolt hand-tight.
5	Steel bolts -4-	Tighten the bolt hand-tight.
6	-1, 2, 3, 4-	10 Nm diagonally
7	Steel bolts -4-	15 Nm
8	-1, 2, 3, 4-	90° additional turn, diagonally

CONTINUOUSLY VARIABLE AUTOMATIC TRANSMISSION – 0AW

Transmission Identification



Transmission code letters and serial numbers are found on the top A ➡ and on the bottom B ➡ of the transmission housing.

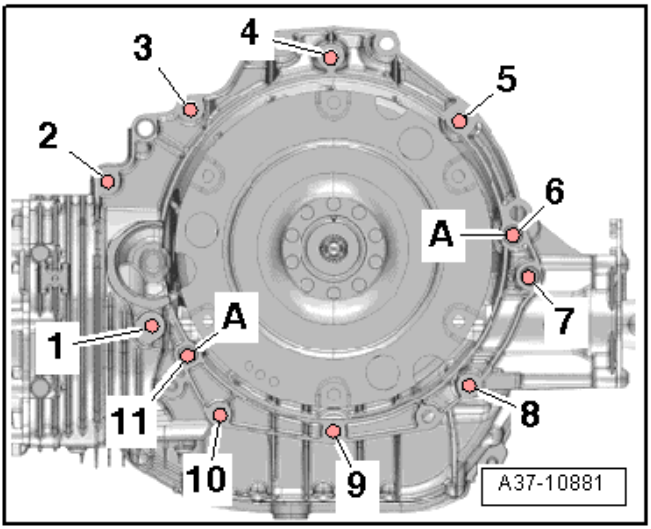
Engine Codes, Transmission Allocations, Ratios and Equipment

Multitronic		**0AW**			
Transmission	Identification codes	LAQ		LKV	
Allocation	Type	Audi A4 from MY 2008		Audi A4 from MY 2008	
	Engine	2.0L TFSI - 155 kW		2.0L TFSI - 155 kW	
Input shaft to disc set 1 ratio		49:48	1.021	49:48	1.021
Disc set 2 to pinion		41:25	1.640	41:25	1.64
Front final drive		34:11	3.091	34:11	3.091

Multitronic		**0AW**			
Transmission	Identification codes	LKW		LSF	
Allocation	Type	Audi A4 from MY 2008		Audi A4 from MY 2008	
	Engine	2.0L TFSI - 155 kW		2.0L TFSI - 155 kW	
Input shaft to disc set 1 ratio		49:48	1.021	49:48	1.021
Disc set 2 to pinion		41:25	1.64	41:25	1.64
Front final drive		34:11	3.091	34:11	3.091

Multitronic		**0AW**	
Transmission	Identification codes	MVC	
Allocation	Type	Audi A4 from MY 2008	
	Engine	2.0L TFSI - 155 kW	
Input shaft to disc set 1 ratio		49:48	1.021
Disc set 2 to pinion		41:25	1.64
Front final drive		34:11	3.091

Securing Transmission to Engine



Item	Bolt	Nm
1 [1)]	M10 x 50 [2)]	65
2 [3)], 7	M12 x 100	30 plus an additional 90° (¼ turn)
3, 6	M12 x 75	30 plus an additional 90° (¼ turn)
4, 5	M12 x 120	30 plus an additional 90° (¼ turn)
8, 9, 10	M10 x 75	15 plus an additional 90° (¼ turn)
11	M12 x 50	30 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	

1) Also secures the starter.
2) Bolt strength rating 10.9; there is no limit to the number of times steel bolts can be used.
3) The aluminum bolts can be used twice.

Aluminum bolts 2 through 11 can only be used twice. After using the bolts once, use a chisel and mark the bolts with two notches (X). To prevent damaging the bolts when marking them, do not clamp them in a vise. Use a ½" drive 14 mm socket and extension clamped into a vice. Do not use bolts that have been marked with an X.

Fastener Tightening Specifications

Component	Bolt Size	Nm
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
ATF fill and inspection plug (always replace bolts)	-	30
ATF pipes, nuts on pipes	-	29
ATF pipe, return from the ATF cooler to the transmission	-	8
ATF pipe, return pipe to ATF filer		20
ATF pipe, supply from the transmission to the ATF cooler 2	-	5
ATF pipe, supply from the transmission to the atf cooler 3	-	8
Automatic Transmission Fluid (ATF) filter	-	5 plus an additional 90° (¼ turn)
Drive Axle Heat Shield	-	23
Dual mass flywheel-to-drive plate (always replace bolts)	-	60
Selector lever cable, nut	-	13
Selector lever cable adjustment	-	13
Selector lever cable bracket	-	8
Selector mechanism function unit, nut	-	10
Transmission mount lower stop	-	20 plus an additional 90° (¼ turn)
Transmission mount, nut	-	20
Transmission support		
Bolt	-	40
Nut	-	20
Tunnel crossmember	-	70

1) For bolt tightening clarification, refer to ElsaWeb under ATF Pipes, ATF Cooler and ATF Filter Overview, item 3.

2) For bolt tightening clarification, refer to ElsaWeb under ATF Pipes, ATF Cooler and ATF Filter Overview, items 6, 7 and 12.

Gears, Hydraulic Controls – 0AW

Fastener Tightening Specifications

Component	Nm
Cover	10 an additional 90° (¼ turn)
Hydraulic Control Unit	5 an additional 90° (¼ turn)
Transmission Control Module	5 an additional 90° (¼ turn)

1) Replace

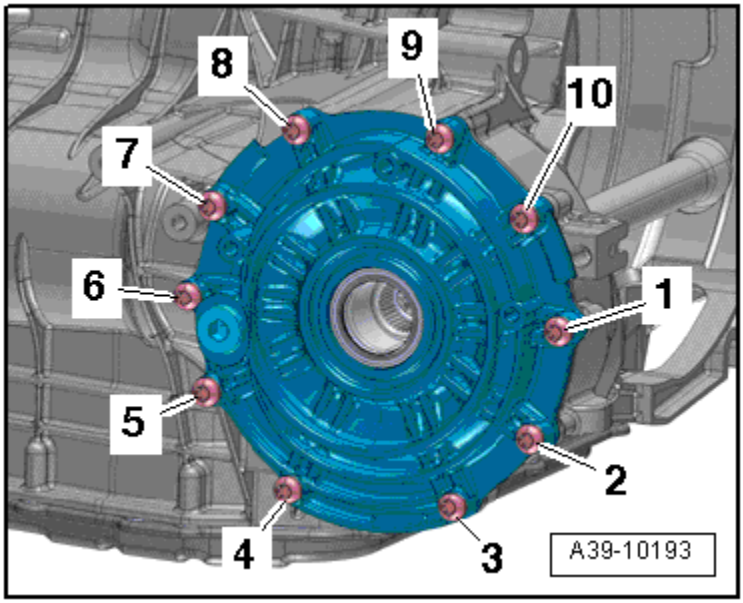
Rear Final Drive, Differential – 0AW

Fastener Tightening Specifications

Component	Nm
Bracket for the Left Flange Shaft	10 an additional 90° (¼ turn)
Rear Final Drive, Differential 1)	30
Fill and inspection plug for the transmission fluid inside the front final drive 1)	30
Gearshift Lever	10
Hydraulic Control Unit	5 plus an additional 45° (⅛ turn)
Transmission Control Module	5 plus an additional 45° (⅛ turn)

1) Replace

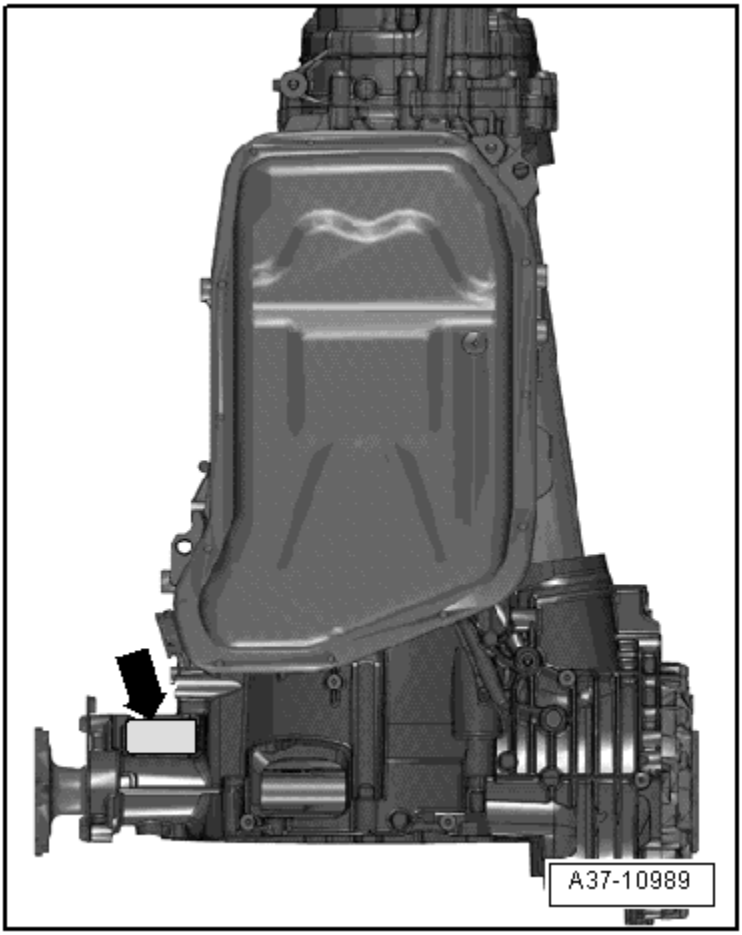
Front Final Drive Cover Tightening Specifications



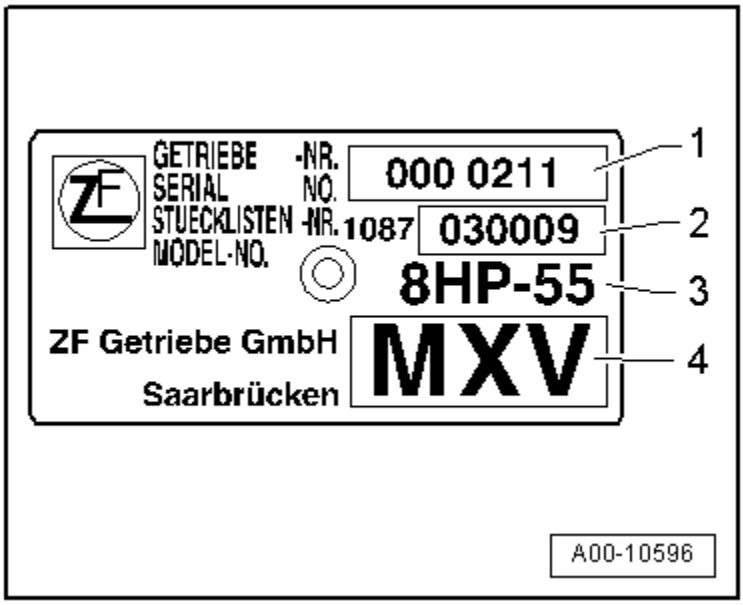
Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	3
2	Tighten bolts 1 through 10 in sequence	20
3	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)

AUTOMATIC TRANSMISSION – 0BK

Transmission Identification



Transmission code letters are located on the data plate under the transmission. Type plate installed location ➡.



1 - Transmission serial number
2 - Parts list number
3 - Manufacturer transmission identification: 8HP-55
4 - Example of a transmission code: MXV

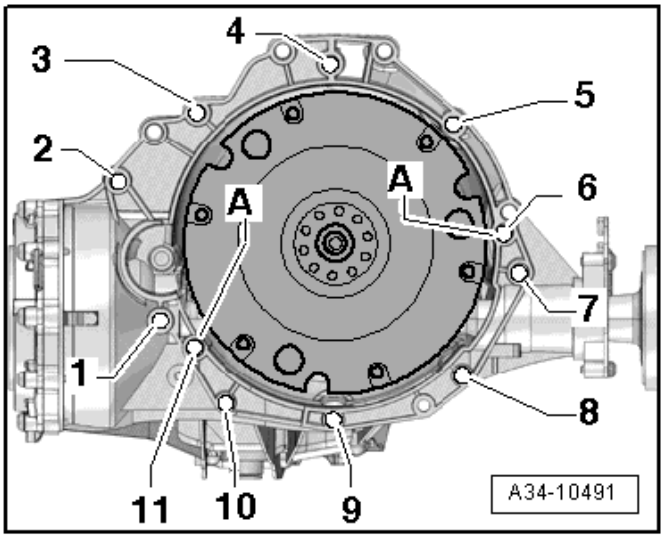
The transmission code letters are also included on the vehicle data labels.

Code Letters, Transmission Allocations, Ratios and Equipment

Automatic Transmission			**0BK AWD**	
Trans-mission	Identification codes		MXW	NES
	Month of manufacture	from	06.2010	07.2010
		through	07.2010	
Torque converter	Identification codes		NW235	NW235
Allocation	Type		Audi A4 from MY 2008	Audi A4 from MY 2008
	Engine		2.0L TFSI - 155 kW	2.0L TFSI - 155 kW
Primary drive			25:29 = 0.862	25:29 = 0.862
Gear wheel, front axle			31:29 = 1.069	31:29 = 1.069
Front axle bevel gear			34:11 = 3.091	34:11 = 3.091
Complete front axle ratio = primary drive x drive wheel x bevel gear			2.848	2.848
Rear axle bevel gear			43:13 = 3.308	43:13 = 3.308
Complete rear axle ratio = rear axle bevel gear x primary drive			2.851	2.851
Oil system, front final drive/ transfer case			Separated	Separated

Controls, Housing – 0BK

Securing Transmission to Engine



Item	Bolt	Nm
1 [1)]	M10 x 50 [2)]	65
2 [1)], 7	M12 x 100 [3)]	30 plus an additional 90° (¼ turn)
3 [4)], 6	M12 x 75 [3)]	30 plus an additional 90° (¼ turn)
4, 5 [4)]	M12 x 120 [3)]	15 plus an additional 90° (¼ turn)
8, 10	M10 x 75 [3)]	15 plus an additional 90° (¼ turn)
9	M10 x 60 [3)]	15 plus an additional 90° (¼ turn)
11 [5)]	M12 x 50 [3)]	30 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	

1) Also secures the starter.
2) Bolt strength rating 10.9, there is no limit to the number of times steel bolts can be used.
3) The aluminum bolts can be used twice.
4) With a bracket for the wires.
5) Installed from the engine side.

Aluminum bolts 2 through 11 can only be used twice. After using the bolts once, use a chisel and mark the bolts with two notches (X). To prevent damaging the bolts when marking them, do not clamp them in a vise. Use a ½" drive 14 mm socket and extension clamped into a vice. Do not use bolts that have been marked with an X.

Fastener Tightening Specifications

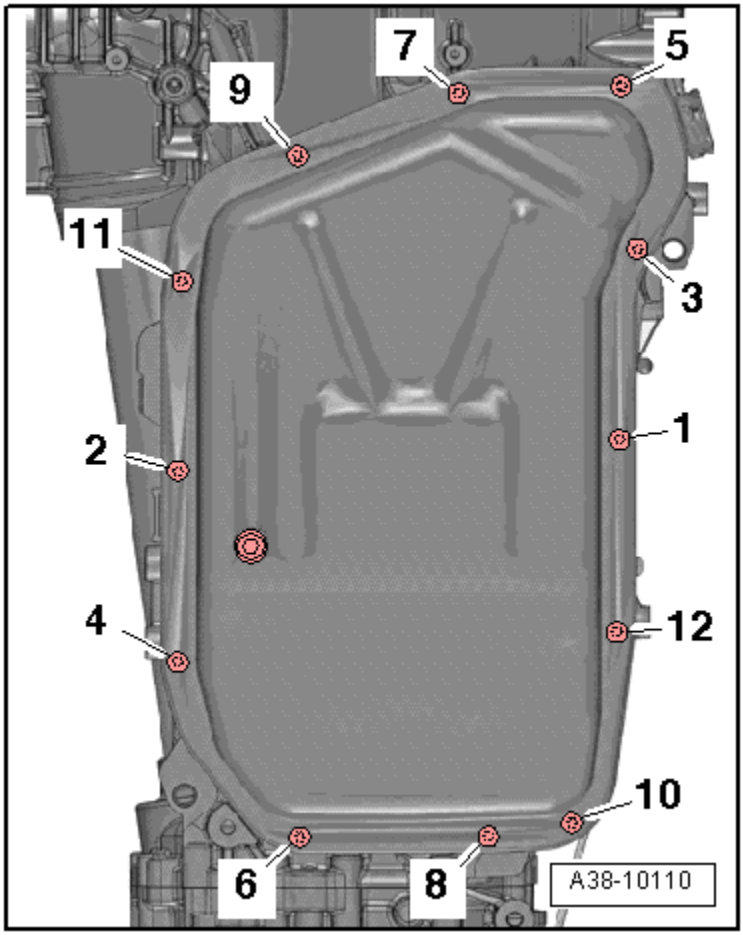
Component	Bolt Size	Nm
ATF drain plug (always replace)	-	12
ATF pipe, nut	-	29
ATF plug for the hole for checking and filling (always replace)	-	30
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Drain plug for the hole for checking and filling the transmission fluid inside the transfer case	-	27
Drain plug for the hole for checking and filling the transmission fluid inside the front final drive	-	27
Drive axle heat shield	-	23
Oil drain plug for the transmission fluid inside the transfer case	-	12
Oil drain plug for the transmission fluid inside the front final drive	-	10
Selector mechanism function unit to the body, nut	-	10

Gears, Hydraulic Controls – 0BK

Fastener Tightening Specifications

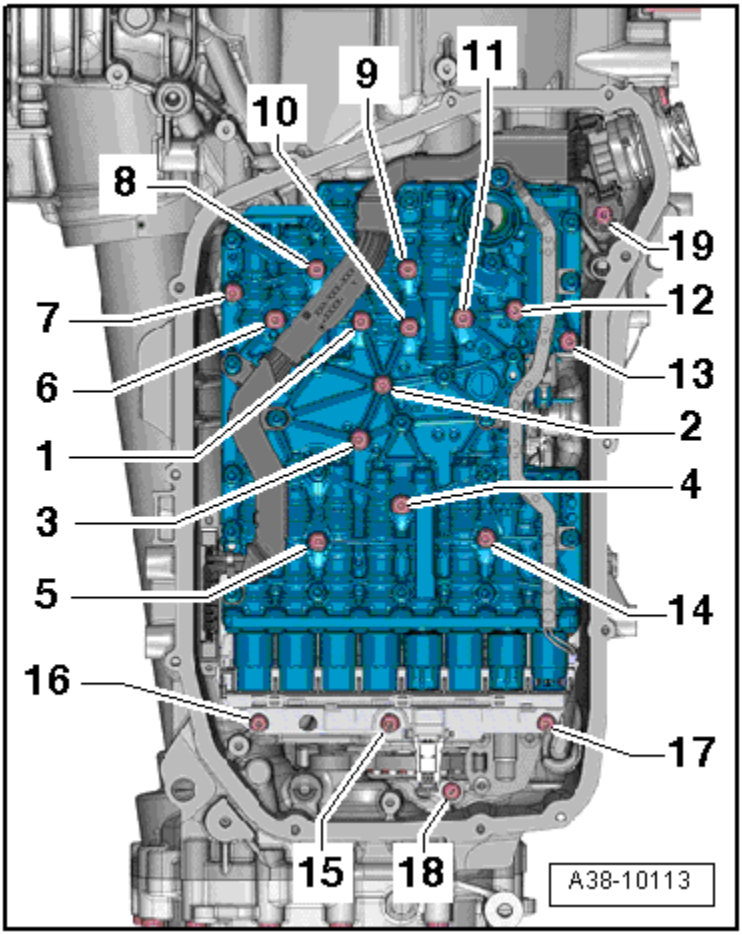
Component	Nm
Mechatronic connector-to-transmission housing	10
Transmission output speed sensor-to-transmission housing	10

ATF Oil Pan Tightening Specifications



Stage	Bolts	Tightening Specification/Additional Turn
1	1 through 12	Hand-tighten until the bolt heads touch
2	1 through 12	4
3	1 through 12	an additional 45° (⅛ turn)

Mechatronic Tightening Specification



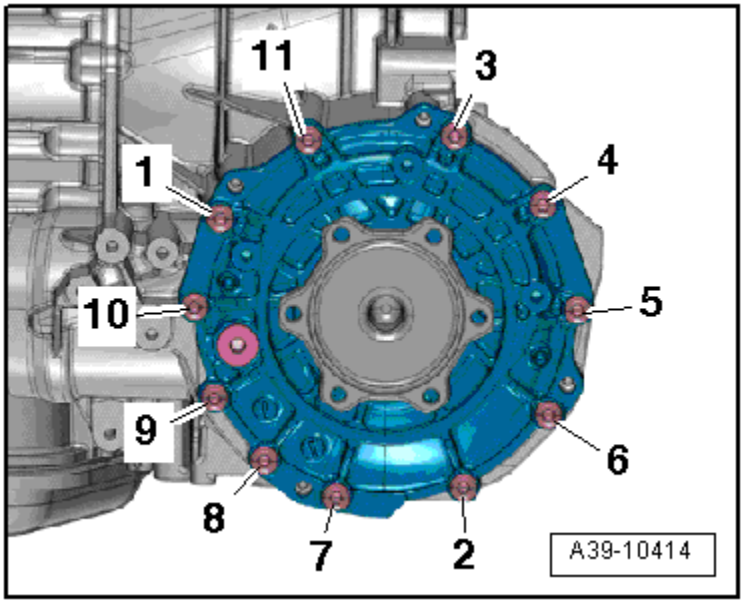
Component	Nm
Tighten bolts 1 through 19 in sequence	10

Rear Final Drive, Differential – 0BK

Fastener Tightening Specifications

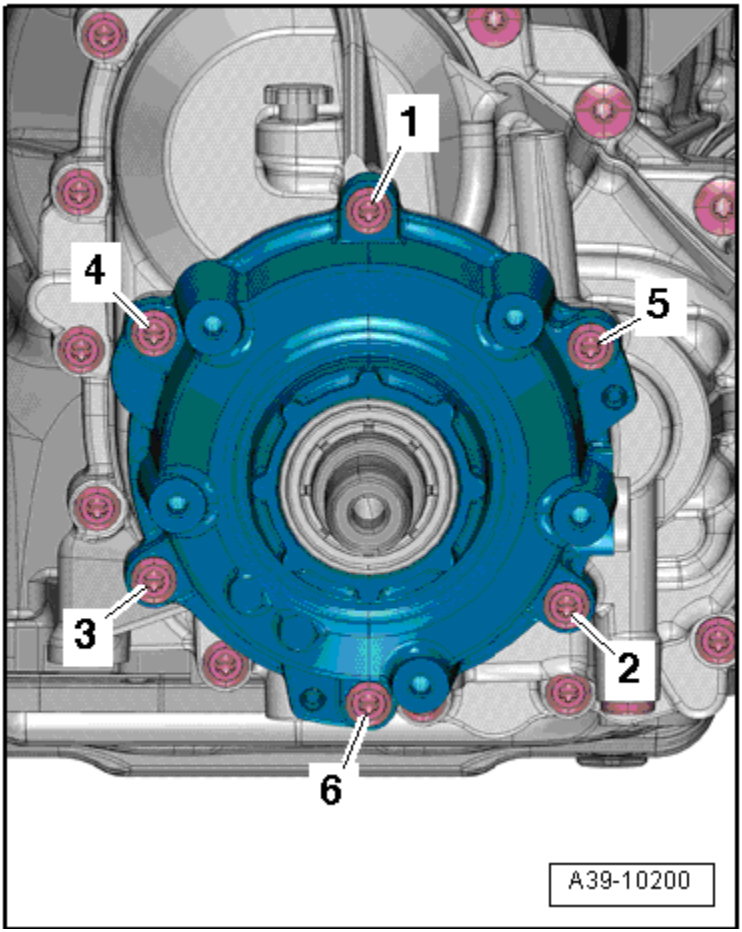
Component	Nm
Drain Plug	27
Oil Drain Plug for the Transmission Fluid Inside the Front Final Drive	10
Oil Drain Plug for the Transmission Fluid Inside the Transfer Case	12

Front Final Drive Cover Tightening Specifications



Stage	Bolts	Nm
1	1 and 6	3
2	1 through 11	27

Center Differential Housing Tightening Specification

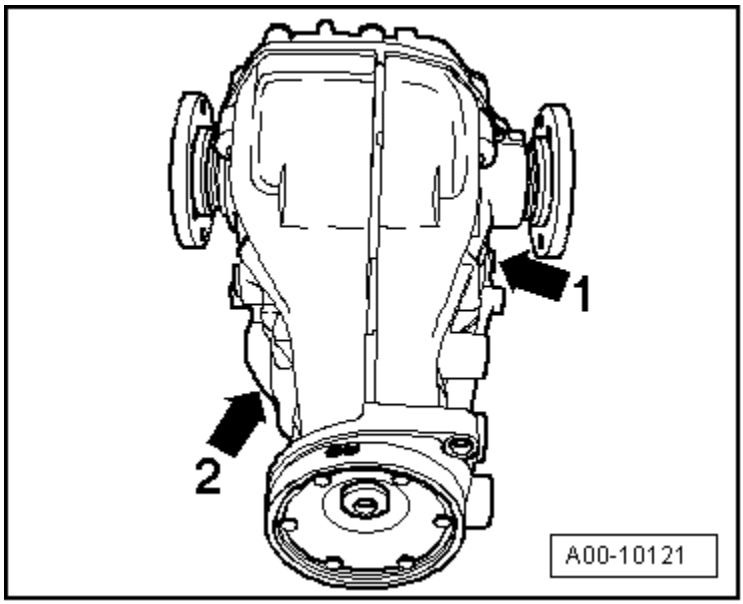


Replace the center differential housing bolts.

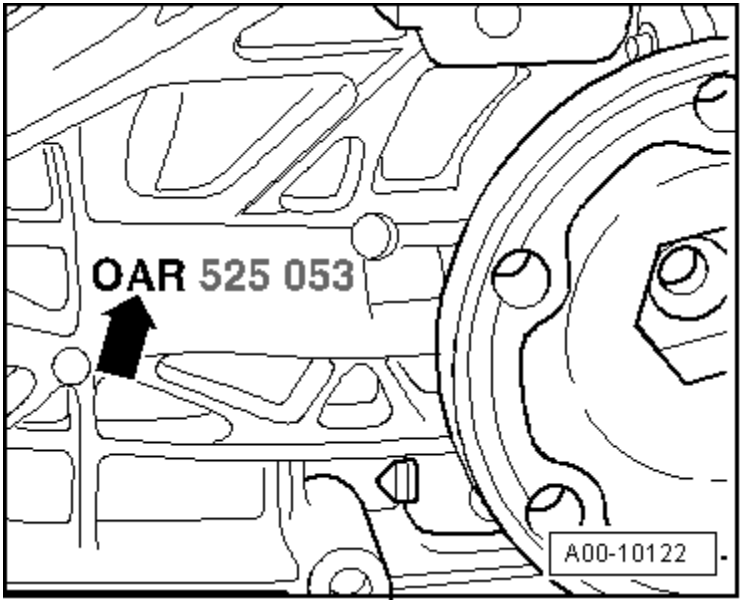
Stage	Bolts	Nm
1	1 and 6	3
2	1 through 6	10
3	1 through 6	an additional 90° (¼ turn)

REAR FINAL DRIVE - 0BC

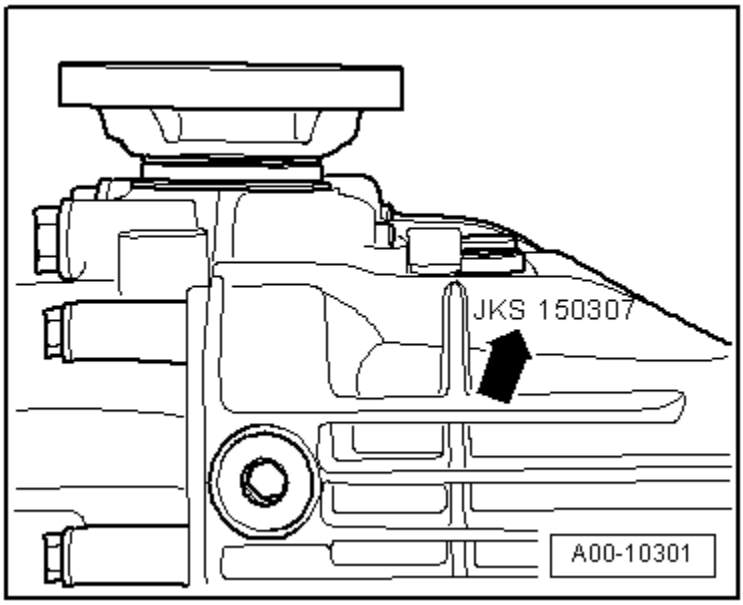
Rear Final Drive Identification



Final drive code letters	
1	OBC final drive and 0AR
2	Code letters and production date



Example: Arrow 1



Example: Arrow 2

Example	JKS	15	03	07
2	Code letters	Day	Month	Year 2007 of production

Rear Final Drive Transmission Allocations, Ratios, Capacities

Rear Final Drive		0BC		
Code letters		**JKP**	**JKQ**	**JKR**
Ratio	Final drive Z_2:Z_1	37:10 = 3.700	37:10 = 3.700	37:9 = 4.111
Driveshaft flange diameter		70.7 mm	75.5 mm	70.7 mm
Gear oil capacity		→ Fluid Capacity Tables; Rep. Gr.03;		

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

- Date of manufacture
- Gear oil specification
- Engine, manual transmission and automatic transmission allocation using code letters and PR numbers.

Rear Final Drive		0BC		
Code letters		**JKS**	**KCC**	**KLL**
Ratio	Final drive $Z_2:Z_1$	35:9 = 3.889	43:13 = 3.308	35:8 = 4.375
Driveshaft flange diameter		75.5 mm	75.5 mm	70.7 mm
Gear oil capacity		→ Fluid Capacity Tables; Rep. Gr.03;		

The following information can be found in the Electronic Parts Catalog ETKA:
- Date of manufacture
- Gear oil specification
- Engine, manual transmission and automatic transmission allocation using code letters and PR numbers.

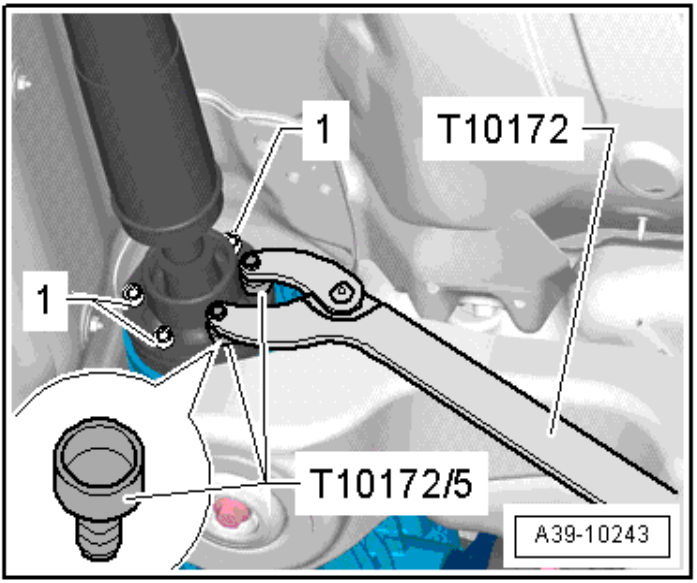
Rear Final Drive		0BC		
Code letters		**KLM**	**KRT**	**LYF**
Ratio	Final drive $Z_2:Z_1$	35 : 8 = 4.375	42:9 = 4.666	37:9 = 4.111
Driveshaft flange diameter		75.5 mm	75.5 mm	75.5 mm
Gear oil capacity		→ Fluid Capacity Tables; Rep. Gr.03;		

The following information can be found in the Electronic Parts Catalog ETKA:
- Date of manufacture
- Gear oil specification
- Engine, manual transmission and automatic transmission allocation using code letters and PR numbers.

Rear Final Drive		0BC	
Code letters		**MNA**	**MNB**
Ratio	Final drive $Z_2:Z_1$	37:9 = 4.111	37:9 = 4.111
Driveshaft flange diameter		70.7 mm	75.5 mm
Gear oil capacity		→ Fluid Capacity Tables; Rep. Gr.03;	

The following information can be found in the Electronic Parts Catalog ETKA:
- Date of manufacture
- Gear oil specification
- Engine, manual transmission and automatic transmission allocation using code letters and PR numbers.

Rear Final Drive Identification



Step	Bolts	Tightening Specification/Additional Turn
1	-1-	Next to the color dot 30 Nm [1]
2	-1-	Next 30 Nm
3	-1-	All round 90° additional turn

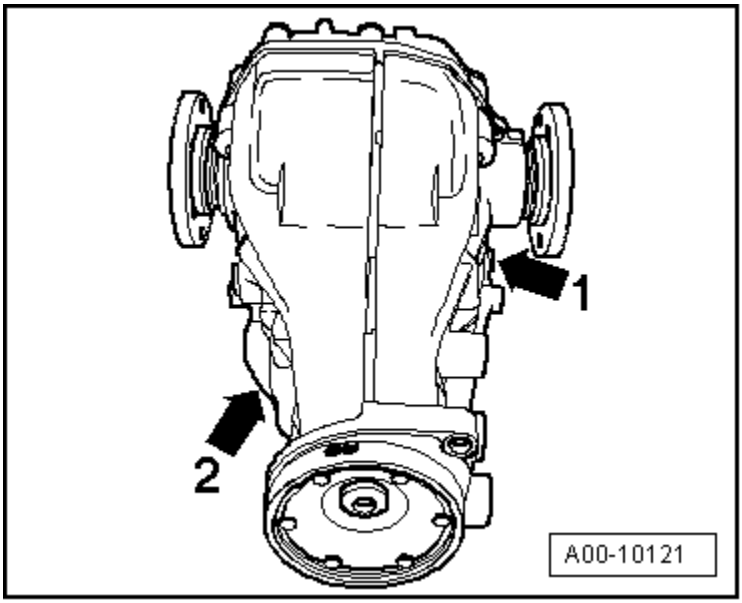
[1] By doing this, the CV joint is pushed slightly to the opposite side and imbalance is avoided..

Fastener Tightening Specifications

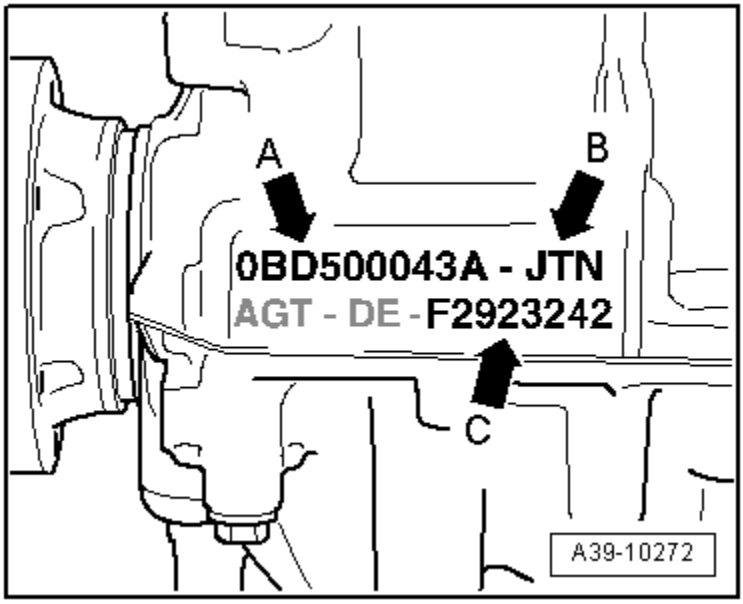
Component	Nm
Backing plate for driveshaft (always replace)	30 plus an additional 90° (¼ turn)
Balance weight-to-rear final drive	22
Check plug for rear final drive	30
Crossmember	55
Driveshaft heat shield	24
Heat Shield-to-crossmember	20
Intermediate bearing bracket	20
Subframe-to-frame	55
Subframe-to-rear final drive	95

REAR FINAL DRIVE 0BD

Rear Final Drive Identification



Final drive code letters	
2	Code letters and production date



-Arrow A- Final Drive 0BD with the part number (example: 0BD 500 043A) -Arrow B- code letters JTN -Arrow C- rear final drive date of manufacture

Example	F	292	3242
	Year of manufacture -2006- F = 2006, G = 2007, H = 2008 ...	Day of manufacture -292. calendar day- (always three digits)	Serial number of the day of production

Rear Final Drive		0BD	
Code letters		**JTN**	**KBU**
Manufactured	from to	08.08	01.08
Allocation	Engine	1.8L - 118 kW TFSI 3.2L - 195 kW FSI	2.0L - 155 kW TFSI 3.2L - 195 kW FSI
Gear ratios	Final drive Z_2:Z_1	35:8 = 4.375	43:13 = 3.308
Driveshaft flange Ø		70.7 mm	70.7 mm
Capacities		→ Fluid Capacity Tables; Rep. Gr.03;	
Specification		Gear oil G 052 145 A1 (container size 0.5 Liter) Gear oil G 052 145 S2 (container size 1.0 Liter)	
Allocation to engine, manual transmission and automatic transmission using the Electronic Parts Catalog (ETKA)			

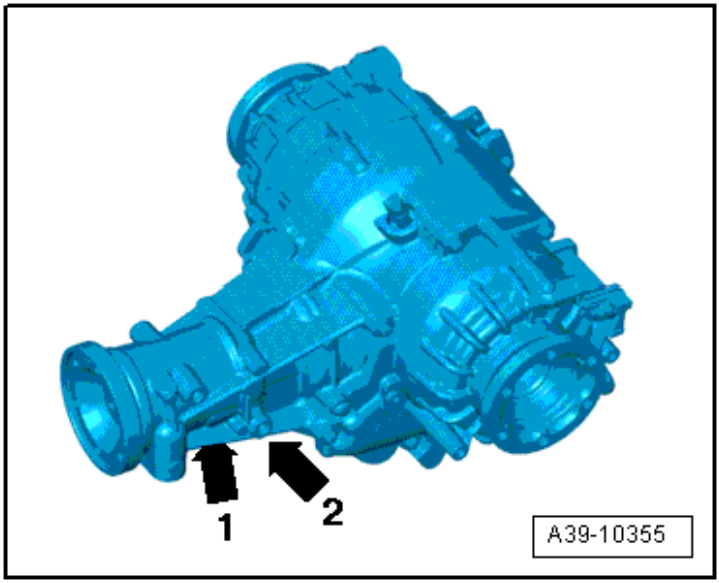
Fastener Tightening Specifications

Component	Nm
Backing plate for driveshaft (always replace)	30 plus an additional 90° (¼ turn)
Crossmember	55
Heat shield	20
Intermediate bearing bracket	20
Screw plug	45
Subframe [1)]	55
	95

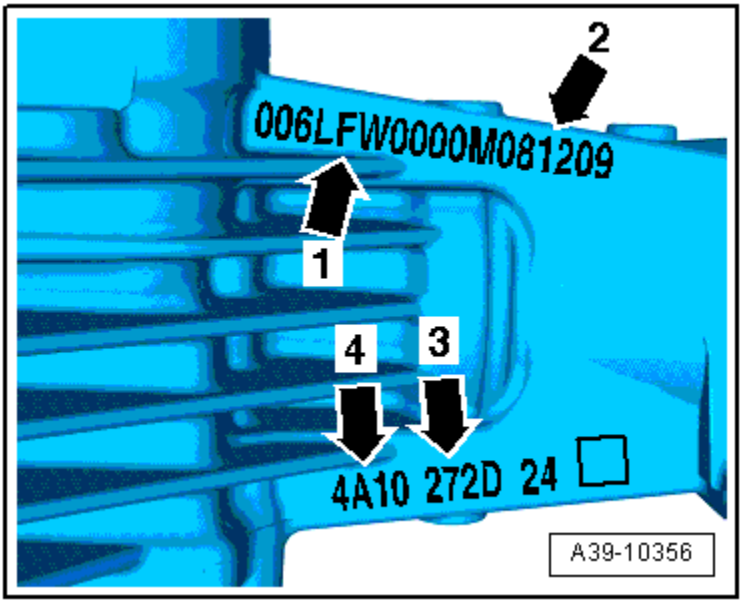
[1)] For bolt tightening clarification, refer to ElsaWeb under Rear Final Drive Assembly Overview, items 2 and 3.

REAR FINAL DRIVE 0BF

Rear Final Drive Identification



Final drive code letters	
arrow 1	Clutch classification
arrow 2	Code and build date



-Arrow 1- code letters -LFW- -Arrow 2- rear final drive date of manufacture -Arrow 3- Right clutch classification (classification of the clutch friction values) Example: -272D- -Arrow 4- Left clutch classification (classification of the clutch friction values) Example: -4A10-

Example	**08**	**12**	**09**
	Year of manufacture -2008-	Month	Day

Rear Final Drive		**0BF**		
Code letters		**LFU**	**LFV**	**LFW**
Ratio	Final drive $Z_2:Z_1$	35:9 = 3.889	37:9 = 4.111	43:13 = 3.308
Driveshaft flange diameter		75.5 mm	75.5 mm	75.5 mm
Gear oil capacity for the final drive (differential and pinion). No change interval.		→ Fluid Capacity Tables; Rep. Gr.03;		
Gear oil specification		Refer to Electronic Parts Catalog ETKA		
ATF capacity for the hydraulic control unit and chambers. No change interval.		→ Fluid Capacity Tables; Rep. Gr.03;		

Code letters	LFU	LFV	LFW
ATF specification	Refer to Electronic Parts Catalog ETKA		

Rear Final Drive		0BF		
Code letters		**LGH**	**LGJ**	**MBV**
Ratio	Final drive Z_2:Z_1	37:10 = 3.700	35:8 = 4.375	35:9 = 3.889
Driveshaft flange diameter		75.5 mm	75.5 mm	75.5 mm
Gear oil capacity for the final drive (differential and pinion). No change interval.		→ Fluid Capacity Tables; Rep. Gr.03;		
Gear oil specification		Refer to Electronic Parts Catalog ETKA		
ATF capacity for the hydraulic control unit and chambers. No change interval,		→ Fluid Capacity Tables; Rep. Gr.03;		
ATF specification		Refer to Electronic Parts Catalog ETKA		

Rear Final Drive		0BF		
Code letters		**MBW**	**MKU**	**MKV**
Ratio	Final drive Z_2:Z_1	37:10 = 3.700	37:9 = 4.111	43:13 = 3.308
Driveshaft flange diameter		75.5 mm	75.5 mm	75.5 mm
Gear oil capacity for the final drive (differential and pinion). No change interval.		→ Fluid Capacity Tables; Rep. Gr.03;		
Gear oil specification		Refer to Electronic Parts Catalog ETKA		
ATF capacity for the hydraulic control unit and chambers. No change interval.		→ Fluid Capacity Tables; Rep. Gr.03;		
ATF specification		Refer to Electronic Parts Catalog ETKA		

Rear Final Drive		0BF		
Code letters		**MKW**	**MKX**	**MKY**
Ratio	Final drive Z_2:Z_1	35:8 = 4.375	35:9 = 3.889	37:10 = 3.700
Driveshaft flange diameter		75.5 mm	75.5 mm	75.5 mm
Gear oil capacity for the final drive (differential and pinion). No change interval.		→ Fluid Capacity Tables; Rep. Gr.03;		
Gear oil specification		Refer to Electronic Parts Catalog ETKA		
ATF capacity for the hydraulic control unit and chambers. No change interval.		→ Fluid Capacity Tables; Rep. Gr.03;		
ATF specification		Refer to Electronic Parts Catalog ETKA		

Fastener Tightening Specifications

Component	Bolt Size	Nm
All wheel drive clutch valve-to-hydraulic control unit housing bolt	-	2.5
All wheel drive pump-to-hydraulic control unit housing bolt	-	5
Automatic transmission fluid drain plug-to-final drive housing	-	15
Automatic transmission fluid inspection plug-to-left chamber	-	15
Center bearing	-	20
Drive axle heat shield-to-rear final drive bolt	-	20
Driveshaft center bearing-to-body bolt	-	20
Driveshaft-to-rear final drive flange bolt (always replace)	-	30 plus an additional 90° (¼ turn)
Driveshaft-to-transmission flange bolt (always replace)	-	30 plus an additional 90° (¼ turn)
Flange shaft-to-rear final drive bolt (always replace)	-	50 plus an additional 180° (½ turn)
Gear oil inspection plug-to-final drive housing	-	15
Hydraulic control module-to-final drive housing bolt	M8 [1]	20
	M8 [2]	20
	M8 [3]	30
Left pipe installed between the hydraulic control unit and the left chamber, nuts	-	30
Left/right chamber-to-final drive housing bolt	-	24
Oil pressure/temperature sensor-to-hydraulic control unit housing	-	10
Right pipe installed between the hydraulic control unit and the right chamber, nuts	-	30
Shuttle valve-to-hydraulic control unit housing	-	8
Subframe-to-rear final drive - lower bolt	-	55
Subframe-to-rear final drive - rear bolt	-	95
Wiring harness bracket		9
Wiring harness bracket-to-right chamber bolt	-	5
Wiring harness bracket-to-rear final drive	-	9

[1] 50 mm long
[2] 50 mm long, with a permanent seal under the bolt head
[3] 30 mm long

SUSPENSION, WHEELS, STEERING

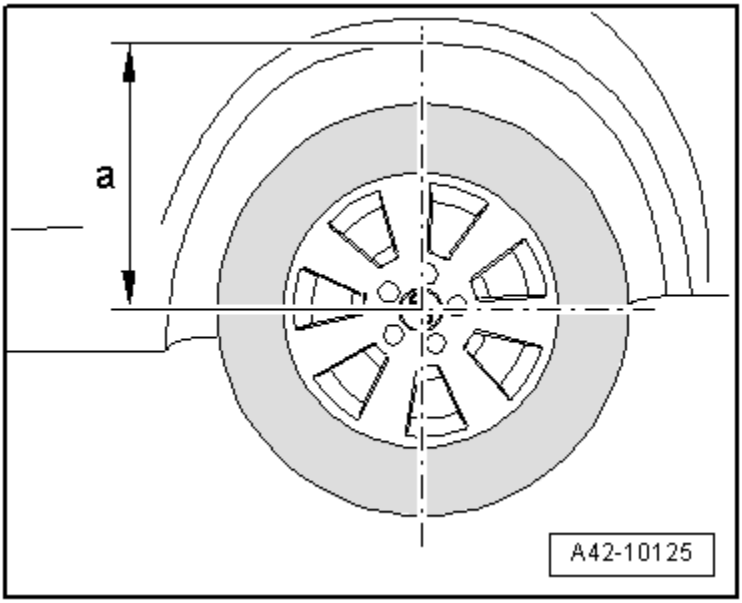
General Specifications

Chassis

Front axle	Five-link - front axle, upper and lower transverse link, transverse stabilizer, twin gas-filled strut
Rear axle	Track controlled axle, upper and lower transverse links, transverse stabilizer, individual wheel suspension, twin gas-filled struts with coil spring

Front Suspension

Front Axle – Curb Weight Data



Before starting work, use a tape measure and measure dimension a from wheel center to lower edge of wheel housing. Take this measurement with suspension in curb weight position (vehicle unladen).

FWD/AWD		Standard suspension 1BA Anmerkung	China City suspension 1BB Anmerkung	Sport suspension 1BD Anmerkung	allroad steel spring suspension 1BP Anmerkung
Wheelbase	mm	Approx. 2812	Approx. 2873	Approx. 2815	Approx. 2809
Front track	mm	Approx. 1567	Approx. 1567	Approx. 1569	Approx. 1588
Rear track	mm	Approx. 1557	Approx. 1557	Approx. 1558	Approx. 1581
Maximum steering angle at curved inner wheel	Degree	39° 57′	39° 57′	39° 57′	39° 57′

- The specified values apply to all engine versions.
- Tracks change with use of wheels with different offset.

FWD/AWD		Sport Suspension 1BE Anmerkung	Chassis with Electronic Damping 1BL Anmerkung	Heavy Duty Suspension 1BR Anmerkung	Sport Chassis (S-Line) 1BV Anmerkung
Wheelbase	mm	Approx. 2815	Approx. 2815	Approx. 2811	Approx. 2815
Front track	mm	Approx. 1569	Approx. 1569	Approx. 1565	Approx. 1569
Rear track	mm	Approx. 1558	Approx. 1558	Approx. 1556	Approx. 1558
Maximum steering angle at curved inner wheel	Degree	39° 57′	39° 57′	39° 57′	39° 57′

Fastener Tightening Specifications

Component	Bolt Size	Nm
Ball joint to lower control arm nut (always replace)		
Combination nut, wrench 18 mm	M12	110
Combination nut, wrench 21 mm	M12	120
Combination nut	M14	140
Collar nut	M12	145
Ball joint-to-wheel bearing housing bolt (always replace)	-	40
Body acceleration sensor nut	-	5
Brake shield-to-wheel bearing housing bolt	-	10
Coupling rod-to-shock absorber fork bolt (always replace) [1)]	-	40 plus an additional 90° (¼ turn)
Coupling rod-to-stabilizer bar bolt (always replace) [1)]	-	40 plus an additional 90° (¼ turn)
Drive axle-to-transmission flange bolt (always replace)	-	70
Drive axle-to-wheel hub bolt (always replace)	-	200 plus an additional 180° (½ turn)
Guide link-to-subframe nut (always replace) [1)]	-	70 plus an additional 180° (½ turn)
Level control system sensor bolt	-	20
Lower control arm-to-subframe nut (always replace) [1)]	-	70 plus an additional 180° (½ turn)
Shock absorber fork-to-suspension strut	-	90 plus an additional 180° (½ turn)
Shock absorber fork-to-lower control arm bolt (always replace) [1)]	-	90 plus an additional 90° (¼ turn)
Stabilizer bar-to-subframe nut (always replace) [1)]	-	25
Subframe-to-body bolt (always replace)	-	115 plus an additional 90° (¼ turn)
Subframe crossbrace bolt (always replace) [2)]	-	90 plus an additional 135° turn
		90 plus an additional 90° (¼ turn)

Fastener Tightening Specifications *(cont'd)*

Component	Bolt Size	Nm
Subframe shield-to-subframe bolt	-	9
	-	20
Suspension strut-to-body bolt (always replace)	-	40 plus an additional 90° (¼ turn)
Suspension strut-to-shock absorber fork nut (always replace)	-	40 plus an additional 90° (¼ turn)
Tie rod-to-wheel bearing housing nut (always replace)		
Collar nut	-	20 Nm plus an additional 90° (¼ turn)
12-point combi nut	-	100
Hex combi nut	-	110
Tower brace bolt	-	7
Tower brace nut	-	30
Upper control arm-to-suspension strut bolt (always replace) [1)]	-	50 plus an additional 90° (¼ turn)
Upper control arm-to-wheel bearing housing nut (always replace)	-	40
Wheel bearing and hub-to-wheel bearing housing bolt (always replace)	-	80 plus an additional 90° (¼ turn)
Wheel speed sensor-to-wheel bearing housing bolt	-	9

1) Must be tightened in the curb weight position. refer to ElsaWeb under *Wheel Bearing, with Coil Spring, Lifting to Curb Weight Position.*

2) For bolt tightening clarification, refer to ElsaWeb under *Subframe, Crossbrace, Stabilizer Bar, Coupling Rod and Subframe Shield Overview" and see items -21 and 22-.*

Rear Suspension

Fastener Tightening Specifications

Component	Nm
ABS wheel speed sensor bolt	9
Brake hose bracket bolt	10
Brake rotor mounting bolt	
FWD	10
AWD	5
Brake shield-to-wheel bearing housing bolt	10

Component	Nm
Coupling rod-to-stabilizer bar bolt (always replace) [1)]	40 plus an additional 90° (¼ turn)
Coupling rod-to-subframe bolt (always replace) [1)]	40 plus an additional 90° (¼ turn)
Cv joint clamp	20
Drive axle inner CV joint cover bolt (always replace)	
88 mm outer constant velocity joint and 100 mm inner constant velocity joint	20 plus an additional 90° (¼ turn)
100 mm outer constant velocity joint and 108 mm inner constant velocity joint	70
Drive axle-to-wheel hub bolt (always replace)	200 plus an additional 180° (½ turn)
Left rear level control system sensor-to-body bolt	5
Left rear level control system sensor-to-lower transverse link bolt	9
Lower transverse link-to-subframe bolt (always replace)	70 plus an additional 180° (½ turn)
Lower transverse link-to-wheel bearing housing nut (always replace) [1)]	120 plus an additional 360° (full turn)
Securing clip	5
Shock absorber-to-upper shock absorber mount nut	35
Shock absorber-to-wheel bearing housing bolt (always replace)	150 plus an additional 180° (½ turn)
Stabilizer bar-to-subframe bolt (always replace)	25 plus an additional 90° (¼ turn)
Subframe-to-body bolt (always replace) [1)]	115 plus an additional 90° (¼ turn)
Subframe support bolt	55
Tie rod-to-subframe nut (always replace) [1)]	95
Tie rod-to-wheel bearing housing bolt (always replace) [1)]	90 plus an additional 90° (¼ turn)
Upper shock absorber mount-to-body bolt (always replace)	50 plus an additional 45° (⅛ turn)
Upper transverse link-to-subframe bolt (always replace)	95

Fastener Tightening Specifications *(cont'd)*

Component	Nm
Upper transverse link-to-wheel bearing housing nut (always replace) [1)]	70 plus an additional 180° (½ turn)
Wheel bearing unit-to-wheel bearing housing bolt, FWD (always replace)	200 plus an additional 180° (½ turn)
Wheel bearing unit-to-wheel bearing housing bolt, AWD (always replace)	80 plus an additional 90° (¼ turn)

[1)] Must be tightened in the curb weight position. Refer to ElsaWeb under Wheel Bearing, with Coil Spring, Lifting to Curb Weight Position.

Wheels, Tires, Wheel Alignment

Fastener Tightening Specifications

Component	Nm
Adaptive cruise control sensor assembly bracket bolt	8
Level control system control module bracket and ground wire nut	6
Level control system control module-to-bracket bolt	8
Tire pressure monitoring control module nut	2
Tire pressure monitoring sensor union nut	8
Decorative trim-to-wheel rim bolt	5
Wheel electronics-to-metal valve microencapsulated bolt, BERU system	4

Wheel Bolt Tightening Specifications

DANGER!

In order to make sure the wheel bolts fit correctly, be sure to use the correct wheel bolts specified for the model. The wheel bolts for each model have different diameters on the surface of the ball running surface on the wheel rim and they have different lengths.

Model	Model	Tightening Specification
A4 B8	8K	120 Nm
S4 B8	8K	120 Nm
A4 allroad	8K	120 Nm
RS 4 B8	8K	120 Nm

Wheel Alignment Data

Front and all wheel drive.

Specifications valid for all engine versions.

If the vehicle has RHD and the standard chassis (1BA), then check and adjust the camber on the front axle according to the height of the vehicle Anker.

Front axle	Standard suspension (1BA)	China City Suspension (1BB)	Sport suspension (1BE/1BD)	Steel Spring Suspension allroad (1BP)
Camber	- 43′ ± 23′ Anmerkung	- 43′ ± 23′	- 1°5′ ± 23′	- 20′ ± 23′
Maximum permissible difference between both sides	30′	30′	30′	30′
Toe per wheel (adjustment value)	+ 10′ ± 5′	+ 10′ ± 5′	+ 10′ ± 5′	+ 10′ ± 5′
Toe per wheel (control value)	+ 10′ ± 7′	+ 10′ ± 7′	+ 10′ ± 7′	+ 10′ ± 7′
Toe-out angle at 20 degrees Anmerkung	1° 49′ ± 30′	1° 49′ ± 30′	1° 49′ ± 30′	1° 49′ ± 30′
Outer wheel steering angle at maximum steering angle	33° 12’ + 1° 30’- 2°	33° 12’ + 1° 30’- 2°	33° 12’ + 1° 30’- 2°	33° 12’ + 1° 30’- 2°
Inner wheel steering angle at maximum steering angle	39° 36’ + 1° 30’- 2°	39° 36’ + 1° 30’- 2°	39° 36’ + 1° 30’- 2°	39° 36’ + 1° 30’- 2°

Front axle	Chassis with electronic damping (1BL)	Heavy duty suspension (1BR)	Sport Suspension S-Line (1BV)
Camber	- 1°5′ ± 23′	- 30′ ± 23′	- 1°13′ ± 23′
Maximum permissible difference between both sides	30′	30′	30′
Toe per wheel (adjustment value)	+ 10′ ± 5′	+ 10′ ± 5′	+ 10′ ± 5′
Toe per wheel (control value)	+ 10′ ± 7′	+ 10′ ± 7′	+ 10′ ± 7′
Toe-out angle at 20 degrees Anmerkung	1° 49′ ± 30′	1° 49′ ± 30′	1° 49′ ± 30′
Outer wheel steering angle at maximum steering angle	33° 12’ + 1° 30’- 2°	33° 12’ + 1° 30’- 2°	33° 12’ + 1° 30’- 2°
Inner wheel steering angle at maximum steering angle	39° 36’ + 1° 30’- 2°	39° 36’ + 1° 30’- 2°	39° 36’ + 1° 30’- 2°

Rear axle	Standard suspension (1BA)	China City Suspension (1BB)	Sport Suspension (1BE)/(1BD)	Steel Spring Suspension allroad (1BP)
Camber	- 1°20′ ± 25′	- 1°20′ ± 25′	- 1°20′ ± 25′	- 1°20′ ± 25′
Maximum permissible difference between both sides	30′	30′	30′	30′
Toe per wheel (adjustment value)	+ 10′ ± 5′	+ 10′ ± 5′	+ 10′ ± 5′	+ 10′ ± 5′
Toe per wheel (control value)	+ 10′ ± 5′	+ 10′ ± 5′	+ 10′ ± 5′	+ 10′ ± 5′
Maximum permissible deviation in direction of travel relative to vehicle longitudinal axis	10′	10′	10′	10′

Rear axle	Chassis with electronic damping (1BL)	Heavy duty suspension (1BR)	Sport Suspension S-Line (1BV)
Camber	- 1°20′ ± 25′	- 1°20′ ± 25′	- 1°20′ ± 25′
Maximum permissible difference between both sides	30′	30′	30′
Toe per wheel (adjustment value)	+ 10′ ± 5′	+ 10′ ± 5′	+ 10′ ± 5′
Toe per wheel (control value)	+ 10′ ± 5′	+ 10′ ± 5′	+ 10′ ± 5′
Maximum permissible deviation in direction of travel relative to vehicle longitudinal axis	10′	10′	10′

- The camber values are defined in the following table based on the vehicle heights at the front axle.

Camber adjustment values on the front axle for RHD vehicles and standard chassis (1BA)						
Vehicle height			Camber			Maximum permissible difference in height between the right and left
Drift	Left and right average absolute value Wheel	Average Delta or specified vehicle height in mm	Test - adjustment dimension	Drift	Maximum permissible difference between both sides	
Too high	401	10	-33′	± 23′	30′	≤ 10 mm
	400	9	-34′			
	399	8	-35′			
	398	7	-36′			
	397	6	-37′			
	396	5	-38′			
	395	4	-39′			
	394	3	-40′			
	393	2	-41′			
	392	1	-42′			
Specified	391	0	-43′			
Too low	390	-1	-44′			
	389	-2	-45′			
	388	-3	-46′			
	387	-4	-47′			
	386	-5	-48′			
	385	-6	-49′			
	384	-7	-50′			
	383	-8	-51′			
	382	-9	-52′			
	381	-10	-53′			

Steering

Steering Gear – Technical Data

Steering gear	Maintenance-free rack-and-pinion steering with servo assist
Turning diameter	Approximately 11.50 m

Fastener Tightening Specifications

Component	Nm
Belt Pulley	22
Electronic Steering Column Lock Control Module to Steering Column Bolt	5
Handle to Steering Column Bolt	3
Mounting Bracket for Steering Column	5

Component	Nm
Power Steering Fluid Reservoir Bolt	9
Power Steering Line to Steering Gear Bolt	20
Power Steering Line to Body Retaining Nut	9
Power Steering Line to Pump Bolt	9
Power Steering Line to Pump Union Nut	38
Power Steering Line to Pump Union Nut	
This tightening specification applies only with the 17 mm ring spanner insert, open -V.A.G 1331/10-	36
Power Steering Line to Steering Gear Retaining Nut	6
Power Steering Pump Mounting Bolt	
- 4-Cylinder	25
- 6-Cylinder	20
Power Steering Pump Bracket to Engine Bolt, 6-Cylinder	20
Pressurized Line Union Nut	40
Right Knee Bar to Steering Column Bolt [2) 3)]	20
Rubber Bushing to Steering Gear	6
Servotronic Solenoid Valve to Steering Gear Mounting Bolt [5)]	3
Steering Column to Mounting Bracket Bolt [2)]	20
Steering Gear to Subframe Bolt [1)]	80 plus an additional 180° (½ turn)
Steering Intermediate Shaft to Steering Column Bolt [1) 4)]	30 plus an additional 90° (¼ turn)
Steering Intermediate Shaft to Steering Gear Bolt [1) 4)]	30 plus an additional 90° (¼ turn)
Steering Wheel to Steering Column Bolt [1)]	50
Tie Rod to Steering Gear	90
Tie Rod End to Tie Rod Lock Nut	80
Tie Rod End to Wheel Bearing Housing Nut [1)]	
- 12-Point Combi Nut	100
Hex Collar Nut	20 plus an additional 90° (¼ turn)
- Hex Combi Nut	110

1) Always replace after removal.
2) Follow the assembly sequence when installing. Refer to ElsaWeb under *Follow the Assembly Sequence when Installing*
3) Installed depending on the country version.
4) The threaded hole for the bolt must always be cleaned (for example, using a thread tap).
5) Always follow bolt tightening sequence. Refer to ElsaWeb under *Servotronic Solenoid Valve -N119*

Clamp Style	Pliers -V.A.G 1682 A- (Hazet) with adapter -V.A.G 1682 A/1-	Pliers -V.A.G 1682- (Ötiker) with adapter -V.A.G 1682 A/1-
85 mm clamp (front passenger side)	7 Nm	9 Nm
59 mm clamp (driver side)	10 Nm	12 Nm

BRAKE SYSTEM

General, Technical Data

Front Wheel Brakes				
Production-relevant no. (Pr. No.)		1LT	1LA/1LB	1LJ
Brake caliper		FN3- 57 16”	FBC-57 16”	FBC-57 17”
Brake disc ventilated	Dia. mm	314	320	345
Brake disc, thickness	mm	25	30	30
Brake disc, wear limit	mm	23	28	28
Pad thickness with backing plate and dampening sheet	mm	20.3	18.8	18.8
Brake pad wear limit with backing plate and dampening sheet	mm	7	7	7

Rear Wheel Brakes			
Production-relevant no. (Pr. No.)		1KW	1KE
Brake caliper		CII-43 EPB (16”)	CII-43 EPB (17”)
Brake disc	Dia. mm	300	330
Unvented brake disc thickness	mm	12	------
Internally vented brake disc thickness		------	22
Brake disc, wear limit	mm	10	20
Brake caliper, piston	Dia. mm	43	43
Pad thickness with backing plate and dampening sheet	mm	17.5	17.5
Brake pad wear limit with backing plate and dampening sheet	mm	7	7

Antilock Brake System

Fastener Tightening Specifications

Component	**Nm**
Brake lines to hydraulic unit M10 (dia. 5 mm brake lines)	12
Brake lines to hydraulic unit M12 (dia. 5 mm brake lines)	12
Brake lines to hydraulic unit M12 (dia. 8 mm brake lines)	16
ABS/ESP speed sensor to wheel bearing housing	9

Mechanical Components

Fastener Tightening Specifications

Component	Nm
Brake Pedal Bracket to Body Nut	8
Brake Pedal Mounting Pin to Bracket Bolt	8
Electromechanical Parking Brake Control Module Nut	3
Electromechanical Parking Brake Motor to Rear Brake Caliper Bolt	12
Front Brake Caliper to Brake Carrier Bolt	30
Front Brake Carrier to Wheel Bearing Housing Bolt [1)]	196
Front Brake Line Connection to Brake Caliper	20
Front Brake Pad Bolt	5
Front Cover Plate Bolt	10
Gas Pedal Module to Brake Pedal Bracket Bolt	8
Rear Brake Caliper to Brake Carrier Bolt [1)]	35
Rear Brake Carrier to Wheel Bearing Housing Bolt	100
Rear Brake Hose in Brake Caliper	19
Rear Brake Hose to Brake Pipe Line	12
Rear Brake Pad Bolt	5
[1)] Always replace after removal.	

Mechanical Components

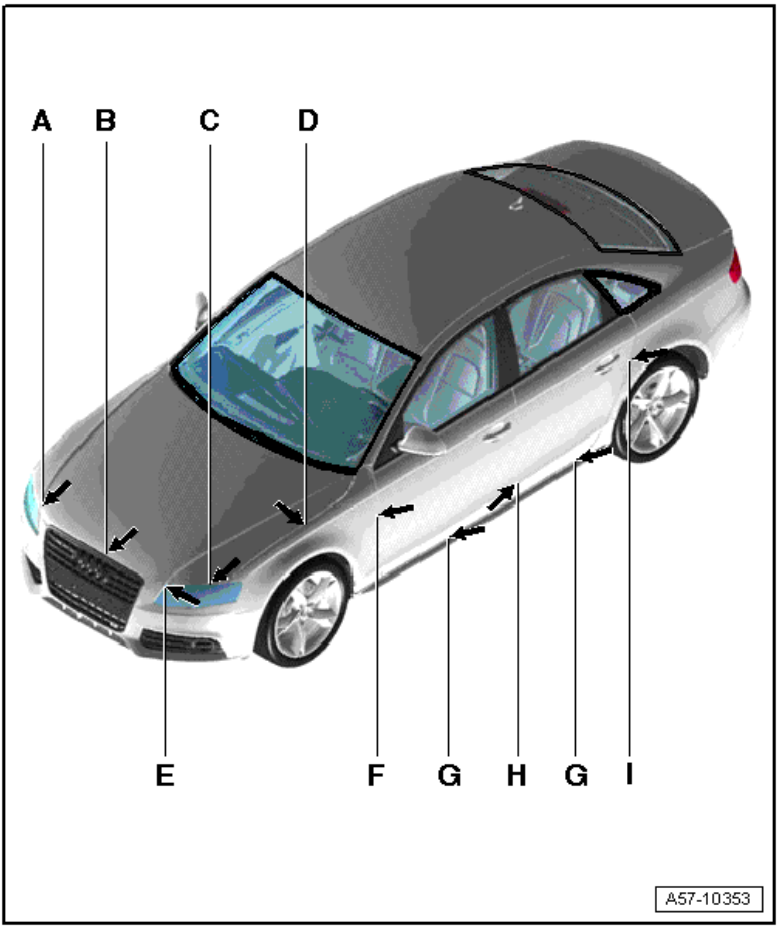
Tightening Specifications

Component	Nm
Ball Head to Brake Booster	30
Brake Booster to Bracket Bolt	23
Brake Fluid Reservoir Cap	5
Brake Line to Master Cylinder	24
Brake Line Connection to the Brake Hose	12
Brake Line Connection to the Brake Caliper	19
Brake Master Cylinder Nut	49
Brake Pedal Mounting Bracket Bolt	20
Brake System Vacuum Pump Bracket Nut	9
Front Bleeder Valve	15
Front Brake Caliper to Brake Carrier Bolt	30
Front Brake Carrier to Wheel Bearing Housing Bolt	196
Rear Brake Caliper to Brake Carrier Bolt [1)]	35
[1)] Always replace after removal.	

BODY

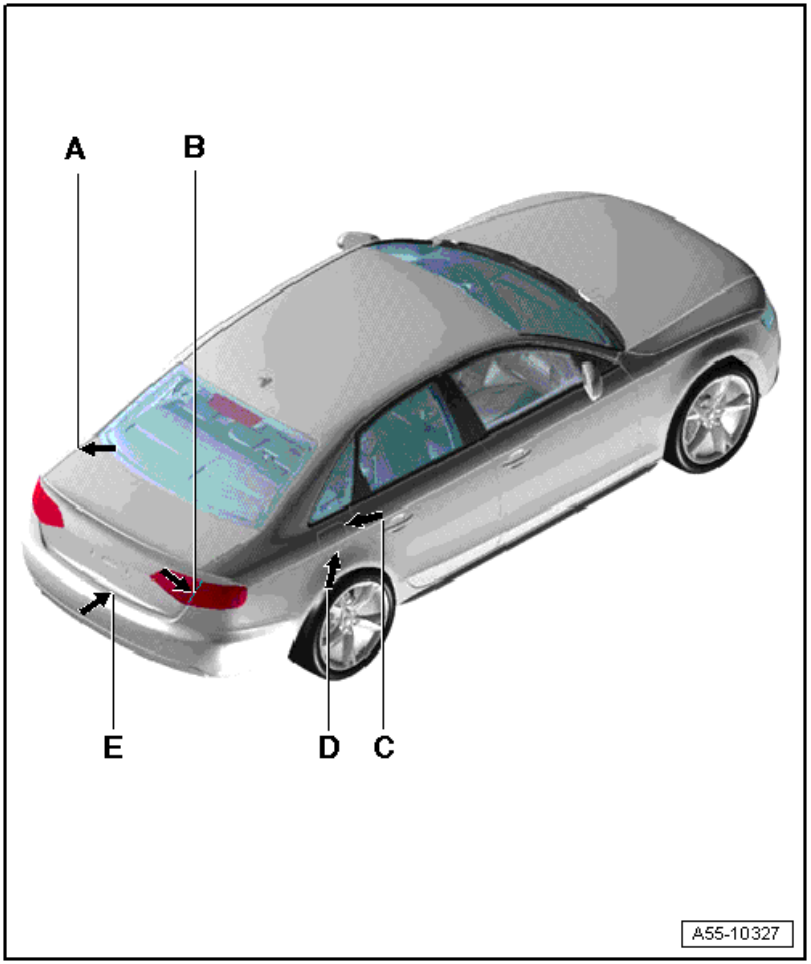
Air Gap Body Dimensions

Front Gap Dimensions



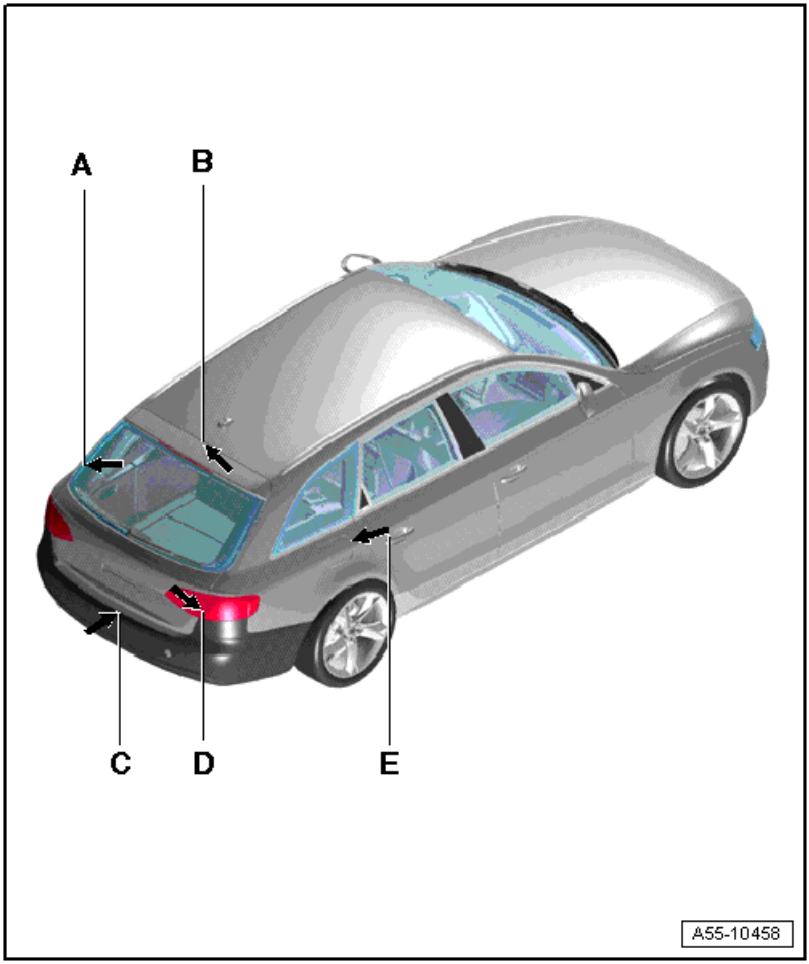
Component	mm
A	5.0 ± 0.5
B	4.5 ± 0.5
C	5.0 ± 0.5
D	3.0 ± 0.5
E	4.5 ± 0.5
F	3.5 ± 0.5
G	5.5 ± 0.5
H	4.5 ± 0.5
I	3.5 ± 0.5

Rear Gap Dimensions



Component	mm
A	4.0 ± 0.5
B	4.5 ± 0.5
C	Front and rear 2.2
D	Top and bottom 2
E	5 ± 0.5

Rear Gap Dimensions – Avant



Component	mm
A	3.5 ± 0.5
B	4.5 ± 0.5
C	5.0 ± 0.5
D	3.5 ± 0.5
E	2.2 ± 0.5

Body Exterior

Lock Carrier Service Position Tightening Specifications

Component	Nm
Impact bar to the lock carrier bolts	4
Upper lock carrier bolts	10
Lower lock carrier bolts	30
Side impact bar bolts	30

Front Fender Tightening Specifications

Component	Nm
Front fender bolts	10
Front fender nuts	4
Fender end plate bolts	1.5
Fender brace	8
Bumper cover mount-to-brace nuts	6

Underbody Trim Tightening Specifications

Component	Nm
Front noise insulation bolts	5
Rear noise insulation bolts	2

Plenum Chamber Bulkhead Tightening Specification

Component	Nm
Plenum chamber bolt	7

Front Hood Tightening Specifications

Component	Nm
Hood hex nut	21
Gas filled strut ball studs	21
Hood hinge nuts	21
Hood catch nuts	8
Hood lock bolts	11

Rear Lid Tightening Specifications

Component	Nm
Rear lid bolts	21
Gas filled strut ball studs	21
Rear lid hinge hex head nut	21
Rear lid latch bracket bolts	21
Rear lid lock bolts	21

Front and Rear Door Tightening Specifications

Component	Nm
Cover for the door lock	3.5
Door upper hinge locking screw	25
Door bottom hinge bolt body	32
Door bottom hinge bolt to door	45
Door lock	19
Door lock-to-inner door part bolt	20
Door arrester bolts (front)	25
Door arrester bolts (rear)	8
Stud bolt-to-upper door hinge	30
Side impact protection bolts	20

Sunroof Tightening Specifications

Component	Nm
Sliding headliner bolts	1.5
Frame bolts	8
Frame nuts	8
Electrical drive motor bolts	4
Slotted guide rail Torx® bolts	5
Installation unit bolts	8
Sunroof Panel 1	7
Sunroof Panel 2	3

Front Bumper Tightening Specifications

Component	Nm
Bumper cover bolts (1 per side)	1.5
Bumper cover bolts (4 per side)	2
Bumper cover bolts (2 in front)	4
Bumper cover bolts (6 in front)	2
Bumper cover bolts (2 on top)	4
Bumper cover end plate bolts	1.5
	3
Front bumper cover mount nut	4
Vent grille bolt	2
Left guide piece bolts	2
Crossmember bolts	8
Right guide piece bolts	2
Guide trim bolts	2
Side impact bar-to-bracket bolts	20
Impact bar bracket bolts	55
Bumper carrier bolts (4 per side)	60
Bumper carrier bolts (6 across top)	8
Lower spoiler bolts	2
Underbody impact guard bolt (allroad)	1.5

Rear Bumper Tightening Specifications

Component	Nm
Impact member mount bolt	57
Impact member mount nut	17
Rear bumper cover bolts (1 per side)	1.5
Rear bumper cover bolts (4 in front)	5
Rear bumper cover bolts (3 per back side)	2
Rear bumper cover bolts (4 on top)	5
Rear bumper carrier nuts	17
Securing strip hex nuts	2.5
Guide trim hex nuts	2
Crossmember bolts	20
Top tow hitch bolts	20
Tow hitch bolts	57

Front and Rear Door Window Tightening Specifications

Component	Nm
Window regulator nuts	9
Window regulator motor bolts	3.5
Window guide trim bolts	2

Front Wheel Housing Liner Tightening Specification

Component	Nm
Wheel housing liner bolts	2

Exterior Mirror Tightening Specifications

Component	Nm
Cover for the mirror adjustment unit mount	1
Mirror adjusting unit	1.5
Seal-to-mirror adjusting unit mount	10
Side Turn Signal	1

Rear View Mirror Tightening Specifications

Component	Nm
Mirror base plate bolts	10
Assembly component bolts	1

Radiator Grille Tightening Specification

Component	Nm
Radiator grille bolts	1.5

Strips and Trim Tightening Specifications

Component	Nm
Sill panel extension bolts	2
Retaining strip-to-sill panel bolts	2

Body Interior

Storage Compartment Tightening Specifications

Component	Nm
Center Console (with a front center armrest)	
Ashtray to console bolt	2.5
Bracket bolt	3
Bracket nut	8
Cupholder to console bolt	1.4
Rear trim to console bolts	2.5
Storage compartment to console bolt	1.4
Trim to console bolts	1.4
Center Console (without a front center armrest)	
Ashtray to console bolt	2.5
Bracket bolt	3
Bracket nut	8
Console to vehicle floor nuts	4
Cupholder to console bolt	1.4

Storage Compartment Tightening Specifications *(cont'd)*

Component	Nm
Front Center Armrest	
Padding to bracket bolts	2.2
Support base bolts	3
Support base to vehicle nuts	20
Support base hinge bolts	3
Glove Compartment	
Bolt (front facing)	3
Bolt (threaded clip to compartment)	3
Bolt (underside lower)	3
Bolt (upper)	3
Instrument Panel Cover	
Bolt (front left)	3
Bolt (front right)	3
Bolt (side)	3
Steering Column Trim	
Lower trim screws	2
Release handle bolt	3
Underside of lower trim bolt	2

Passenger Protection Tightening Specifications

Component	Nm
Airbag Control Module	
Airbag control module nuts to vehicle body	9
Airbag Crash Sensors	
Driver side airbag crash sensor	5
Driver side rear side airbag crash sensor	9
Driver front airbag crash sensor	9
Front passenger side airbag crash sensor	5
Passenger side front airbag crash sensor	9
Passenger side rear side airbag crash sensor	9
Battery Interrupt Igniter	
Battery interrupt igniter nuts	15
LATCH Child Seat Anchorage	
Bracket to seat pan screws	8
Center top tether retaining bracket bolts[1)]	9
Left top tether retaining bracket bolt [1)]	9
Right top tether retaining bracket bolts [1)]	9
Driver Airbag/Steering Wheel	
Back of steering wheel bolt	7
Front Side Airbag	
Front side airbag to seat frame bolt	8

Component	Nm
Head Curtain Airbag	
Front of head curtain airbag bolts	3.5
Rear of head curtain airbag buts to ground bolt	9
Passenger Airbag	
Nuts for front passenger airbag to vehicle	8
Rear Side Upholstery	
Bolt for side upholstery to vehicle (if equipped with side airbag)	9
Bolt for side upholstery to vehicle (if not equipped with side airbag)	3
Seat Belts	
Driver's front seat buckle to vehicle bolt	33
Passenger's front seat buckle to vehicle bolt	33
Front three-point driver's seat belt to vehicle bottom bolt	45
Front three-point passenger's seat belt to vehicle bottom bolt	45
Front three-point driver's seat belt to vehicle top bolt	45
Front seat belt guide bolts	45
Seat belt height adjuster bolts	5
Rear belt buckle latch bolts	27
Rear center three-point seat belt bolt	45
Rear center three-point seat belt nut	45
Rear outer three-point seat belt lower bolt	45
Rear outer three-point seat belt upper bolt45	45
Seat Position Sensor	
Seat position sensor bolt	0.3
[1] For bolt tightening clarification, these are applicable for allroad model only.	

Interior Trim Tightening Specifications

Component	Nm
Front Door Trim	
Armrest bolts	1.2
Door trim bolts	2.5
Inside door release mechanism bolt	1.2
Pull handle bolt	1.2
Front Sill Panel	
Driver's side front sill panel bolt	2.5
Impact Absorber and Glove Compartment Bracket	
Left retainer for glove compartment bolts	9
Right retainer for glove compartment bolts	9
Left shock absorber bolts	9
Right shock absorber bolts	9

Interior Trim Tightening Specifications *(cont'd)*

Component	Nm
Instrument Panel Central Tube	
Bracket for air intake chamber bolt	9
Bracket for glove compartment	9
Front bracket bolts	20
Front lower support bolt	3.6
Front upper support bolt	20
Interior lower support bolts	20
Interior upper support bolts	3.6
Stud bolt	20
Stud bolt nut	20
Driver's area securing bolts	20
Instrument Panel Components	
Access/start authorization switch trim bolts	3
Light switch trim bolts	1.5
Instrument cluster mounting bracket bolts	3
Support bolts, center (behind MMI screen)	3
Support bolts, left (upper)	3
Support bolts, right (lower)	3
Support bolts, right (upper)	3
Speaker trim mount nuts	0.5
Pillar Trim	
A-Pillar upper trim bolts	3.5
D-Pillar trim bolts [1)]	2
Rear mount bolts [1)]	3
Rear Door Trim	
Armrest bolts	1.2
Door trim bolts	2.5
Inside door release mechanism bolt	1.2
Pull handle bolt	1.2
Component	**Nm**
Rear lid trim (allroad)	
Lower trim bolts [1)]	2
Rear Lid Trim (Sedan)	
Rear lid trim upper bolt [2)]	1.8
Rear Luggage Compartment	
Luggage compartment side trim bolts [2)]	6
Retaining hooks (if equipped) [2)]	1.5
Rear cross panel trim bolts [1)]	1.5
Luggage compartment side trim rear bolt [1)]	3
Luggage compartment side trim upper bolt [1)]	1.5
Partition screen separator guide cover bolts [1)]	9

Component	Nm
Partition screen separator bracket bolt [1]	4.5
Partition screen separator mount bolt [1]	9
Component	**Nm**
Rear Shelf (Sedan)	
Rear shelf bolts	2
Rear shelf with spacer (with additional fastener)	2
Rear shelf to spacer bolts	2
Storage Area Floor (allroad)	
Counter-support bolts [1]	2.2
Front bracket main bolt [1]	55
Front bracket secondary bolts [1]	9
Rear bracket bolts [1]	9
Right retaining track bolts [1]	7
Tie down eye bolts [1]	6
Trailer hitch storage bolts (if equipped) [1]	4
Sun Shade (Rear Door)	
Sunshade bolt	1.2
Sun shade mount bolt	1.3
Sun Shade (Rear Windshield)	
Bracket and guide strip bolts	2.3
Rear deck bolts	2
Sun shade to rear shelf nuts	3

[1] For bolt tightening clarification, these are applicable for allroad model only.
[2] FFor bolt tightening clarification, these are applicable for Sedan model only.

Seat Frames Tightening Specifications

Component	Nm
Front Seat — (Many Components Listed - “If Equipped”)	
Backrest to seat pan screws	33
Backrest adjustment motor bolt	7.5
DVD retaining plate screws	6
DVD socket nut	0.4
Component	**Nm**
Lumbar support adjustment switch screws	0.5
Retaining bracket for sill side trim screws	8
Seat adjustment control head	0.4
Seat angle adjuster bolts	6.5
Seat angle adjuster shoulder pin	6
Seat angle adjustment motor bolt	20
Seat angle adjustment motor screws	10
Seat pan to vehicle floor bolts	50

Seat Frames Tightening Specifications *(cont'd)*

Component	Nm
Seat cushion fan air intake grille bolts	1.5
Seat depth adjuster bolts	4
Seat depth adjuster screws	4
Seat height adjuster screws	6.5
Seat height adjuster bolt	10
Seat height adjustment lever screws	8
Seat height adjustment motor to bracket screws	10
Seat pan to lower seat pan frame bolts	22
Shaft for backrest frame nut	6
Sill side trim retaining bracket screws	3.5
Spindle for adjustment bolt (left hand threaded)	18
Storage compartment bolts	8
Rear Seat	
Center armrest bracket with hinges nuts	8
Center armrest bracket with hinges nuts (fixed rear seat backrest)	5
Center armrest bracket with hinges screws	11
Center armrest bracket with hinges self locking bolts (fixed rear seat backrest)	8
Center armrest with pass-through cover bracket screws	8
Center armrest with pass-through cover hood bolts	11
Center bracket securing bracket bolt	9
Cover for backrest bolts	4
Cover trim for backrest bolt	0.9
Divided backrest center bracket screws	16.5
Fixed rear seat backrest (lower bolts)	33
Fixed rear seat backrest (upper bolts)	30
Inner bearing Assembly Bolt	15
Lock cylinder locking tab bolts	25
Side upholstery bolt (if equipped with side airbag)	9
Side upholstery bolt (if equipped without side airbag)	3

HEATING AND AIR CONDITIONING

Refrigerant (PAG) Oil Capacities

Model	Production	Total capacity (cm^3)
1K0 820 803 K Sanden	from 04.04	130 ± 10
1K0 820 803 E Denso	from 04.04	130 ± 10
1K0 820 803 H Zexel	from 04.04	130 ± 10

Refrigerant Oil Distribution

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

Refrigerant R134a Vapor Pressure Table

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

Heating and Ventilation System Tightening Specifications

Component	Nm
Fresh air intake-to-plenum, nuts	3.5
Coolant pipes bracket-to-heat exchanger connector flange, screw	2.5

A/C System Tightening Specifications

Component	Fastener Size	Nm
A/C pressure temperature sensor	-	5
Compressor drain plug, Denso	-	30
Compressor drive plate bolts	-	10
Compressor drive plate protection	-	30
Compressor input shaft	-	60
Compressor mounting	-	25
Dryer cartridge	-	2
Electric compressor mounting bolt	-	25
Evaporator connector	-	5
Expansion valve, front	-	10
Expansion valve, rear (Hybrid)	-	10
Hybrid battery refrigerant shut-off valve 1 union	-	10
Pressure relief valve, Denso	-	10
Refrigerant line-to-compressor	M6	9
	M8	25
Refrigerant line-to-condenser	-	9
Refrigerant line with inner heat exchanger	-	10
Reservoir-to-condenser	-	10

ELECTRICAL EQUIPMENT

Battery, Starter, Generator, Cruise Control

Fastener Tightening Specifications

Component	Nm
Battery retaining bracket-to-body bolt	18
Fuse panel A nut	5
Generator bolt	23
Ground wire with battery monitoring control module-to-battery nut	5
Ground wire with battery monitoring control module-to-body nut	20
Spare tire retainer-to-body bolt [2]	18
Spare tire-to-retainer nut [2]	4
Terminal 30/B+ wire-to-generator nut	16
Terminal B+ wire-to-starter nut	15
Vehicle tool kit cover retainer-to-body bolt [1]	18
Vehicle tool kit cover-to-retainer nut [1]	4
Voltage stabilizer bracket-to-body nut	3

[1] Sedan only
[2] Avant only

Instruments

Fastener Tightening Specifications

Component	Nm
12 V Socket 3-to-trim panel nut	2
Converter with socket 12V - 230V-to-cupholder bolt	1.4
Data bus on board diagnostic interface bolt	3
Horn-to-impact member nut	9
Instrument cluster-to-instrument panel bolt	2.5
Radio frequency controlled clock receiver-to-body bolt	2.5

Windshield Wiper/Washer System

Fastener Tightening Specifications

Component	Nm
Rear window wiper arm-to-wiper motor nut	12
Rear window wiper motor-to-rear lid nut	8
Windshield wiper arm-to-wiper motor nut	17

Exterior Lights, Switches

Fastener Tightening Specifications

Component	Nm
Access/start authorization switch-to-instrument panel bolt	3
Exterior rearview mirror turn signal bulb-to-exterior rearview mirror housing screw	0.9
Fog lamp-to-body screw	4.5
Headlamp bracket to body screw	4.5
Headlamp mount to body screw	8
Mount to headlamp bracket screw	8
Parking aid control module frame-to-body nut	3
Steering column clamping ring screw	4
Steering column electronic systems control module-to-turn signal, cruise control, windshield wiper and washer intermittent switch bolt	0.5
Halogen headlamp	
Bracket-to-headlamp screw [1)]	1.8
Bracket-to-headlamp screw [1)]	4.5
Bracket-to-body screw	4.5
Headlamp bracket-to-body screw	4.5
Headlamp bracket-to-vent tube adapter screw	4.5
Headlamp range control positioning motor housing cap-to-headlamp	2
Headlamp range control positioning motor-to-headlamp screw	1.4
Headlamp-to-vent tube adapter screw	4.5
Mount-to-body screw	8
Mount-to-headlamp bracket screw	8
Turn signal housing cap-to-headlamp screw	2
Xenon headlamp with cornering light	
Bracket-to-headlamp screw [2)]	1.8
Bracket-to-headlamp screw [2)]	4.5
Bracket-to-body screw	4.5
Daytime Running Lamp (DRL) and parking lamp LED module-to-headlamp screw	1.4
Headlamp range control positioning motor-to-headlamp screw	1.4
Headlamp range control positioning motor housing cap-to-headlamp screw	2
Hid headlamp control module-to-headlamp screw	1.4
Power output stage-to-headlamp screw	1.4
Tail lamp, sedan	
Bracket-to-rear lid nut	3.5

Fastener Tightening Specifications *(cont'd)*

Component	Nm
Bulb socket-to-outer tail lamp screw	1.7
LED tail lamp, sedan	
Body-to-outer tail lamp threaded stud	3.5
Bracket-to-rear lid stud nut	4
Tail lamp, Avant	
Body-to-outer tail lamp threaded stud	3.5
Bracket-to-rear lid stud nut	3.5
Bulb socket-to-outer tail lamp nut	3.5
LED Tail Lamp, Avant/Allroad	
Body to outer tail lamp threaded stud	3.5
Bracket to rear lid stud nut	3.5
Inner tail lamp to lid nut	4

1) For clarification on the screws, refer to ElsaWeb under Halogen Headlamp Overview, items 9 and 10.

2) For clarification on the screws, refer to ElsaWeb under Xenon Headlamp with Cornering Light Overview, items 10 and 17.

Interior Lights, Switches

Fastener Tightening Specifications

Component	Nm
Access/start authorization antenna-to-body bolt 1)	2
Access/start authorization antenna in luggage compartment-to-body bolt	2
Alarm horn-to-body bolt 1)	5
	7
Front interior/reading lamp-to-roof bolt	1.6
Headlamp assistant-to-interior rearview mirror bolt	2.4
Lane change assistance control module-to-body screw	3.5
Left access/start authorization antenna-to-body bolt	2
Sunroof adjustment regulator-to-front interior/reading lamp bolt	1

1) For bolt clarification, refer to ElsaWeb under Ultrasonic Interior Monitoring Overview, items 2 and 3.

DTC CHART

Engine Code CAEB

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 < 1.9 - 4.2°CRK/s
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) > 6.8 - 8°CRK
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1, Sensor A)	• Permissible deviation < 11° Rev or • Permissible deviation > 11° Rev
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 2.34 - 3.59 V
P0031	HO2S Heater Control Circuit Low (Bank 1, Sensor 1) Short to Ground	Heater voltage < 2.34 V
P0032	HO2S Heater Control Circuit High (Bank 1, Sensor 1) Short to B+	Heater voltage > 3.59 V
P0036	HO2S Heater Control Circuit (Bank 1, Sensor 2) Open Circuit	SULEV heater voltage 4.50 - 5.50 V
P0037	HO2S Heater Control Circuit Low (Bank 1, Sensor 2) Short to Ground	Heater voltage < 3.00 V
P0038	HO2S Heater Control Circuit High (Bank 1, Sensor 2) Short to B+	Heater current 2.70 - 5.50 A

DTC	Error Message	Malfunction Criteria and Threshold Value
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 and • RPM controller torque value ≥ calculated max. value Out of range - High • Engine speed deviation > 80 RPM and • RPM controller torque value ≤ calculated min. value Plausibility check • Integrated deviation of engine speed low and integrated deviation of engine speed high > 2000 RPM
P0068	MAP/MAF – Throttle Position Correlation	• Plausibility with fuel system load calculation < -50% • Plausibility with fuel system load calculation > 50%
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 < 0 - 396 kg/h • Mass air flow vs. upper threshold > 34 - 907 kg/h • Load calculation > 19% and • Fuel system (mult.) < -21% • Load calculation < -19% and • Fuel system (mult.) > 21 %
P0102	Mass or Volume Air Flow A Circuit Low Input	MAF sensor signal < 66 µs
P0103	Mass or Volume Air Flow A Circuit High Input	MAF sensor signal > 4500 µs
P0106	Manifold Absolute Pressure/ BARO Sensor Range/ Performance	Boost pressure signal • Altitude sensor < -210 hPa • Altitude sensor > 230 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 < 46°C
P0116	Engine Coolant Temperature (Sensor 1) Circuit Range/ Performance	Stuck high •Difference in value between ECT and AAT at engine start (depending on engine off time) > 25 - 40°C and • Difference in value between IAT and AAT at engine start (depending on engine off time) < 25 - 40°C and • Difference in value between AAT and ECT at engine start (depending on engine off time) > 25 - 40°C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance (ULEV)	• Signal in range 109.6 - 140.3°C and no change on signal < 1.5 K • Signal in range 50.3 - 88.4°C and no change on signal < 1.5 K • Signal in range 88.5 - 109.5°C and no change on signal < 1.5 K
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 < -40°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 < 0.20 V
P0123	Throttle/Pedal Position Sensor A Circuit High Input	Signal voltage > 4.81 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 < 2.0 V
		Nernst voltage < 1.50 V
		Adjustment voltage < 0.30 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass > 3.25 V
		Nernst voltage > 4.40 V
		Adjustment voltage > 7 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0133	O2 Circuit Slow Response (Bank 1, Sensor 1)	Symmetric fault: • Lower value of both area ratios R2L and L2R < 0.30 and • Difference of R2L area ratio vs. L2R area ratio -0.400 - 0.400 Asymmetric fault: • Lower value of both area ratios R2L and L2R < 0.30 and • Difference of R2L area ratio vs. L2R area ratio NOT (-0.400 - 0.400) General: • Lower value of both counters for area ratio R2L and L2R ≥ 5 times
P0135	O2 Heater Circuit (Bank 1, Sensor 1)	• O2S ceramic temperature < 715°C and • Heater duty cycle 100% • 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 • Number of heater coupling ≥ 6 times
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.

DTC	Error Message	Malfunction Criteria and Threshold Value
P0139	O2 Circuit Slow Response (Bank 1 Sensor 2)	• EWMA filtered transient time at fuel cut off > 0.7 Sec. • In voltage range 201 - 347.7 mV • Number of checks (initial phase) > 3 • Number of checks (step function) > 3
P0140	O2 Circuit No Activity Detected (Bank 1, Sensor 2)	• Signal voltage .40 - .60 mV for > 3 Sec or • Difference in sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) ≥ 2.80 V
P0141	O2 Heater Circuit (Bank 1, Sensor 2) Out of Range	Heater resistance 810 - 4560 Ω
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
P0169	Incorrect Fuel Composition	Comparison with fuel quantity incorrect
P0171	System Too Lean (Bank 1)	Lean at idle • Adaptive value > 21% Lean at part-load • Adaptive value 26% (only B8 ULEVVII)
P0172	System Too Rich (Bank 1)	Too rich at idle • Adaptive value < 5.02% (< 6.0% only B8 ULEV) Too rich at part-load • Adaptive value < 21% (< -26% only B8 ULEVVII)
P0190	Fuel Rail Pressure Sensor A Circuit	Signal voltage > 4.8 V
P0191	Fuel Rail Control Valve, High Pressure Side	Actual pressure > 20.6 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
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 • Internal logic failure
P0202	Injector Circuit/Open - Cylinder 2	• Low side signal current < 2.1 A • Internal logic failure
P0203	Injector Circuit/Open - Cylinder 3	• Low side signal current < 2.1 A • Internal logic failure
P0204	Injector Circuit/Open - Cylinder 4	• Low side signal current < 2.1 A • Internal logic failure
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 > 4.81 V
P0234	Turbocharger/Supercharger Overboost Condition Rationality Check High	Difference of set value boost pressure vs. actual boost pressure value > 200 - 1280 hPa
P0236	Turbocharger Boost Sensor A Plausability Check	Difference in boost pressure signal vs. altitude sensor signal > 220 hPa or Difference in boost pressure signal vs altitude sensor signal, <120 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

DTC	Error Message	Malfunction Criteria and Threshold Value
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
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 > 150 hPa
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 voltage 4.40 - 5.60 V
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 > 4.75 V
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance (Bank 1)	Deviation runner flap position vs. actual position > 25%
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low (Bank 1)	Signal voltage < 0.25 V
P2088	Camshaft Position A Actuator Control Circuit Low (Bank 1) Short to Ground	Signal voltage < 2.15 - 3.25 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2089	Camshaft Position A Actuator Control Circuit High (Bank 1) Short to B+	Signal current > 2.2 A
P2096	Post-Catalyst Fuel Trim System Too Lean (Bank 1)	I-portion of 2nd lambda control loop < 0.030
P2097	Post-Catalyst Fuel Trim System Too Rich (Bank 1)	I-portion of 2nd lambda control loop > 0.030
P3081	Engine Temperature Too Low	Reference model temperature - measured engine coolant temp. > 10 [K]

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 5.0 - 20.0%
P0301	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 5.0 - 20.0%
P0302	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 5.0 - 20.0%
P0303	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 5.0 - 20.0%
P0304	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 5.0 - 20.0%
P0321	Ignition/Distributor Engine Speed Input Circuit Range/ Performance	• Comparison of counted teeth vs. reference = incorrec or • Monitoring reference gap failure
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	• Camshaft signal > 3 • Engine speed = no signal

DTC	Error Message	Malfunction Criteria and Threshold Value
P0324	Knock Control System Error	• Signal fault counter (combustion) > 24 or • Signal fault counter (measuring window) > 2.00
P0327	Knock Sensor 1 Circuit signal range check	• Lower threshold < 70 V
P0327	Knock Sensor 1 Circuit Short to ground, Port A	• Lower threshold < 70 V
P0327	Knock Sensor 1 Circuit signal range check	• Lower threshold < 70 V
P0328	Knock Sensor 1 Circuit signal range check (Bank 1)	Upper threshold > 18.0...150.0 V
P0328	Knock Sensor 1 Circuit short to B+ Port B (Bank 1)	Upper threshold >1.00 V
P0328	Knock Sensor 1 Circuit short to B+ Port A (Bank 1)	Upper threshold >1.00 V
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 • Crankshaft signals = 8
P0343	Camshaft Position Sensor A Circuit High Input (Bank 1 or Single Sensor)	• Signal voltage high and • Crankshaft signals = 8
P0351	Ignition Coil A Primary/ Secondary Circuit	• Signal current < -0.25 to 2.0 mA or • Internal check failed
P0352	Ignition Coil B Primary/ Secondary Circuit	• Signal current < -0.25 to 2.0 mA • Internal check failed

DTC	Error Message	Malfunction Criteria and Threshold Value
P0353	Ignition Coil C Primary/ Secondary Circuit	• Signal current < -0.25 to 2.0 mA or • Internal check failed
P0354	Ignition Coil D Primary/ Secondary Circuit	• Signal current < -0.25 to 2.0 mA or • Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	System Check After SAI (PZEV)	Deviation SAI pressure > 20.0 hPa
P0413	Open Circuit (PZEV)	Signal voltage 9.25 - 11.25 V
P0414	Short to Ground (PZEV)	Signal voltage < 6.00 V
P0415	Short to B+ (PZEV)	Signal current 2.20 - 4.20 A
P0418	Air Pump Relay Open Circuit (PZEV)	Signal voltage 4.50 - 5.50 V
P0420	Catalyst System Efficiency Below Threshold (Bank 1) PZEV only	• Measured OSC / OSC of borderline catalyst value for front catalyst , <0.40 or • Value for front catalyst, <1.30 and • Value for main catalyst, <1.20
P0420	Catalyst System (only bin 5, ULEV) Efficiency Below Threshold (Bank 1)	• 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	Reaction of idle controller or lambda controller Deviation less than .079% lambda controller AND < 35% idle controller deviation
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.55 - 1.75 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
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)	< 5 - 6.5 Sec.
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 < 4 km/h
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 and • RPM controller torque value ≥ calculated max value • Integrated deviation of engine speed low and integrated deviation of engine speed high > 2000 RPM
P0507	Idle Air Control System - RPM Higher Than Expected	• Engine speed deviation > -80 RPM and • RPM controller torque value ≤ calculated min. value

DTC	Error Message	Malfunction Criteria and Threshold Value
P050B	Cold Start Idle Air Control System Performance	Difference between commanded spark timing vs. actual value > 0.25%
P052A	VVT Actuator Intake	Difference between target position and actual position > 12.0°CRK
P053F	Fuel Rail Control Valve High Pressure Side	

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	• Function monitoring: WDA general cause failure • Function monitoring: WDA internal check failure • Function monitoring: WDA overvoltage detection failure • EEPROM check failed • Internal hardware check (electrical adjustment communication, voltage supply) check
P0606	ECM: 5V Supply Voltage	Internal hardware check under-/over-voltage detection
P0606	ECM: A/D Converter	• Power-up calibration check failed • A/D-channel conversion check failed
P0606	ECM: A/D Converter 2	• Power-up calibration check failed • A/D-channel conversion 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
P0638	Throttle Actuator Control Range/Performance (Bank 1)	Rationality check: • Time to close to reference point > 0.6 Sec. and • Reference point 2.88% Rationality check: • Time to open over reference point > 0.1 Sec or • Time to close below reference point > 0.6 Sec Signal range check at mechanical stop low • TPS 1 signal voltage ≠ 0.40 - 0.80 V or • TPS 2 signal voltage ≠ 4.20 - 4.60 V
P0641	Sensor Reference Voltage A Circuit/Open	Signal voltage deviation > ± 0.3 V
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage < 4.6 - 5.0 V
P0643	Sensor Reference Voltage A Circuit High	5V supply voltage > 4.99 - 5.41 V
P0651	Sensor Reference Voltage B Circuit/Open	Signal voltage deviation > ± 0.3 V
P0652	Sensor Reference Voltage B Circuit Low	Signal voltage < 4.6 - 5.0 V
P0653	Sensor Reference Voltage B Circuit High	5V supply voltage > 4.99 - 5.41 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

DTC	Error Message	Malfunction Criteria and Threshold Value
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 • Difference sense circuit voltage with camshaft actuator commanded off and on > 2.5 V • Battery voltage > 3 V
P0697	Sensor Reference Voltage C Circuit/Open	Signal voltage deviation > ± 0.3 V
P0698	Sensor Reference Voltage C Circuit Low	Signal voltage < 4.6 - 5.0 V
P0699	Sensor Reference Voltage C Circuit High	5V supply voltage > 4.99 - 5.41 V
P062B	Injection Valves Communication	Internal logic failure
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
U0140	CAN communication with Body Control Module	Received CAN message - no message
U0146	CAN Gateway A	CAN communication with gateway, time out
U0155	CAN Instrument Cluster	Received CAN message - no message

DTC	Error Message	Malfunction Criteria and Threshold Value
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
U0415	CAN: Vehicle Speed Sensor	• Speed sensor signal: initialization error 655.34km/h • Speed sensor signal: low voltage error 655.33km/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

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 < 0.85

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Pressure control activity > 0.25 MPa and • Fuel trim activity < 0.85
P12A4	Fuel Rail Pump Control Valve Stuck Closed	• Pressure control activity, <6.00 mPa and • Fuel trim activity, 0.85...1.15
P13EA	Ignition Timing Monitor	Difference between commanded spark timing and actual value > 0.60%
P150A	Engine Off Time	Comparison of engine off time from instrument cluster control unit with engine after run time. • Difference between engine off time and ECM after run time < -12.0 Sec. Comparison of engine off time from instrument cluster control unit with engine after run time • Difference between engine off time and ECM after run time > 12.0 Sec.
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	• Duty cycle >80% and • ECM power stage, no failure • Deviation throttle valve angles vs. calculated value 4.0 - 50.0%
P2106	Throttle Actuator Control System	Internal check
P2106	Throttle Actuator Control System Open circuit	Internal check
P2106	Throttle Actuator Control System temp./current monitoring	Internal check, failed
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 < 0.646 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High Input	Signal voltage > 4.794 V
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low Input	Signal voltage < 0.276 V
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.431 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage sensor 1 vs 2, > 0.143...0.703 V
P2146	Fuel Injector Group A Supply Voltage Circuit / Short to Ground	Short to ground (high side) • Signal current > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A
P2149	Fuel Injector Group B Supply Voltage Circuit / Short to ground	Short to ground (high side) • Signal current > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A
P2177	Fuel System	• System too lean at part load • Adaptive value > 26%
P2178	Fuel System	• System too rich at part load • Adaptive value < 26%
P2181	Cooling System Performance	Cooling system temp too low after a sufficient air mass flow interval 55 - 80°C
P2187	Fuel System	• System too lean at idle • Adaptive value > 5.02%
P2188	Fuel System	• System too rich at idle • Adaptive value < 6.0%
P2195	O2 Sensor Signal Biased/ Stuck Lean (Bank 1, Sensor 1)	Delta lambda of 2nd lambda control loop > 0.07
P2196	O2 Sensor Signal Biased/ Stuck Rich (Bank 1, Sensor 1)	Delta lambda of 2nd lambda control loop < 0.07
P2231	O2 Sensor Signal Circuit Shorted to Heater Circuit	Delta O2S signal front > 190 uA

DTC	Error Message	Malfunction Criteria and Threshold Value
P2237	O2 Sensor Positive Current Control Circuit/Open (Bank 1, Sensor 1)	• Lambda set value < 0.97 or • O2S signal front 1.49 - 1.51 and lambda set value > 1.03 V • O2S signal front < 1.70 V and fuel cut off > 3.00 Sec. • O2S signal front 1.49 - 1.51 V and delta lambda controller > 0.10
P2243	O2 Sensor Reference Voltage Circuit/Open (Bank 1, Sensor 1)	• O2S signal front > 3.25 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)	Signal voltage < 3.00 V
P2258	Air Pump Relay Short to B+ (PZEV)	Signal current 0.60 - 1.20 A
P2270	O2 Circuit Slow Response (Bank 1, Sensor 2)	O2S signal rear not oscillating at reference < 603...649 mV
P2279	Intake Air System Leak	• Threshold to detect a defective system > 1.45 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 • Difference between target pressure vs. actual pressure, < -1.50 mPa
P2294	Fuel Pressure Regulator 2 Control Circuit	• Signal voltage 1.40 - 3.20 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 < 1.40 - 3.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.20 V

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Signal current > 24.0 mA
P2301	Ignition Coil A Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2303	Ignition Coil B Primary Control Circuit Low	Signal current > 24.0 mA
P2304	Ignition Coil B Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2306	Ignition Coil C Primary Control Circuit Low	Signal current > 24.0 mA
P2307	Ignition Coil C Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA
P2309	Ignition Coil D Primary Control Circuit Low	Signal current > 24.0 mA
P2310	Ignition Coil D Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.4 - 5.6 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.15 to 3.25 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current > 3.0 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > 0.5 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	• High signal voltage > 12 Sec. and • Number of checks = 30 • Cumulative time of high signal voltage during pumping > 50 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P2414	O2 Sensor Exhaust Sample Error (Bank 1, Sensor 1)	• Threshold 1 - Signal voltage 3.1 - 4.81 V • Threshold 2 - Signal voltage 2.5 to 3.10 V
P2431	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)	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
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 4.81 V

DTC CHART

Engine Code CPMA

Fuel and Air Mixture, Additional Emission Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake (A) Camshaft Position Slow Response (Bank 1)	Signal change < 1.9 - 4.2°CRK/s
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) > 6.8 - 8°CRK
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1, Sensor A)	• Permissible deviation < 11° Rev or • Permissible deviation > 11° Rev
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 2.34 - 3.59 V
P0031	HO2S Heater Control Circuit Low (Bank 1, Sensor 1) Short to Ground	Heater voltage < 2.34 V
P0032	HO2S Heater Control Circuit High (Bank 1, Sensor 1) Short to B+	Heater voltage > 3.59 V
P0036	HO2S Heater Control Circuit (Bank 1, Sensor 2) Open Circuit	SULEV heater voltage 4.50 - 5.50 V
P0037	HO2S Heater Control Circuit Low (Bank 1, Sensor 2) Short to Ground	Heater voltage < 3.00 V
P0038	HO2S Heater Control Circuit High (Bank 1, Sensor 2) Short to B+	Heater current 2.70 - 5.50 A

DTC	Error Message	Malfunction Criteria and Threshold Value
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 and • RPM controller torque value ≥ calculated max. value Out of range - High • Engine speed deviation > 80 RPM and • RPM controller torque value ≤ calculated min. value Plausibility check • Integrated deviation of engine speed low and integrated deviation of engine speed high > 2000 RPM
P0068	MAP/MAF – Throttle Position Correlation	• Plausibility with fuel system load calculation < -50% • Plausibility with fuel system load calculation > 50%
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 < 0 - 396 kg/h • Mass air flow vs. upper threshold > 34 - 907 kg/h • Load calculation > 19% and • Fuel system (mult.) < -21% • Load calculation < -19% and • Fuel system (mult.) > 21 %
P0102	Mass or Volume Air Flow A Circuit Low Input	MAF sensor signal < 66 µs
P0103	Mass or Volume Air Flow A Circuit High Input	MAF sensor signal > 4500 µs
P0106	Manifold Absolute Pressure/ BARO Sensor Range/ Performance	Boost pressure signal • Altitude sensor < -210 hPa • Altitude sensor > 230 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 < 46°C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0116	Engine Coolant Temperature (Sensor 1) Circuit Range/ Performance	Stuck high •Difference in value between ECT and AAT at engine start (depending on engine off time) > 25 - 40°C and • Difference in value between IAT and AAT at engine start (depending on engine off time) < 25 - 40°C and • Difference in value between AAT and ECT at engine start (depending on engine off time) > 25 - 40°C
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance (ULEV)	• Signal in range 109.6 - 140.3°C and no change on signal < 1.5 K • Signal in range 50.3 - 88.4°C and no change on signal < 1.5 K • Signal in range 88.5 - 109.5°C and no change on signal < 1.5 K
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 < -40°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 < 0.20 V
P0123	Throttle/Pedal Position Sensor A Circuit High Input	Signal voltage > 4.81 V
P0130	O2 Sensor Circuit (Bank 1, Sensor 1)	O2S ceramic temperature < 640°C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0131	O2 Sensor Circuit (Bank 1, Sensor 1) Low Voltage	Virtual mass < 2.0 V
		Nernst voltage < 1.50 V
		Adjustment voltage < 0.30 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass > 3.25 V
		Nernst voltage > 4.40 V
		Adjustment voltage > 7 V
P0133	O2 Circuit Slow Response (Bank 1, Sensor 1)	Symmetric fault: • Lower value of both area ratios R2L and L2R < 0.30 and • Difference of R2L area ratio vs. L2R area ratio -0.400 - 0.400 Asymmetric fault: • Lower value of both area ratios R2L and L2R < 0.30 and • Difference of R2L area ratio vs. L2R area ratio NOT (-0.400 - 0.400) General: • Lower value of both counters for area ratio R2L and L2R ≥ 5 times
P0135	O2 Heater Circuit (Bank 1, Sensor 1)	• O2S ceramic temperature < 715°C and • Heater duty cycle 100% • 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 • Number of heater coupling ≥ 6 times
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

DTC	Error Message	Malfunction Criteria and Threshold Value
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)	• EWMA filtered transient time at fuel cut off > 0.7 Sec. • In voltage range 201 - 347.7 mV • Number of checks (initial phase) > 3 • Number of checks (step function) > 3
P0140	O2 Circuit No Activity Detected (Bank 1, Sensor 2)	• Signal voltage .40 - .60 mV for > 3 Sec or • Difference in sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) ≥ 2.80 V
P0141	O2 Heater Circuit (Bank 1, Sensor 2) Out of Range	Heater resistance 810 - 4560 Ω
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
P0169	Incorrect Fuel Composition	Comparison with fuel quantity incorrect
P0171	System Too Lean (Bank 1)	Lean at idle • Adaptive value > 21% Lean at part-load • Adaptive value 26% (only B8 ULEVVII)
P0172	System Too Rich (Bank 1)	Too rich at idle • Adaptive value < 5.02% (< 6.0% only B8 ULEV) Too rich at part-load • Adaptive value < 21% (< -26% only B8 ULEVVII)
P0190	Fuel Rail Pressure Sensor A Circuit	Signal voltage > 4.8 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0191	Fuel Rail Control Valve, High Pressure Side	Actual pressure > 20.6 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 • Internal logic failure
P0202	Injector Circuit/Open - Cylinder 2	• Low side signal current < 2.1 A • Internal logic failure
P0203	Injector Circuit/Open - Cylinder 3	• Low side signal current < 2.1 A • Internal logic failure
P0204	Injector Circuit/Open - Cylinder 4	• Low side signal current < 2.1 A • Internal logic failure
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 > 4.81 V
P0234	Turbocharger/Supercharger Overboost Condition Rationality Check High	Difference of set value boost pressure vs. actual boost pressure value > 200 - 1280 hPa
P0236	Turbocharger Boost Sensor A Plausability Check	Difference in boost pressure signal vs. altitude sensor signal > 220 hPa or Difference in boost pressure signal vs altitude sensor signal, <120 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

DTC	Error Message	Malfunction Criteria and Threshold Value
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
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 > 150 hPa
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 voltage 4.40 - 5.60 V
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 > 4.75 V
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance (Bank 1)	Deviation runner flap position vs. actual position > 25%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low (Bank 1)	Signal voltage < 0.25 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 current > 2.2 A
P2096	Post-Catalyst Fuel Trim System Too Lean (Bank 1)	I-portion of 2nd lambda control loop < 0.030
P2097	Post-Catalyst Fuel Trim System Too Rich (Bank 1)	I-portion of 2nd lambda control loop > 0.030
P3081	Engine Temperature Too Low	Reference model temperature - measured engine coolant temp. > 10 [K]

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 5.0 - 20.0%
P0301	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 5.0 - 20.0%
P0302	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 5.0 - 20.0%
P0303	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 5.0 - 20.0%
P0304	Crankshaft Speed Fluctuation (Single or Multiple)	• Emission threshold misfire rate (MR) > 1.7% • Catalyst damage misfire rate (MR) > 5.0 - 20.0%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0321	Ignition/Distributor Engine Speed Input Circuit Range/ Performance	• Comparison of counted teeth vs. reference = incorrec or • Monitoring reference gap failure
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	• Camshaft signal > 3 • Engine speed = no signal
P0324	Knock Control System Error	• Signal fault counter (combustion) > 24 or • Signal fault counter (measuring window) > 2.00
P0327	Knock Sensor 1 Circuit Low Input (Bank 1) Short to ground, Port B	• Lower threshold < 70 V
P0327	Knock Sensor 1 Circuit Short to ground, Port A	• Lower threshold < 70 V
P0327	Knock Sensor 1 Circuit signal range check	• Lower threshold < 70 V
P0328	Knock Sensor 1 Circuit signal range check (Bank 1)	Upper threshold > 18.0...150.0 V
P0328	Knock Sensor 1 Circuit short to B+ Port B (Bank 1)	Upper threshold >1.00 V
P0328	Knock Sensor 1 Circuit short to B+ Port A (Bank 1)	Upper threshold >1.00 V
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 • Crankshaft signals = 8
P0343	Camshaft Position Sensor A Circuit High Input (Bank 1 or Single Sensor)	• Signal voltage high and • Crankshaft signals = 8

DTC	Error Message	Malfunction Criteria and Threshold Value
P0351	Ignition Coil A Primary/ Secondary Circuit	• Signal current < -0.25 to 2.0 mA or • Internal check failed
P0352	Ignition Coil B Primary/ Secondary Circuit	• Signal current < -0.25 to 2.0 mA • Internal check failed
P0353	Ignition Coil C Primary/ Secondary Circuit	• Signal current < -0.25 to 2.0 mA or • Internal check failed
P0354	Ignition Coil D Primary/ Secondary Circuit	• Signal current < -0.25 to 2.0 mA or • Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	System Check After SAI (PZEV)	Deviation SAI pressure > 20.0 hPa
P0413	Open Circuit (PZEV)	Signal voltage 9.25 - 11.25 V
P0414	Short to Ground (PZEV)	Signal voltage < 6.00 V
P0415	Short to B+ (PZEV)	Signal current 2.20 - 4.20 A
P0418	Air Pump Relay Open Circuit (PZEV)	Signal voltage 4.50 - 5.50 V
P0420	Catalyst System Efficiency Below Threshold (Bank 1) PZEV only	• Measured OSC / OSC of borderline catalyst value for front catalyst , <0.40 or • Value for front catalyst, <1.30 and • Value for main catalyst, <1.20
P0420	Catalyst System (only bin 5, ULEV) Efficiency Below Threshold (Bank 1)	• 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

DTC	Error Message	Malfunction Criteria and Threshold Value
P0441	Evaporative Emission System Incorrect Purge Flow	Reaction of idle controller or lambda controller Deviation less than .079% lambda controller AND < 35% idle controller deviation
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.55 - 1.75 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)	< 5 - 6.5 Sec.
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 < 4 km/h
P0503	Vehicle Speed Sensor A Out of Range/High	Vehicle speed > 200 km/h

DTC	Error Message	Malfunction Criteria and Threshold Value
P0506	Idle Air Control System - RPM Lower Than Expected	• Engine speed deviation < -80 RPM and • RPM controller torque value ≥ calculated max value • Integrated deviation of engine speed low and integrated deviation of engine speed high > 2000 RPM
P0507	Idle Air Control System - RPM Higher Than Expected	• Engine speed deviation > -80 RPM and • RPM controller torque value ≤ calculated min. value
P050B	Cold Start Idle Air Control System Performance	Difference between commanded spark timing vs. actual value > 0.25%
P052A	VVT Actuator Intake	Difference between target position and actual position > 12.0°CRK
P053F	Fuel Rail Control Valve High Pressure Side	

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

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	ECM Processor	• Function monitoring: WDA general cause failure • Function monitoring: WDA internal check failure • Function monitoring: WDA overvoltage detection failure • EEPROM check failed • Internal hardware check (electrical adjustment communication, voltage supply) check
P0606	ECM: 5V Supply Voltage	Internal hardware check under-/ over-voltage detection
P0606	ECM: A/D Converter	• Power-up calibration check failed • A/D-channel conversion check failed
P0606	ECM: A/D Converter 2	• Power-up calibration check failed • A/D-channel conversion check failed
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 > 0.6 Sec. and • Reference point 2.88% Rationality check: • Time to open over reference point > 0.1 Sec or • Time to close below reference point > 0.6 Sec Signal range check at mechanical stop low • TPS 1 signal voltage ≠ 0.40 - 0.80 V or • TPS 2 signal voltage ≠ 4.20 - 4.60 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0641	Sensor Reference Voltage A Circuit/Open	Signal voltage deviation > ± 0.3 V
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage < 4.6 - 5.0 V
P0643	Sensor Reference Voltage A Circuit High	5V supply voltage > 4.99 - 5.41 V
P0651	Sensor Reference Voltage B Circuit/Open	Signal voltage deviation > ± 0.3 V
P0652	Sensor Reference Voltage B Circuit Low	Signal voltage < 4.6 - 5.0 V
P0653	Sensor Reference Voltage B Circuit High	5V supply voltage > 4.99 - 5.41 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 • Difference sense circuit voltage with camshaft actuator commanded off and on > 2.5 V • Battery voltage > 3 V
P0697	Sensor Reference Voltage C Circuit/Open	Signal voltage deviation > ± 0.3 V
P0698	Sensor Reference Voltage C Circuit Low	Signal voltage < 4.6 - 5.0 V
P0699	Sensor Reference Voltage C Circuit High	5V supply voltage > 4.99 - 5.41 V
P062B	Injection Valves Communication	Internal logic failure
U0001	High Speed CAN Communication Bus	CAN message, no feedback

DTC	Error Message	Malfunction Criteria and Threshold Value
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
U0140	CAN communication with Body Control Module	Received CAN message - no message
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
U0415	CAN: Vehicle Speed Sensor	• Speed sensor signal: initialization error 655.34km/h • Speed sensor signal: low voltage error 655.33km/h • Speed sensor signal: sensor error 655.35 km/h • Vehicle speed >/= 325 km/h

DTC	Error Message	Malfunction Criteria and Threshold Value
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

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 < 0.85
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Pressure control activity > 0.25 MPa and • Fuel trim activity < 0.85
P12A4	Fuel Rail Pump Control Valve Stuck Closed	• Pressure control activity, <6.00 mPa and • Fuel trim activity, 0.85...1.15
P13EA	Ignition Timing Monitor	Difference between commanded spark timing and actual value > 0.60%
P150A	Engine Off Time	Comparison of engine off time from instrument cluster control unit with engine after run time. • Difference between engine off time and ECM after run time < -12.0 Sec. Comparison of engine off time from instrument cluster control unit with engine after run time • Difference between engine off time and ECM after run time > 12.0 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
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	Internal check
P2106	Throttle Actuator Control System Open circuit	Internal check
P2106	Throttle Actuator Control System temp./current monitoring	Internal check, failed
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 < 0.646 V
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High Input	Signal voltage > 4.794 V
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low Input	Signal voltage < 0.276 V
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.431 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage sensor 1 vs 2, > 0.143...0.703 V
P2146	Fuel Injector Group A Supply Voltage Circuit / Short to Ground	Short to ground (high side) • Signal current > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A
P2149	Fuel Injector Group B Supply Voltage Circuit / Short to ground	Short to ground (high side) • Signal current > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A
P2177	Fuel System	• System too lean at part load • Adaptive value > 26%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2178	Fuel System	• System too rich at part load • Adaptive value < 26%
P2181	Cooling System Performance	Cooling system temp too low after a sufficient air mass flow interval 55 - 80°C
P2187	Fuel System	• System too lean at idle • Adaptive value > 5.02%
P2188	Fuel System	• System too rich at idle • Adaptive value < 6.0%
P2195	O2 Sensor Signal Biased/ Stuck Lean (Bank 1, Sensor 1)	Delta lambda of 2nd lambda control loop > 0.07
P2196	O2 Sensor Signal Biased/ Stuck Rich (Bank 1, Sensor 1)	Delta lambda of 2nd lambda control loop < 0.07
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 • O2S signal front 1.49 - 1.51 and lambda set value > 1.03 V • O2S signal front < 1.70 V and fuel cut off > 3.00 Sec. • O2S signal front 1.49 - 1.51 V and delta lambda controller > 0.10
P2243	O2 Sensor Reference Voltage Circuit/Open (Bank 1, Sensor 1)	• O2S signal front > 3.25 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)	Signal voltage < 3.00 V
P2258	Air Pump Relay Short to B+ (PZEV)	Signal current 0.60 - 1.20 A
P2270	O2 Circuit Slow Response (Bank 1, Sensor 2)	O2S signal rear not oscillating at reference < 603...649 mV
P2271	O2 Sensor Signal Stuck Rich (Bank 1, Sensor 2)	O2S signal rear > 0.603 - 0.649 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2279	Intake Air System Leak	• Threshold to detect a defective system > 1.45 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 • Difference between target pressure vs. actual pressure, < -1.50 mPa
P2294	Fuel Pressure Regulator 2 Control Circuit	• Signal voltage 1.40 - 3.20 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 < 1.40 - 3.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.20 V

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Signal current > 24.0 mA
P2301	Ignition Coil A Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2303	Ignition Coil B Primary Control Circuit Low	Signal current > 24.0 mA
P2304	Ignition Coil B Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2306	Ignition Coil C Primary Control Circuit Low	Signal current > 24.0 mA
P2307	Ignition Coil C Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA

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

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.4 - 5.6 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.15 to 3.25 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current > 3.0 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > 0.5 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	• High signal voltage > 12 Sec. and • Number of checks = 30 • Cumulative time of high signal voltage during pumping > 50 Sec.
P2414	O2 Sensor Exhaust Sample Error (Bank 1, Sensor 1)	• Threshold 1 - Signal voltage 3.1 - 4.81 V • Threshold 2 - Signal voltage 2.5 to 3.10 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
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 4.81 V

Transmission

DTC	Error Message	Malfunction Criteria and Threshold Value
P2637	Torque management Feedback Signal ”A”	CAN message signal error flag, = 1
P2714	Pressure Control Solenoid ”D” Performance or Stuck off	Signal voltage > 3.20 V
P2715	Pressure Control Solenoid ”D” Stuck On	PWM hardware detection, 0 or 100%
P2716	Pressure Control Solenoid ”D” Electrical	• Current higher or lower than threshold, <730 mA • EDS output voltage at short to ground or open circuit ~ 0,5 V smaller than EDS supply voltage • Static leakage current flow
P2723	Pressure Control Solenoid ”E” Performance or Stuck off	PWM hardware detection, 0 or 100%
P2725	Pressure Control Solenoid “E” Electrical	• Current higher or lower than threshold, <730 mA • EDS output voltage at short to ground or open circuit ~ 0,5 V smaller than EDS supply voltage • Static leakage current flow
P2732	Pressure Control Solenoid ”F” Performance or Stuck off	PWM hardware detection, 0 or 100%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2733	Pressure Control Solenoid ”F” Stuck On	PWM hardware detection, 0 or 100%
P2734	Pressure Control Solenoid “F” Electrical	• EDS output voltage at short to ground or open circuit ~ 0,5 V smaller than EDS supply voltage • Static leakage current flow
P2735	Pressure Control Solenoid “F” Intermittent	PWM hardware detection, 0 or 100%

DTC CHART

Engine Code CGXC

Fuel and Air Mixture, Additional Emission Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake Camshaft Position Slow Response (Bank 1)	• Difference between target position vs. actual position > 8.00 - 63.75 °CRK • For time > 1.5 - 3.0 s and • Adjustment angle >=3.00 °CRK
P000B	Exhaust Camshaft Position slow response (Bank 1)	• Difference between target position vs. actual position > 8.00 - 63.75 °CRK • For time > 1.5 - 3.0 s and • Adjustment angle >=3.00 °CRK
P000C	Intake Camshaft Position slow response (Bank 2)	• Difference between target position vs. actual position > 8.00 - 63.75 °CRK • For time > 1.5 - 3.0 s and • Adjustment angle >=3.00 °CRK
P000D	Exhaust Camshaft Position slow response (Bank 2)	• Difference between target position vs. actual position > 8.00 - 63.75 °CRK • For time > 1.5 - 3.0 s and • Adjustment angle >=3.00 °CRK
P0010	Intake (A) Camshaft Position Target Error Bank 1	Signal voltage, signal voltage 4.70...5.40 V
P0011	Intake (A) Camshaft Position Target Error Bank 1	• Difference between target position vs. actual position > 8.00 - 63.75 °CRK • For time > 1.5 - 3.0 s and • Adjustment angle >=3.00 °CRK

DTC	Error Message	Malfunction Criteria and Threshold Value
P0013	Exhaust (A) Camshaft Position Response check (Bank 1 Bank 2)	Signal voltage 4.70...5.40 V
P0014	Exhaust (A) Camshaft Position Target error (Bank 1)	• Difference between target position vs. actual position > 8.00 - 63.75 °CRK • For time > 1.5 - 3.0 s and • Adjustment angle >=3.00 °CRK
P0016	Crankshaft Position - Camshaft Position Correlation Intake (Bank 1 Bank 2)	• Permissible deviation < -11° Rev and • Engine speed no signal
P0017	Crankshaft Position - Camshaft Position Correlation Exhaust Bank 1 Bank 2	• Permissible deviation < -11.01° CRK or • Permissible deviation > 11.01° CRK
P0018	Crankshaft Position - Camshaft Position Correlation Intake (Bank 1 Bank 2)	• Per missible deviation < -11.01° CRK and • Engine speed no signal
P0019	Crankshaft Position - Camshaft Position Correlation Exhaust (Bank 1 Bank 2)	• Permissible deviation < -11.01° CRK or • Permissible deviation > 11.01° CRK
P0020	Intake (A) Camshaft Position Actuator Circuit / Open (Bank 1)	Signal voltage, signal voltage 4.70...5.40 V
P0021	Intake (A) Camshaft Position target Error (Bank 2)	• Difference between target position vs. actual position > 8.00 - 63.75 °CRK • For time > 1.5 - 3.0 s and • Adjustment angle < 3.00 °CRK
P0023	Exhaust (A) Camshaft Position Response check (Bank 1 Bank 2)	Signal voltage 4.70...5.40 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0024	Exhaust (A) Camshaft Position Target Error (Bank 2)	• Difference between target position vs. actual position > 8.00 - 63.75 °CRK • For time > 1.5 - 3.0 s and • Adjustment angle < 3.00 °CRK
P0030	HO2S Heater Control Circuit (Bank 1, Sensor 1) Open Circuit	Signal voltage > 4.70 - 5.40 V
P0031	HO2S Heater Control Circuit Low (Bank 1, Sensor 1) Short to Ground	Signal voltage < 0.0 - 3.26 V
P0032	HO2S Heater Control Circuit High (Bank 1, Sensor 1) Short to B+	Heater current > 5.50 V
P0036	HO2S Heater Control Circuit (Bank 1, Sensor 2) Open Circuit	Signal voltage 2.34 .. 3.59 V
P0037	HO2S Heater Control Circuit Low (Bank 1, Sensor 2) Short to Ground	Signal voltage < 2.34 V
P0038	HO2S Heater Control Circuit High (Bank 1, Sensor 2) Short to B+	Signal current > 3.59 A
P0040	Oxygen Sensors front	Lambda controllers exceed thresholds in opposite directions • Case 1: lambda control value bank 1 < 0.80 and • Lambda control value bank 2 > 1.20 • Case 2: lambda control value bank 1 > 1.20 and • Lambda control value bank 2 < 0.80
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

DTC	Error Message	Malfunction Criteria and Threshold Value
P0050	HO2S Heater Control Circuit (Bank 1, Sensor 1) Open circuit	Signal voltage > 4.70 ... 5.40 V
P0051	HO2S Heater Control Circuit Low (Bank 1, Sensor 1) Short to ground	Signal voltage 0.0...3.26 V
P0052	HO2S Heater Control Circuit High (Bank 1, Sensor 1) Short to B+	Heater current > 5.50 A
P0056	HO2S Heater Control Circuit (Bank 1, Sensor 2) open circuit	Signal voltage 2.34 .. 3.59 V
P0057	HO2S Heater Control Circuit Low (Bank 1, Sensor 2) short to ground	Heater voltage < 2.34 V
P0058	HO2S Heater Control Circuit High (Bank 1, Sensor 2) Short to B+	Signal current > 3.59 A
P0068	MAP/MAF – Throttle Position Correlation	Deviation throttle controller < 43 or > 43%
P0070	Ambient air temp sensor short to B+	Ambient air temp < 50.0 °C
P0071	Rationality check	• Difference ECT vs. IAT at engine start < 24.8...39.8 K and • Difference IAT vs. AAT at engine start > 24.8...39.8 K and • Difference AAT vs. ECT at engine start > 24.8...39.8 K (depending on engine off time)
P0072	Ambient air temp sensor short to ground	• Ambient air temp > 87.0 °C
P007C	Intake Air Temperature Sensor after intercooler 1	• IAT < 0.099 V
P007D	Intake Air Temperature Sensor after intercooler 1	IAT > 3.20 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0087	Fuel Rail/System Pressure - Too Low	• Pressure control activity > 1.0 mPa • Fuel trim activity 0.90 - 2.0 and • Difference between target pressure vs. actual pressure > 0.40 mPa
P0088	Fuel Rail/System Pressure - Too High	Fuel rail pressure > 13.9 MPa
P0089	Fuel Pressure Regulator 1 Performance	• Difference between actual pressure - target pressure > 200 kPa • Pressure control activity <-350 kPa or >350 kPa
P008A	Fuel Pressure out of range low	< 80.0 kPa
P008B	Fuel Pressure out of range high	Actual press > 850 MPa
P0096	Charge Air Cooler Temp. Sensor 1 > Cross Checking	Difference Charge air cooler temp. sensor 1 vs. median between (ECT, IAT, Charge air cooler temp. sensor 1, Charge air cooler temp. sensor 2) > 9.8 K
P0097	Charge Air Cooler Temp. Sensor 1 Short to Ground	Signal Voltage < 0.10 V
P0098	Charge Air Cooler Temp. Sensor 1 Short to Battery Voltage / Open Circuit	Signal Voltage > 4.62 V
P00A6	Charge Air Cooler Temp. Sensor 2 Cross Checking	Difference Charge air cooler temp. sensor 2 vs. median between (ECT, IAT, Charge air cooler temp. sensor 2 , Charge air cooler temp. sensor 1) > 9.8 K
P00A7	Charge Air Cooler Temp. Sensor 2 Short to Ground	Signal Voltage < 0.10 V
P00A8	Charge Air Cooler Temp. Sensor 2 Short to Battery Voltage / Open Circuit	Signal Voltage > 4.62 V
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 < 11 - 192% • Mass air flow vs. upper threshold > 120 - 168% • Load calculation > 20% and • Fuel system (mult.) < 15% • Mass air flow vs. calculated mass air flow < 20%
P0102	Mass or Volume Air Flow A Circuit Low Input	MAF sensor signal < 0.2 V
P0103	Mass or Volume Air Flow A Circuit High Input	MAF sensor signal > 4.8 V
P0106	Manifold Pressure Sensor Range/Performance	Boost pressure signal • Manifold pressure signal: variation between state 1 and 2 < 50.00 [hPa]
P0107	Manifold Pressure Sensor	• Signal voltage < 0.20 V Range check: • Manifold pressure signal < 80.00 hPa
P0108	Manifold Pressure Sensor	• Signal voltage > 4.80 V Range check: • Manifold pressure signal > 1170.00 hPa
P0111	Intake Air Temperature (Sensor 1) Cross Check	• Difference IAT vs. ECT at engine start > 24.8...39.8 K • (depending on engine off time) and difference IAT vs. AAT at engine start > 24.8...39.8 K
P0112	Intake Air Temperature (Sensor 1) Circuit Low Input	Signal voltage < 0.15 V
P0113	Intake Air Temperature Sensor 1 Circuit High Input	Signal voltage > 4.50 V
P0116	Engine Coolant Temperature (Sensor 1) Circuit Range/ Performance	• Difference ECT vs. IAT at engine start > 24.8...39.8 K and • Difference IAT vs. AAT at engine start < 24.8...39.8 K and • Difference AAT vs. ECT at engine start < 24.8...39.8 K (depending on engine off time)

DTC	Error Message	Malfunction Criteria and Threshold Value
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 < -40°C
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	• TPS 1 - TPS 2 > 6.30% and • | TPS 1 - calc. value | > 9.0%
P0122	Throttle/Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.18 V
P0123	Throttle/Pedal Position Sensor A Circuit High Input	Signal voltage > 4.63 V
P012B	Charger inlet pressure rationality check	• Press difference in cross check between boost press. sensor 1/2; IM press., ambient press sensor • Press difference in cross check between boost press. sensor 1/2; IM press.
P012C	Charger inlet pressure short to ground	Signal voltage < 0.2 V
P012D	Charger inlet pressure short to B+	Signal voltage > 4.8 V
P0130	O2 Sensor Circuit (Bank 1, Sensor 1)	Sensor element temperature < 690 °C
P0131	O2 Sensor Circuit, Bank 1 Bank 2 Low Voltage	Virtual mass (VM) voltage < 1.75 V
		Nernst voltage (UN) < 1.50 V
		Adjustment voltage (IP) < 0.30 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass (VM) > 3.25 V
		Nernst voltage (UN) > 4.40 V
		Adjustment voltage (IP) > 7 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0133	O2 Circuit Slow Response (Bank 1, Sensor 1)	Symmetric fault: • Difference of R2L area ratio vs. L2R area ratio -0.50...1.00 • Lower value of both counters for area ratio R2L and L2R >= 5 times Delay Time: • Gradient ratio >= 0.30 • Lower value of both area ratios R2L and L2R < 0.30 Transient Time: • Gradient ratio >= 0.30 • Gradient ratio <= 0.60 • Lower value of both counters for area ratio R2L and L2R < 0.30 or • Lower value of both gradient ratios R2L and L2R < 0.30 Asymmetric Fault: • Difference of R2L area ratio vs. L2R area ratio NOT (-0.50...1.00) • Values of both counters for area ratio R2L and L2R >= 5 times Delay Time: • Gradient ratio >= 0.30 • Lower value of both area ratios R2L and L2R < 0.30 Transient Time: • Gradient ratio >= 0.30 • Gradient ratio <= 0.60 • Lower value of both area ratios R2L and L2R < 0.30 or • Lower value of both gradient ratios R2L and L2R < 0.30

DTC	Error Message	Malfunction Criteria and Threshold Value
P0135	O2 Heater Circuit (Bank 1, Sensor 1)	Out of range high • O2S ceramic temperature < 725°C and • Heater duty cycle 90.00% Rationality check (sensor heating up) • O2S ceramic temperature < 725° C and • Time after O2S heater on 40 Sec.
P0136	O2 Circuit (Bank 1, Sensor 2)	• Delta O2S signal rear > 2.00 V
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 > 1.08 V for time > 5 Sec.
P0139	O2 Circuit Slow Response (Bank 1 Sensor 2)	• O2S rear signal 640 .. 645 mV.
P013A	Oxygen Sensors rear (binary LSF)	• EWMA filtered max differential transient time at fuel cut off >= 0.5 Sec and • Number of checks >= 3.00 (initial phase and step function)
P013C	Oxygen Sensors rear (binary LSF)	• EWMA filtered max differential transient time at fuel cut off >= 0.5 Sec and • Number of checks >= 3.00 (initial phase and step function)

DTC	Error Message	Malfunction Criteria and Threshold Value
P0140	O2 Circuit No Activity Detected (Bank 1, Sensor 2)	• Signal voltage .40 - .60 mV for time > 3 Sec and • Difference in sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) ≥ 2.80 V
P0140	O2S signal check - circuit continuity (sensor ground line open circuit)	• Internal resistance > 80,000Ω and • Exhaust temperature > 700° C
P0141	O2 Heater Circuit (Bank 1, Sensor 2) Out of Range	Heater resistance 500 - 10000 Ω
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
P0150	O2 Sensor Circuit (Bank 1, Sensor 1)	Sensor element temperature < 690° C
P0151	O2 Sensor Circuit, (Bank 1 Bank 2) Low Voltage	• Virtual mass (VM) voltage < 1.75 V • Nernst voltage (UN) < 1.50 V • Adjustment voltage (IP) < 3.0 V
P0152	O2 Sensor Circuit, (Bank 1 Bank 2) High Voltage	• Virtual mass (VM) voltage < 3.25 V • Nernst voltage (UN) < 4.40 V • Adjustment voltage (IP) < 7.0 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0153	O2 Circuit Slow Response (Sensor 1, Bank 2)	Symmetric fault: • Difference of R2L area ratio vs. L2R area ratio -0.50...1.00 • Lower value of both counters for area ratio R2L and L2R >= 5 times Delay Time: • Gradient ratio >= 0.30 • Lower value of both area ratios R2L and L2R < 0.30 Transient Time: • Gradient ratio >= 0.30 • Gradient ratio <= 0.60 • Lower value of both counters for area ratio R2L and L2R < 0.30 or • Lower value of both gradient ratios R2L and L2R < 0.30 Asymmetric Fault: • Difference of R2L area ratio vs. L2R area ratio NOT (-0.50...1.00) • Values of both counters for area ratio R2L and L2R >= 5 times Delay Time: • Gradient ratio >= 0.30 • Lower value of both area ratios R2L and L2R < 0.30 Transient Time: • Gradient ratio >= 0.30 • Gradient ratio <= 0.60 • Lower value of both area ratios R2L and L2R < 0.30 or • Lower value of both gradient ratios R2L and L2R < 0.30

DTC	Error Message	Malfunction Criteria and Threshold Value
P0155	O2 Heater Circuit (Bank 1, Sensor 1	Out of range high • O2S ceramic temp. < 725° C • and heater duty cycle > 90.00% Rationality check (sensor heating up) • O2S ceramic temp. < 725° C • and time after O2S heater on 40.0 Sec
P0156	O2 Circuit (Bank 1, Sensor 2)	Delta O2S signal rear > 2 V
P0157	O2 Circuit Low Voltage (Bank 1, Sensor 2)	• Signal voltage < 0.06 V • For time > 3.0 Sec and • Difference of sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) < 0.01 V
P0158	O2 Circuit High Voltage (Bank 1, Sensor 2)	• Signal voltage > 1.08 V • For time > 5.0 Sec
P0159	O2 Circuit Slow Response (Bank 1, Sensor 2)	O2S rear signal 640 .. 645 mV
P0160	O2 Circuit No Activity Detected (Bank 1, Sensor 2)	• Signal voltage 0.40...0.60 V • For time > 3.0 Sec and • Difference of sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) >= 2.80 V
P0160	O2S signal check - circuit continuity (sensor ground line open circuit)	• Internal resistance > 80,000Ω and • Exhaust temperature > 700° C
P0161	O2 Heater Circuit (Bank 1, Sensor 2) out of range	Heater resistance > 500...10000 Ω
P0169	Function monitoring: injection time	Comparison with fuel quantity incorrect
P0171	Fuel System Too Lean, Additive (Bank 1, Bank 2)	Adaptive value > 5.30%
P0171	Fuel System Too Lean, Multiplicative (Bank 1, Bank 2)	Too rich at idle Adaptive value > 25%
P0172	System Too Rich-Additive (Bank 1, Bank 2)	Adaptive value <-5.30%
P0172	System Too Rich-Multiplicative (Bank 1, Bank 2)	Adaptive value <- 20%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0174	Fuel System Too Lean, Additive (Bank 1, Bank 2)	Adaptive value > 5.30%
P0174	Fuel System Too Lean, Multiplicative (Bank 1, Bank 2)	System too lean adaptive value > 20
P0175	System Too Rich-Additive (Bank 1, Bank 2)	Adaptive value <-5.30%
P0175	System Too Rich-Multiplicative (Bank 1, Bank 2)	Too rich at idle Adaptive value < 20%
P017B	Cylinder Head Temperature Sensor	• Difference between modelled and measured cylinder head temperature > 9.8 K • Difference CHDT (Cylinder Head Temperature) vs. ECT at engine start >= 24.8...39.8 K or • Difference CHDT (Cylinder Head Temperature) vs. IAT at engine start >= 24.8...39.8 K • Difference CHDT (Cylinder Head Temperature) vs. ECT at engine start <= -(24.8...39.8) K or • Difference CHDT (Cylinder Head Temperature) vs. IAT at engine start <= -(24.8...39.8) K • Difference CHDT (Cylinder Head Temperature) vs. ECT at engine start <= -(24.8...39.8) K or • Difference CHDT (Cylinder Head Temperature) vs. IAT at engine start <=-(24.8...39.8) K
P017C	Cylinder Head Temperature Sensor	Signal voltage < 0.11 V
P017D	Cylinder Head Temperature Sensor	Signal voltage > 3.10 V
P0190	Fuel Rail Pressure Sensor A Circuit	Signal voltage > 4.8 V
P0191	Fuel Rail Control Valve, High Pressure Side	Actual pressure > 10 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0192	Fuel Rail Pressure Sensor A Circuit Low Input	Signal voltage < 0.20 V
P0201	Injector Circuit/Open - Cylinder 1	Signal voltage < 2.10 A
P0202	Injector Circuit/Open - Cylinder 2	Signal voltage < 2.10 A
P0203	Injector Circuit/Open - Cylinder 3	Signal voltage < 2.10 A
P0204	Injector Circuit/Open - Cylinder 4	Signal voltage < 2.10 A
P0205	Injector Circuit/Open - Cylinder 5	Signal voltage < 2.10 A
P0206	Injector Circuit/Open - Cylinder 46	Signal voltage < 2.10 A
P0221	Throttle/Pedal Position Sensor/Switch B Circuit Range/Performance	• TPS 1 - TPS 2 > 6.30% or • |TPS2 - calc.value| > 9.00%
P0222	Throttle/Pedal Position Sensor/Switch B Circuit Low Input	Signal voltage < 0.16 V
P0223	Throttle/Pedal Position Sensor/Switch B Circuit High Input	Signal voltage > 4.88 V
P0234	Turbocharger/Supercharger Overboost Condition Rationality Check High	Difference of set value boost pressure vs. actual boost pressure value > 200 - 1275 hPa
P0235	Boost pressure control	Boost pressure sensor signal vs target value • > 27....50 kPa, depending on altitude
P0236	Turbocharger/Supercharger Boost Sensor 1 Plausibility check.	Pressure difference in cross check between boost pressure sensor 1/2; IM pressurel > 7 kPa or Pressure difference in cross check between . boost pressure sensor 1/2 and IM > 12...27 kPa
P0237	Turbocharger/Supercharger Boost Sensor 1 Circuit Low	Signal voltage < 0.2 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0238	Turbocharger/Supercharger Boost Sensor A Circuit High	Signal voltage > 4.8 V
P0240	Turbocharger/Supercharger Boost Sensor 2 rationality check	• Pressure difference in cross check between boost pressure sensor 1/2; IM pressure, ambient pressure > 7 kPa • Pressure difference in cross check between boost pressure sensor 1/2; IM pressure > 12...27 kPa • Pressure difference in cross check between pressure sensor 1 and 2 > 12.51 kPa AND fuel trim activity (bank with deviation is considered to be defective > 151%
P0241	Turbocharger/Supercharger Boost Sensor 2 short to ground	Signal voltage < 0.2 V
P0242	Turbocharger/Supercharger Boost Sensor 2 short to Battery Voltage	Signal voltage > 4.8 V
P0243	Turbocharger Wastegate Solenoid A	Signal voltage > 4.40 - 5.60 V
P0245	Turbocharger Wastegate Solenoid A Low	Signal voltage < 2.15 - 3.25 V
P0246	Turbocharger Wastegate Solenoid A High	Signal current > 2.20 A
P025A	Fuel Pump Open circuit	Signal current < 0.8 mA
P025C	Fuel Pump Short to ground	Signal voltage< 2.0 V
P025D	Fuel Pump Short to B+	Signal current > 1.0 A
P0261	Cylinder 1 Injector Circuit short to ground	Signal current < 2.10 A
P0262	Cylinder 1 Injector Circuit short to B+	Signal current > 14.70 A
P0264	Cylinder 2 Injector Circuit short to ground	Signal current < 2.10 A
P0265	Cylinder 2 Injector Circuit short to B+	Signal current > 14.70 A
P0267	Cylinder 3 Injector Circuit short to ground	Signal current < 2.10 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0268	Cylinder 3 Injector Circuit short to B+	Signal current > 14.70 A
P0270	Cylinder 4 Injector Circuit short to ground	Low side signal current < 2.10 A
P0271	Cylinder 4 Injector Circuit short to B+	Signal current > 14.70 A
P0273	Cylinder 5 Injector Circuit short to ground	Signal current < 2.10 A
P0274	Cylinder 5 Injector Circuit short to B+	Signal current > 14.70 A
P0276	Cylinder 6 Injector Circuit short to ground	Signal current < 2.10 A
P0277	Cylinder 6 Injector Circuit short to B+	Signal current > 14.70 A
P0299	Turbocharger/Supercharger Underboost Rationality Check Low	Difference of set boost pressure vs. actual boost pressure value > 150 hPa
P200A	Intake Manifold Runner Control out of range	Signal voltage < 0.7 V
P200B	Intake Manifold Runner Control overtravel	Signal voltage < 0.7 V
P2004	Intake Manifold Runner Control Stuck Open (Bank 1)	• Difference between target position vs. actual position > 30%
P2005	Intake Manifold Runner Control Stuck Closed Bank 2	Difference between target position vs. actual position > 30%
P2006	Intake Manifold Runner Control Circuit/Shorted Bank 1	Difference between target position vs. actual position > 30%
P2007	Intake Manifold Runner Control Stuck Open Bank 2	Deviation runner flaps position > 30 vs. calculated position > 30%
P2008	Intake Manifold Runner Control Circuit/Open (Bank 1)	Signal voltage 4.70 - 5.40 V
P2009	Intake Manifold Runner Control Circuit/Shorted Bank 1	Signal voltage 0.0 - 3.26 V
P2010	Intake Manifold Runner Control Circuit Shorted to B+ (Bank 1)	Signal current > 2.20 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P2014	Intake Manifold Runner Position Sensor/Switch Circuit (Bank 1) Short to ground	Signal voltage < 2.20 V
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance (Bank 1)	Deviation runner flap position vs. actual position > 25%
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low (Bank 1)	Signal voltage < 0.25 V
P2017	Intake Manifold Runner Position Sensor/Switch Circuit Bank 1 Short to B+	Signal voltage, > 4.80 V
P2019	Intake Manifold Runner Position Sensor/Switch Circuit Bank 1 Open circuit	Signal voltage, < 0.20 V
P2022	Intake Manifold Runner Position Sensor/Switch Circuit Bank 1 Short to B+	Signal voltage, > 4.80 V
P2024	Evaporative Emissions (EVAP) Fuel Vapor Temperature / Pressure Sensor Circui	Signal voltage 4.70 - 5.40 V
P2025	Evaporative Emissions (EVAP) Fuel Vapor Temperature / Pressure Sensor Performance	• Response time > 1000 ms • Number of checks > 3.00 • Security bit = incorrect • Number of checks > 3.00 [-] • Time difference between ECM and Smart Module > 3.0 • Smart Module Temp High > 119 °C • Smart Module Temp Low < -39 °C
P2026	Evaporative Emissions (EVAP) Fuel Vapor Temperature / Pressure Sensor short to ground	Signal voltage 0.0 - 3.25 V
P2027	Evaporative Emissions (EVAP) Fuel Vapor Temperature / Pressure Sensor short to battery Voltage	Signal current > 2.20 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P2088	Camshaft Position A Actuator Control Circuit Low (Bank 1) Short to Ground	Signal voltage < 0.0 - 3.25 V
P2089	Camshaft Position A Actuator Control Circuit High (Bank 1) Short to B+	Signal current > 2.2 A
P2090	A Camshaft Position Actuator Control Circuit Low Bank 1 short to ground	Signal voltage 0.0...3.25 V
P2091	VVT actuator exhaust Bank 1 Bank 2	Short to battery plus signal current > 2.20 A
P2092	A Camshaft Position Actuator Control Circuit Low Bank 1 short to ground	Signal voltage 0.0...3.25
P2093	A Camshaft Position Actuator Control Circuit High Bank 1 short to B+	Signal current, > 2.20 A
P2094	A Camshaft Position Actuator Control Circuit Low Bank 1 short to ground	Signal voltage 0.0...3.25 V
P2095	VVT actuator exhaust Bank 1 Bank 2	Short to battery plus signal current > 2.20 A
P2096	Post Catalyst Fuel Trim System out of range high (Bank 1 Bank 2)	Out of range I-portion of 2nd lambda control loop < -0.030
P2097	Post Catalyst Fuel Trim System out of range low (Bank 1 Bank 2)	I-portion of 2nd lambda control loop > 0.030
P2098	Post Catalyst Fuel Trim System out of range high (Bank 1 Bank 2)	Out of range I-portion of 2nd lambda control loop < -0.030
P2099	Post Catalyst Fuel Trim System out of range low (Bank 1 Bank 2)	I-portion of 2nd lambda control loop > 0.030
P3081	Engine Temperature Too Low	Reference model temperature - measured engine coolant temp. > 9.8 K

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random Misfire Detected	• Emission threshold misfire rate (MR) > 2.5% • Catalyst damage misfire rate (MR) > 2.5 - 24%
P0301	Cylinder 1 Misfire Detected	• Emission threshold misfire rate (MR) > 2.5% • Catalyst damage misfire rate (MR) > 2.5 - 24%
P0302	Cylinder 2 Misfire Detected	• Emission threshold misfire rate (MR) > 2.5% • Catalyst damage misfire rate (MR) >2.5 - 24%
P0303	Cylinder 3 Misfire Detected	• Emission threshold misfire rate (MR) > 2.5% • Catalyst damage misfire rate (MR) >2.5 - 24%
P0304	Cylinder 4 Misfire Detected	• Emission threshold misfire rate (MR) > 2.5% • Catalyst damage misfire rate (MR) >2.5 - 24%
P0305	Cylinder 5 Misfire Detected	• Emission threshold misfire rate (MR) > 2.5% • Catalyst damage misfire rate (MR) >2.5 - 24%
P0306	Cylinder 6 Misfire Detected	• Emission threshold misfire rate (MR) > 2.5% • Catalyst damage misfire rate (MR) >2.5 - 24%
P0321	Ignition/Distributor Engine Speed Input Circuit Range/ Performance	• Counted teeth vs. reference incorrect or • Monitoring reference gap failure
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	• Camshaft signal > 3.00 • Engine speed no signal
P0324	Knock Control System Error	• Signal fault counter (combustion) > 24 or • Signal fault counter (measuring window) > 2.00 • Communication errors • SPI communication > 25

DTC	Error Message	Malfunction Criteria and Threshold Value
P0326	Knock Control System	• Lower threshold < 0.029 V • Upper threshold > 1.992 V
P0327	Knock Sensor 1 Circuit Low Input (Bank 1) Short to ground	• Lower threshold < 0.18 V
P0328	Knock Sensor 1 Circuit signal range check (Bank 1)	Upper threshold > 18.0...150.0 V
P0331	Knock Control System	• Lower threshold < 0.029 V • Upper threshold > 1.992 V
P0332	Knock Sensor 1 Circuit Low Input (Bank 1) Short to ground	Lower threshold 0.18 V
P0333	Knock Sensor 1 Circuit short to B+	Upper threshold >1.00 V
P0335	Engine speed sensor	• Open circuit > 1 V • Short to grnd < 1.5 V • Short to B+ > 3.5 V • Signal check no signal
P0336	Engine speed sensor	• RPM signal comparison with phase sensor not synchronous • Counted versus reference teeth > 1 • Actual time value vs modeled time value > 1.375
P0340	Camshaft Position Sensor A Circuit (Bank 1 or Single Sensor)	Signal activity check • Signal voltage no altering @ 4 Rev
P0341	Camshaft Position Sensor A Circuit Range/Performance (Bank 1 or Single Sensor)	• Signal pattern incorrect • Defect counter 6.00
P0342	Camshaft Position Sensor A Circuit Low Input (Bank 1 or Single Sensor)	• Signal voltage permanently low and • Crankshaft signals = 8
P0343	Camshaft Position Sensor A Circuit High Input (Bank 1 or Single Sensor)	• Signal voltage high and • Crankshaft signals 4.00
P0345	Camshaft Position Sensor A Circuit (Bank 1 or single sensor)	Signal activity check • Signal voltage no altering @ 4 Rev
P0346	Camshaft Position Sensor A Circuit Range/Performance (Bank 2 or single sensor)	• Signal pattern incorrect • Defect counter 6.00

DTC	Error Message	Malfunction Criteria and Threshold Value
P0347	Camshaft Position Sensor A Circuit Low (Bank 2 or single sensor)	• Signal voltage permanently low and • Crankshaft signals 4.00
P0348	Camshaft Position Sensor A Circuit High (Bank 2 or single sensor)	• Signal voltage permanently low and • Crankshaft signals 4.00
P0351	Ignition Coil A Primary/ Secondary Circuit	Open circuit • Signal current < -0.25 to 2.0 mA or • Internal check failed
P0352	Ignition Coil B Primary/ Secondary Circuit	Open circuit • Signal current < -0.25 to 2.0 mA • Internal check failed
P0353	Ignition Coil C Primary/ Secondary Circuit	Open circuit • Signal current < -0.25 to 2.0 mA or • Internal check failed
P0354	Ignition Coil D Primary/ Secondary Circuit	Open circuit • Signal current < -0.25 to 2.0 mA or • Internal check failed
P0355	Ignition Coil E Primary/ Secondary Circuit	Open circuit • Signal current < -0.25 to 2.0 mA or • Internal check failed
P0356	Ignition Coil F Primary/ Secondary Circuit	Open circuit • Signal current < -0.25 to 2.0 mA or • Internal check failed
P0366	Camshaft Position Sensor A Circuit Range/Performance (Bank 1 or single sensor)	• Signal pattern incorrect • Defect counter 6
P0367	Camshaft Position Sensor A Circuit Low (Bank 1 or single sensor)	• Signal voltage permanently low and • Crankshaft signals 4.00

DTC	Error Message	Malfunction Criteria and Threshold Value
P0368	Camshaft Position Sensor A Circuit High (Bank 1 or single sensor)	• Signal voltagepermanently high and • Crankshaft signals 4.00
P0391	Camshaft Position Sensor A Circuit Range/Performance (Bank 2 or single sensor)	• Signal pattern incorrect • Defect counter 6
P0392	Camshaft Position Sensor A Circuit Low (Bank 2 or single sensor)	• Signal voltage permanently low and • Crankshaft signals 4.00
P0393	Camshaft Position Sensor A Circuit High (Bank 2 or single sensor)	• Signal voltage permanently high and • crankshaft signals 4.00

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	Rationality check directly after catalyst heating	Difference ambient pressure vs. AIR pressure measured with AIR pressure sensor > 3.00 kPa
P0413	Open Circuit	Signal voltage 4.70 - 5.40 V
P0414	Short to battery plus	Signal current > 2.20 A
P0414	Short to ground	Signal voltage 0.0 - 3.25 V
P0415	Short to B+	Signal current 2.20 - 4.20 A
P0416	Open Circuit	Signal voltage 4.70 - 5.40 V
P0417	Air valve short to ground	Signal voltage 0.0...3.25 V
P0417	Short to battery plus	Signal current > 2.20 A
P0418	Air Pump Relay Open Circuit	Signal voltage 4.7 - 5.4 V
P0420	Catalyst System Efficiency Below Threshold	Measured OSC / OSC of borderline catalyst. EWMA filter value for catalyst < 1.0
P0421	Catalyst Bank 1	EWMA filter value for catalyst < 0.2
P0430	Catalyst System Bank 2	Amplitude ratio O2S > 1.5
P0431	Catalyst Bank 2	EWMA filter value for catalyst < 0.2

DTC	Error Message	Malfunction Criteria and Threshold Value
P0441	Evaporative Emission System functional check Valve Stuck (Purge Flow)	Deviation lambda control < 2.50% and • Deviation idle control < 20%
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.7-2.2 Sec.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage > 4.70 - 5.40 V
P0445	Evaporative Emission System Purge Control Valve short to ground	Signal voltage < 2.0 V
P0445	Evaporative Emission System Purge Control Valve short to battery plus	Signal current >1.0 A
P0450	NVLD switch	Open Circuit signal voltage 0.39 - 0.55 V
P0451	NVLD switch	Natural vacuum leak detection (NVLD) switch position stuck closed
P0452	NVLD switch	Short to ground signal voltage < 0.24 V
P0453	NVLD switch	Short to Battery Voltage signal voltage > 3.0 V
P0455	Evaporative Emission System Leak Detected (Gross Leak/ No Flow)	Time for pressure drop < 0.95- 1.1 Sec.
P0456	Evaporative Emission System Leak Detected (Very Small Leak)	• Natural vacuum leak detection (NVLD) switch position • Switch Open
P0458	Evaporative Emission System Purge Control Valve Circuit Low or Short to Ground	Signal voltage < 0.0 - 3.26 V
P0459	Evaporative Emission System Purge Control Valve Circuit High or Short to Voltage	Signal current > 2.20 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0491	Secondary Air System Insufficient Flow (Bank 1)	• Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.10 [-] • Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.10 [-] and • Relative AIR pressure measured < = 3.00 kPa or • Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.45 [-] • Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.45 [-] and • Relative AIR pressure measured <= 3.00 kP or • Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled while valve bank 2 commanded closed < 0.70[-] • Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled while valve bank 2 commanded closed < 0.70 [-] and • Relative AIR pressure measured <= 3.00 kPa or • Average pressure difference between absolute value and filtered value while valve bank 2 commanded closed < 0.14 - 1.22 kPa and • Relative AIR pressure measured <= 3.00 kPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0492	Secondary Air System Insufficient Flow. Bank 2	• Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.10 [-] • Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.10 [-] and • Relative AIR pressure measured < = 3.00 kPa or • Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.45 [-] • Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.45 [-] and • Relative AIR pressure measured <= 3.00 kP or • Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled while valve bank 2 commanded closed < 0.70[-] • Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled while valve bank 2 commanded closed < 0.70 [-] and • Relative AIR pressure measured <= 3.00 kPa or • Average pressure difference between absolute value and filtered value while valve bank 2 commanded closed < 0.14 - 1.22 kPa and • Relative AIR pressure measured <= 3.00 kPa

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor A Range/Performance	Speed sensor signal: plausibility error failure
P0502	Vehicle Speed Sensor A Electrical check	Speed sensor signal: plausibility error failure
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 and • RPM controller torque value >= calculated max value
P0507	Idle Air Control System RPM Higher Than Expected	Engine speed deviation <-80 RPM and RPM controller torque value <= calculated max. value
P0597	Map Controlled Engine Cooling Thermostat Sensor, Open Circuit	Signal voltage 4.70...5.40 V
P0598	Map Controlled Engine Cooling Thermostat Sensor, Short to Ground	Signal voltage 0.0...3.25 V
P0599	Map Controlled Engine Cooling Thermostat Sensor, Short to Battery Voltage	Signal current > 2.20 A
P050A	Idle Air Control System RPM Higher Or Lower Than Expected	RPM lower: • Engine speed deviation > 200 RPM and • RPM controller torque value >= calculated max. value RPM Higher: • Engine speed deviation < -200 RPM and • RPM controller torque value <= calculated min. value
P050B	Ignition timing monitor	Difference between commanded spark timing vs. actual value > 18.00%
P052A	Cold Start Monitoring VVT intake (Bank 1 Bank 2)	Difference between target position vs. actual position > 8°CA

DTC	Error Message	Malfunction Criteria and Threshold Value
P052C	Cold Start Monitoring VVT intake (Bank 1 Bank 2)	Difference between target position vs. actual position > 8°CA
P053F	Fuel Rail Control Valve	• Target pressure-actual pressure >1.30 MPa • Difference between target pressure vs. actual pressure < -3.00 mPa
P054A	Cold Start Monitoring VVT exhaust (Bank 1 Bank 2)	Difference between target position vs. actual position > 8°CA
P054C	Cold Start Monitoring VVT exhaust (Bank 1 Bank 2)	Difference between target position vs. actual position > 8°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
P0603	Internal hardware check	SPI communication lost
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	ECM faults	• Drive by wire module check check failed • EEPROM-check check failed
P0606	Barometric Pressure Sensor Faults	• Signal gradient, out of range hi and low • Signal voltage, out of range hi and low • Measured ambient pressure, out of range hi and low
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

DTC	Error Message	Malfunction Criteria and Threshold Value
P0634	Map Controlled Engine Cooling Thermostat Sensor, Signal Range Check	Signal range check over temperature > 150° C
P0638	Throttle Actuator Control Range/Performance (Bank 1)	• Time to open to reference point > 0.6 Sec. and • Reference point 1.5% • Time to close over reference point > 0.3 Sec and • Reference point 1.0%
P0641	Sensor Reference Voltage A Circuit/Open	Signal voltage deviation > ± 0.3 V
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage < 4.606 - 4.988 V
P0643	Sensor Reference Voltage A Circuit High	5V supply voltage > 4.998 - 5.406 V
P0651	Sensor Reference Voltage B Circuit/Open	Signal voltage deviation > ± 0.3 V
P0652	Sensor Reference Voltage B Circuit Low	Signal voltage < 4.606 - 4.998 V
P0653	Sensor Reference Voltage B Circuit High	> 5V supply voltage > 4.998 - 5.406 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 > 1.10 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 > 0.7 - 1.4 A • Sense circuit voltage < 5 V
P0688	ECM/PCM Power Relay Sense Circuit	• Sense voltage < 4.0 V
P0697	Sensor Reference Voltage C Circuit/Open	Signal voltage deviation > ± 0.3 V
P0698	Sensor Reference Voltage C Circuit Low	Signal voltage < 4.606 - 4.998 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0699	Sensor Reference Voltage C Circuit High	5V supply voltage > 4.998 - 5.06 V
P062B	Communication check	SPI communications check identifier failure
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus	Global time out...receiving no messages.
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	No message received from TCM
U0121	CAN ABS Brake Unit	No CAN communication with TCU, time-out
U0140 (only S4)	CAN communication with BCM 1	CAN message no message
U0146 (only S4)	CAN Gateway A	CAN communication with gateway, implausible message
U0155	CAN Instrument Cluster	No CAN communication with ICL, time-out
U0302 (only S4)	Software Incompatibility with Transmission Control Module	MT vehicle ECM coded as AT vehicle
U0323	CAN: Instrument cluster Audi only	Ambient temperature value module not encoded for ambient temp sensor, 00h
U0402 (only S4)	CAN Communication with TCM	Invalid data received from TCM • Implausible message
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

DTC	Error Message	Malfunction Criteria and Threshold Value
U0415	CAN link to speed sensor	• Out of range: receiving fault value 407.22 mph • Out of range: receiving fault value > 202.81 mph • Out of range: receiving fault value < 1.24 mph
U0415 (only S4)	CAN: Vehicle Speed Sensor	• Speed sensor signal: initialization error 655.34km/h • Speed sensor signal: low voltage error 655.33km/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	Communication with ICL	Invalid data received from ICL implausible message
U0447 (only S4)	CAN Gateway	Received data from Gateway implausible message

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P10A0	RFP Powerstage, signal range check	Signal range check • ECM power stage failure • or duty cycle < 95% • or duty cycle < 95%
P10A4	RFP Actuator, functional check	Absolute value of maximum deviation between predicted and real value: > 8%
P10A5	RFP sensor, short to B +	Signal voltage > 4.9 V
P10A6	RFP sensor, short to ground / open circuit	Signal voltage < 0.1 V
P100F	Functional check stuck open	• Rail pressure controller value > 60.00...327.67 • Misfire failure
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)

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	• Rail Pressure Bank 1 @ Engine Start < 0.10 mPa • Fuel system too rich @ part load < = -15.00% • Fuel system too rich @ idle <= 3.00% • Rail pressure bank 2 @ engine start > = 0.50 mPa
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Rail Pressure Bank 1 @ Engine Start > 1.50 mPa • Fuel system too lean @ part load > = -15.00% • Fuel system too lean @ idle > = 3.% • Rail pressure bank 2 @ engine start < = 1.00 mPa
P12A4	Fuel Rail Pump Control Valve Stuck Closed	• Pressure control activity < -3.0 • Fuel trim activity 0.90 ... 1.30 mPa and • Difference between target pressure vs. actual pressure < -8.00 mPa
P129B	Fuel Rail Pressure Control Valve	• Open circuit signal voltage 1.40 .. 3.20 V • Rationality check signal pattern incorrect
P129C	Fuel Rail Pressure Control Valve	Signal voltage 1.40... 3.20 V
P129D	Fuel Rail Pressure Control Valve	Short to battery plus signal voltage > 3.20 V
P13EA	Ignition Timing Monitor	Difference between commanded spark timing vs. actual value > 20.00%
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.

DTC	Error Message	Malfunction Criteria and Threshold Value
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	Signal range check • 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 - short to B+ or ground	Short to battery plus/ short to ground • Internal check failed open circuit • Internal check failed Temperature / current monitoring• ECM • Internal check failed Functional check • Internal check failed
P2119	Throttle Actuator Control Range/Performance - Bank 1	• TPS 1 signal voltage NOT (0.21...0.87) V or • TPS 2 signal voltage NOT (4.14...4.84) V
P2122	Throttle/Pedal Position Sensor/Switch D Circuit Low Input	Signal voltage < 0.65 V
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High Input	Signal voltage > 4.79 V
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low Input	Signal voltage < 0.28 V
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.43 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage sensor 1 vs 2, > 0.14...0.70 V
P2146	Fuel Injector Group A Supply Voltage Circuit / Short to Ground	Short to ground (high side) • Signal current > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A
P2147	Injector Circuit short to ground	Signal current > 12 A
P2148	Injector Circuit short to B+	Signal current > 33 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P2149	Fuel Injector Group B Supply Voltage Circuit / Short to ground	Short to ground (high side) • Signal current > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A
P2150	Injector Circuit short to ground	Signal current > 12 A
P2151	Injector Circuit short to b+	Signal current > 33 A
P2152	Fuel Injector Group B Supply Voltage Circuit / Short to ground	Short to ground (high side) • Signal current, > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A
P2153	Injector Circuit short to ground	Signal current > 12 A
P2154	Injector Circuit short to B+	Signal current > 33 A
P2155	Fuel Injector Group B Supply Voltage Circuit / Short to ground	Short to ground (high side) • Signal current, > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A
P2181	Cooling System Performance	Cooling system temperature too low after a sufficient air mass flow interval 60 - 75° C
P2195	O2 Sensor rationality check high (Bank 1, Bank 2)	Delta lambda of 2nd lambda control loop > 0.07
P2196	O2 Sensor rationality check Low (Bank 1, Bank 2)	Delta lambda of 2nd lambda control loop < 0.07
P2197	O2 Sensor rationality check high (Bank 1, Bank 2)	Delta lambda of 2nd lambda control loop < 0.07
P2198	O2 Sensor rationality check Low (Bank 1, Bank 2)	Delta lambda of 2nd lambda control loop < 0.07
P2227	Turbocharger/Supercharger Boost Sensor A Plausibility check.	Press. diff. in cross check between boost press. sensor 1/2; IM press., ambient press. >7 kP
P2231	O2 Sensor Signal Circuit Shorted to Heater Circuit	• Delta O2S signal front > 0.2 .. 0.498 V • Elapsed time since last O2S <0.05 Sec
P2234	O2 Sensor Signal Circuit Shorted to Heater Circuit	• Delta O2S signal front > 0.2 .. 0.498 V • Elapsed time since last O2S < 0.05 Sec

DTC	Error Message	Malfunction Criteria and Threshold Value
P2237	O2 Sensor Positive Current Control Circuit/Open (Bank 1, Sensor 1)	• O2S signal front 1.46...1.52 V and • Delta lambda controller > | 0.10
P2240	O2 Sensor Positive Current Control Circuit / Open (Bank 1, Bank 2)	• O2S signal front 1.46...1.52 V and • Delta lambda controller > | 0.10
P2243	O2 Sensor Reference Voltage Circuit / Open (Bank 1, Bank 2)	• O2S signal front > 3.25 V and Internal resistance > 950 Ω • O2S signal front < 0.20 V and • Internal resistance > 950 Ω
P2247	O2 Sensor Nernst Voltage Open (Bank 1, Bank 2)	• O2S signal front > 3.25 V and • Internal resistance > 950Ω • O2S signal front < 0.20 V and • Internal resistance > 950Ω
P2251	O2 Sensor Signal open circuit (Bank 1, Bank 2)	• O2S signal front 1.44 ... 1.53 V and • Internal resistance > 950 Ω
P2254	O2 Sensor Signal open circuit (Bank 1, Sensor 1)	• O2S signal front 1.44 ... 1.53 V and • Internal resistance > 950 Ω
P2257	Air Pump Relay Short to Ground	Signal voltage 0.00 - 3.26 V
P2258	Air Pump Relay Short to B+	Signal current 0.60 - 2.40 A
P2270	O2 Circuit Slow Response (Bank 1, Sensor 2) SULEV	• O2S signal rear not oscillating at reference < 0.62...0.68 V and • Enrichment after stuck lean 25.00%
P2271	O2 Circuit (Bank 1, Sensor 2)	• Sensor voltage of >= 0.18 V • After oxygen mass > 3300...400 mg • (after fuel cut off) and number of checks >= 1.0

DTC	Error Message	Malfunction Criteria and Threshold Value
P2272	O2 Circuit Slow Response (Bank 1, Sensor 2	• O2S signal rear not oscillating at reference < 0.62...0.68 V and • Enrichment after stuck lean 25.00%
P2273	O2 Circuit Slow Response (Bank 1, Sensor 2	• Sensor voltage of >= 0.18 V • After oxygen mass > 3300...400 mg • (after fuel cut off) and number of checks >= 1.0
P2279	Intake Air System Leak	• Offset value throttle mass flow > 17.00 kg/h and • Correction factor > 0.97
P2293	Fuel Pressure Regulator 2 Performance	• Difference between target pressure vs. actual pressure: > 1.30 mPa
P2294	Offset value throttle mass flow > 17.00 kg/h	Open circuit • Signal voltage 1.40 - 3.20 V • Rationality check • Signal pattern incorrect
P2295	Fuel Pressure Regulator 2 Control Circuit Low Short to Ground	Signal voltage < 1.40 - 3.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Short to battery plus signal voltage > 3.20 V

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Short to ground signal current > 24.0 mA
P2301	Ignition Coil A Primary Control Circuit High	Short to battery plus signal voltage > 5.1...7.0 V
P2303	Ignition Coil B Primary Control Circuit Low	Short to ground signal current > 24.0 mA
P2304	Ignition Coil B Primary Control Circuit High	Short to battery plus signal voltage > 5.1...7.0 V
P2306	Ignition Coil C Primary Control Circuit Low	Short to ground signal current > 24.0 mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P2307	Ignition Coil C Primary Control Circuit High	Short to battery plus signal voltage > 5.1...7.0 V
P2309	Ignition Coil D Primary Control Circuit Low	Short to ground signal current > 24.0 mA
P2310	Ignition Coil D Primary Control Circuit High	Short to battery plus signal voltage > 5.1...7.0 V
P2312	Ignition Coil E Primary Control Circuit Low	Short to ground signal current > 24.0 mA
P2313	Ignition Coil E Primary Control Circuit High	Short to battery plus signal voltage > 5.1...7.0 V
P2315	Ignition Coil F Primary Control Circuit Low	Short to ground signal current > 24.0 mA
P2316	Ignition Coil F Primary Control Circuit High	Short to battery plus signal voltage > 5.1...7.0 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 < to 3 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current 2.7...5.5 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > 10.4 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	• High signal voltage > 10.4 Sec..
P2414	O2 Sensor signal range check (Bank 1, Bank 2)	• Threshold 1 - Signal voltage 2.71 - 6.00 V • Threshold 2: Depending on gain factor, that actual is used for sensor characteristic, the threshold is signal voltage 2.05...3.06 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2415	O2 Sensor signal range check (Bank 1, Bank 2)	• Threshold 1 - Signal voltage 2.71 - 6.00 V • Threshold 2: Depending on gain factor, that actual is used for sensor characteristic, the threshold is signal voltage 2.05...3.06 V
P2431	Rationality check	Difference between AIR pressure, AMP, and MAP -6.0 - 6.00 kPa
P2432	Signal Range Check	Signal voltage < 0.40 V
P2433	Signal Range Check	Signal voltage > 4.60 V
P2440	Air Valve Stuck Open	• Relative AIR pressure measured <= 3.00 kPar • Relative AIR pressure (measured with AIR pressure sensor vs. modeled) vs. relative AIR pressure (measured with AIR pressure sensor vs. modeled while both AIR valves closed) >1.50 [-] • Relative AIR pressure (measured with AIR pressure sensor vs. modeled while valve bank 2 commanded closed) vs. relative AIR pressure (measured with AIR pressure sensor vs. modeled while valve bank 1 commanded closed) >1.50 [-] • Difference of average pressure between absolute value and filtered value while both valves commanded closed >= 0.30 - 1.00 kPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P2442	Air valve bank 2	• Relative AIR pressure measured <= 3.00 kPa • Relative AIR pressure (measured with AIR pressure sensor vs. modeled) vs. relative AIR pressure (measured with AIR pressure sensor vs. modeled while both AIR valves closed) >1.50 [-] • Relative AIR pressure (measured with AIR pressure sensor vs. modeled) relative AIR pressure vs (measured with AIR pressure sensor vs. modeled while both AIR Valves commanded closed) >1.50 [-] • Difference of average pressure between absolute value and filtered value while both valves commanded closed >= 0.30 - 1.00 kPa
P2539	Low Pressure Fuel System Sensor Circuit	Signal voltage > 4.80 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
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 4.81 V
P2629	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 4.8 V

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