2014

A5/S5

Quick Reference Specification Book

Audi
Truth in Engineering

2013 A5/S5
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 Torque

Nm-to-lb·ft (ft·lb)

To calculate: Nm x 0.738 = lb·ft

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

Nm-to-lb·in (in·lb), kg·cm

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

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

N·cm-to-lb·in (in·lb), kg·cm

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

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

kg·cm-to-lb·in (in·lb), N·cm

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

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

Warnings and Cautions

WARNINGS

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

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

(WARNINGS cont'd on next page)

WARNINGS *(cont'd)*

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

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

CAUTIONS

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

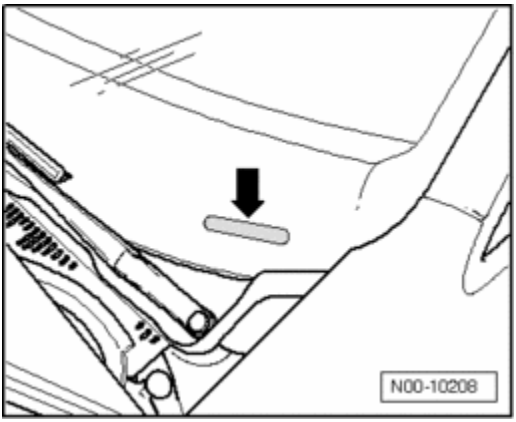
(CAUTIONS cont'd on next page)

CAUTIONS *(cont'd)*

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

VEHICLE IDENTIFICATION

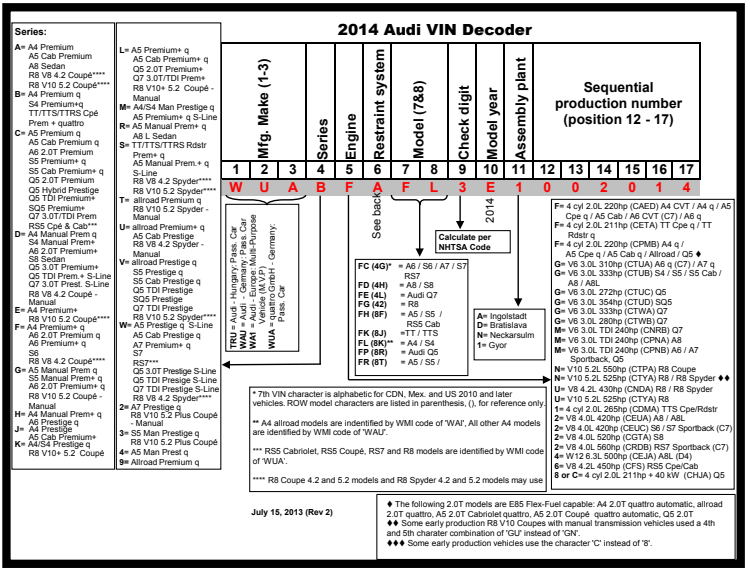
Vehicle Identification Number (VIN) Location

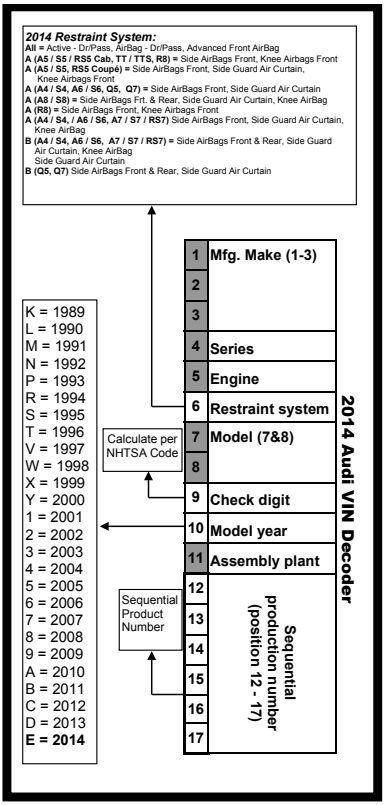


The VIN (➡) is on the left side of the vehicle in the area of the windshield wiper mount. It is visible from the outside.

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

VIN Decoder


2014 Audi VIN Decoder
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 E 1 0 0 2 0 1 4
See back
2014
Calculate per NHTSA Code
Series:
A= A4 Premium
A5 Cab Premium
A8 Sedan
R8 V8 4.2 Coupé****
R8 V10 5.2 Coupé****
B= A4 Premium q
S4 Premium+q
TT/TTS/TTRS Cpé
Prem + quattro
C= A5 Premium q
A5 Cab Premium q
A6 2.0T Premium
S5 Premium+ q
S5 Cab Premium+ q
Q5 2.0T Premium
Q5 Hybrid Prestige
Q5 TDI Premium+
SQ5 Premium+
Q7 3.0T/TDI Prem
RS5 Cpé & Cab***
D= A4 Manual Prem q
S4 Manual Prem+
A6 2.0T Premium+
S8 Sedan
Q5 3.0T Premium+
Q5 TDI Prem.+ S-Line
Q7 3.0T Prest. S-Line
R8 V8 4.2 Coupé -
Manual
E= A4 Premium+
R8 V10 5.2 Coupé****
F= A4 Premium+ q
A6 2.0T Premium q
A6 Premium+ q
S6
R8 V8 4.2 Coupé****
G= A5 Manual Prem q
S5 Manual Prem+ q
A6 2.0T Premium+ q
R8 V10 5.2 Coupé -
Manual
H= A4 Manual Prem+ q
A6 Prestige q
J= A4 Prestige
A5 Cab Premium+
K= A4/S4 Prestige q
R8 V10+ 5.2 Coupé
L= A5 Premium+ q
A5 Cab Premium+ q
Q5 2.0T Premium+
Q7 3.0T/TDI Prem+
R8 V10+ 5.2 Coupé -
Manual
M= A4/S4 Man Prestige q
A5 Premium+ q S-Line
R= A5 Manual Prem+ q
A8 L Sedan
S= TT/TTS/TTRS Rdstr
Prem+ q
A5 Manual Prem.+ q
S-Line
R8 V8 4.2 Spyder****
R8 V10 5.2 Spyder****
T= allroad Premium q
R8 V10 5.2 Spyder -
Manual
U= allroad Premium+ q
A5 Cab Prestige
R8 V8 4.2 Spyder -
Manual
V= allroad Prestige q
S5 Prestige q
S5 Cab Prestige q
Q5 TDI Prestige
SQ5 Prestige
Q7 TDI Prestige
R8 V10 5.2 Spyder****
W= A5 Prestige q S-Line
A5 Cab Prestige q
A7 Premium+ q
S7
RS7***
Q5 3.0T Prestige S-Line
Q5 TDI Prestige S-Line
Q7 TDI Prestige S-Line
R8 V8 4.2 Spyder****
2= A7 Prestige q
R8 V10 5.2 Plus Coupé
Manual
3= S5 Man Prestige q
R8 V10 5.2 Plus Coupé
4= A5 Man Prest q
5= Allroad Premium q
TMU = Audi - Hungary - Pass. Car
WAU = Audi - Europe - Pass. Car
WAI = Audi - Europe Multi-Purpose Vehicles (MVP)
WUA = Quattro GmbH - Germany: Pass. Car
FC (4G)* = A6 / S6 / A7 / S7 RS7
FD (4H) = A8 / S8
FE (4L) = Audi Q7
FG (42) = R8
FH (8F) = A5 / S5 / RS5 Cab
FK (8J) = TT / TTS
FL (8K)** = A4 / S4
FP (8R) = Audi Q5
FR (8T) = A5 / S5 /
A= Ingolstadt
D= Bratislava
N= Neckarsulm
1= Gyor
F= 4 cyl 2.0L 220hp (CAED) A4 CVT / A4 q / A5 Cpe q / A5 Cab / A6 CVT (C7) / A6 q
F= 4 cyl 2.0L 211hp (CETA) TT Cpe q / TT Rdstr q
F= 4 cyl 2.0L 220hp (CPMB) A4 q / A5 Cpe q / A5 Cab q / Allroad / Q5 ♦
G= V6 3.0L 310hp (CTUA) A6 q (C7) / A7 q
G= V6 3.0L 333hp (CTUB) S4 / S5 / S5 Cab / A8 / A8L
G= V6 3.0L 272hp (CTUC) Q5
G= V6 3.0L 354hp (CTUD) SQ5
G= V6 3.0L 333hp (CTWA) Q7
G= V6 3.0L 280hp (CTWB) Q7
M= V6 3.0L TDI 240hp (CNRB) Q7
M= V6 3.0L TDI 240hp (CPNA) A8
M= V6 3.0L TDI 240hp (CPNB) A6 / A7 Sportback, Q5
N= V10 5.2L 550hp (CTPA) R8 Coupe
N= V10 5.2L 525hp (CTYA) R8 / R8 Spyder ♦♦
U= V8 4.2L 430hp (CNDA) R8 / R8 Spyder
U= V10 5.2L 525hp (CTYA) R8
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 Sportback (C7)
2= V8 4.0L 520hp (CGTA) S8
2= V8 4.0L 560hp (CRDB) RS7 Sportback (C7)
4= W12 6.3L 500hp (CEJA) A8L (D4)
6= V8 4.2L 450hp (CFS) RS5 Cpe/Cab
8 or C= 4 cyl 2.0L 211hp + 40 kW (CHJA) Q5
* 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 indentified by WMI code of 'WAI', All other A4 models are identified by WMI code of 'WAU'.
*** RS5 Cabriolet, RS5 Coupé, RS7 and R8 models are identified by WMI code of 'WUA'.
**** R8 Coupe 4.2 and 5.2 models and R8 Spyder 4.2 and 5.2 models may use
July 15, 2013 (Rev 2)
♦ The following 2.0T models are E85 Flex-Fuel capable: A4 2.0T quattro automatic, allroad 2.0T quattro, A5 2.0T Cabriolet quattro, A5 2.0T Coupé quattro automatic, Q5 2.0T
♦♦ Some early production R8 V10 Coupes with manual transmission vehicles used a 4th and 5th charater combination of 'GU' instead of 'GN'.
♦♦♦ Some early production vehicles use the character 'C' instead of '8'.


2014 Restraint System:
All = Active - Dr/Pass, AirBag - Dr/Pass, Advanced Front AirBag
A (A5 / S5 / RS5 Cab, TT / TTS, R8) = Side AirBags Front, Knee Airbags Front
A (A5 / S5, RS5 Coupé) = Side AirBags Front, Side Guard Air Curtain, Knee Airbags Front
A (A4 / S4, A6 / S6, Q5, Q7) = Side AirBags Front, Side Guard Air Curtain
A (A8 / S8) = Side AirBags Frt. & Rear, Side Guard Air Curtain, Knee AirBag
A (R8) = Side AirBags Front, Knee Airbags Front
A (A4 / S4, / A6 / S6, A7 / S7 / RS7) Side AirBags Front, Side Guard Air Curtain, Knee AirBag
B (A4 / S4, A6 / S6, A7 / S7 / RS7) = Side AirBags Front & Rear, Side Guard Air Curtain, Knee AirBag
Side Guard Air Curtain
B (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
E = 2014
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)
2014 Audi VIN Decoder

SALES CODES

Engine Codes

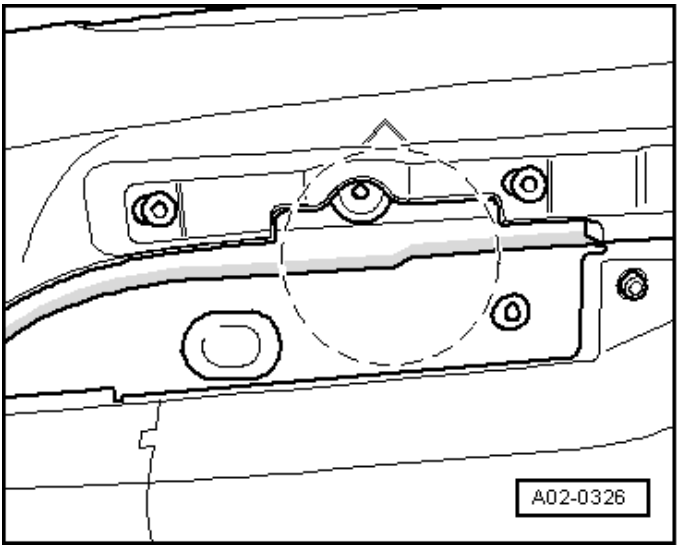
CAED	2.0L 4-cylinder
CGXC, CTUB	3.0L 6-cylinder
CFSA	4.2L 8-cylinder

Transmission Codes

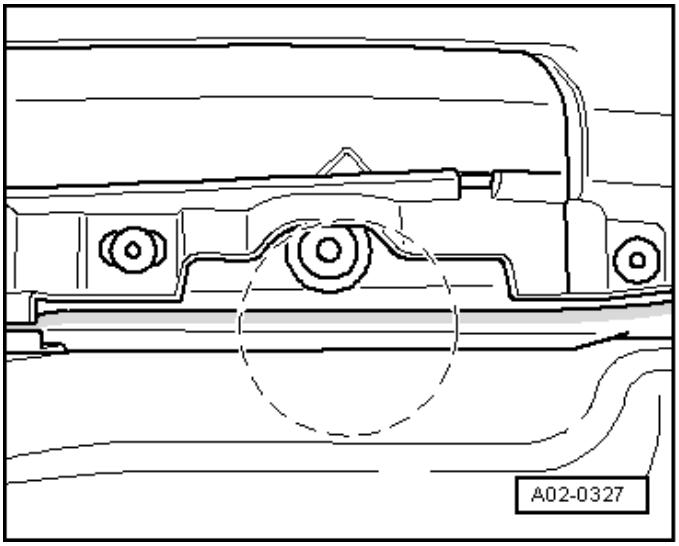
0AW	Continuously variable transmission
0B2, 0B4	6-speed manual transmission
0B5	7-speed direct shift automatic transmission
0BK	8-speed automatic transmission
0AW	Continuously variable transmission

VEHICLE LIFTING

Hoist and Floor Jack Lifting Points



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

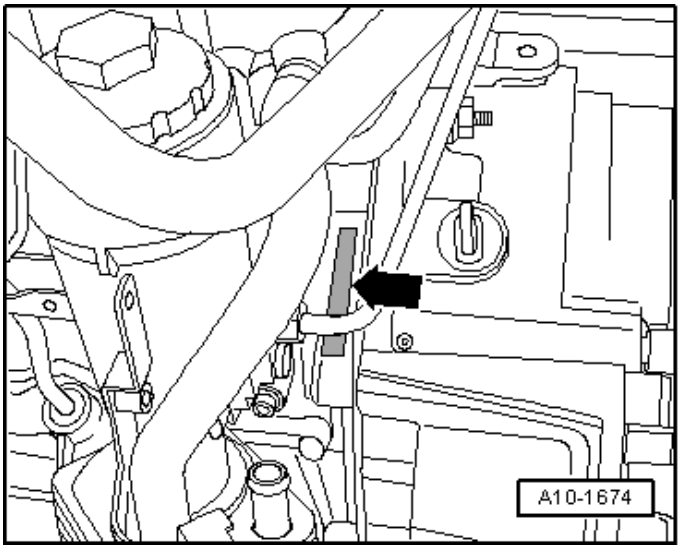


Rear: At the side member vertical reinforcement area.
The marking is for the onboard vehicle jack.

ENGINE MECHANICAL – 2.0L CAED, CPMB

General, Technical Data

Engine Number Location



The engine number (engine code and serial number) (➡) is located on the left side of the vehicle where the engine/transmission are joined.

Engine Data

Code Letters		CAEB	CPMB
Displacement	liter	1.984	1.984
Output	kW at RPM	162 @ 4300	155 @ 4300
Torque	Nm at RPM	350 @ 3000 to 4200	350 @ 3000 to 5000
Bore	Diameter in mm	82.5	82.5
Stroke	mm	92.8	92.8
Compression ratio		9.6	9.6
RON		95 [1)]	95 [1)]
Injection system/ignition system		FSI	FSI
Ignition sequence		1-3-4-2	1-3-4-2
Knock control		Yes	Yes
Turbocharger, Supercharger		Yes	Yes
Exhaust Gas Recirculation (EGR)		No	No
Variable intake manifold		No	No
Variable valve timing		Yes	Yes
Secondary Air Injection (AIR)		No	No

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

Engine Assembly – 2.0L CAED, CPMB

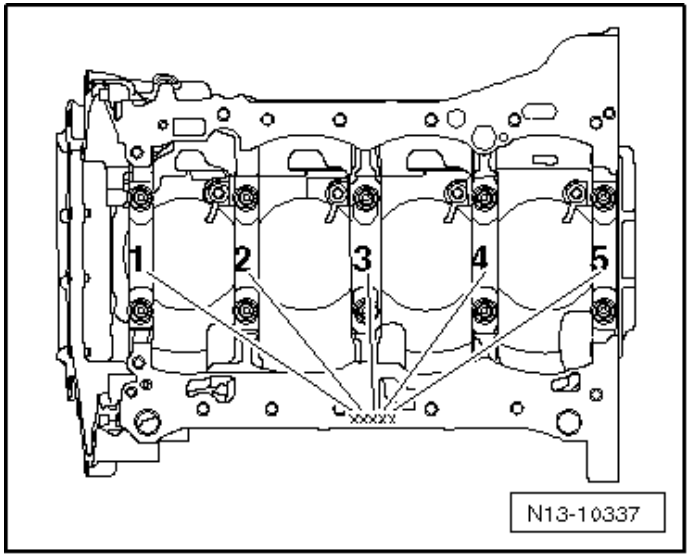
Fastener Tightening Specifications

Component	Fastener size	Nm
Bolts and nuts	M6	9
	M8	20
	M10	40
	M12	60
Engine mount [1)]	-	90 plus an additional 90° (¼ turn)
Engine mount retaining plate	-	20
Engine support	-	40
Heat shield-to-engine support	-	10
Hydraulic line bracket nut	-	9
Subframe-to-engine mount	-	55

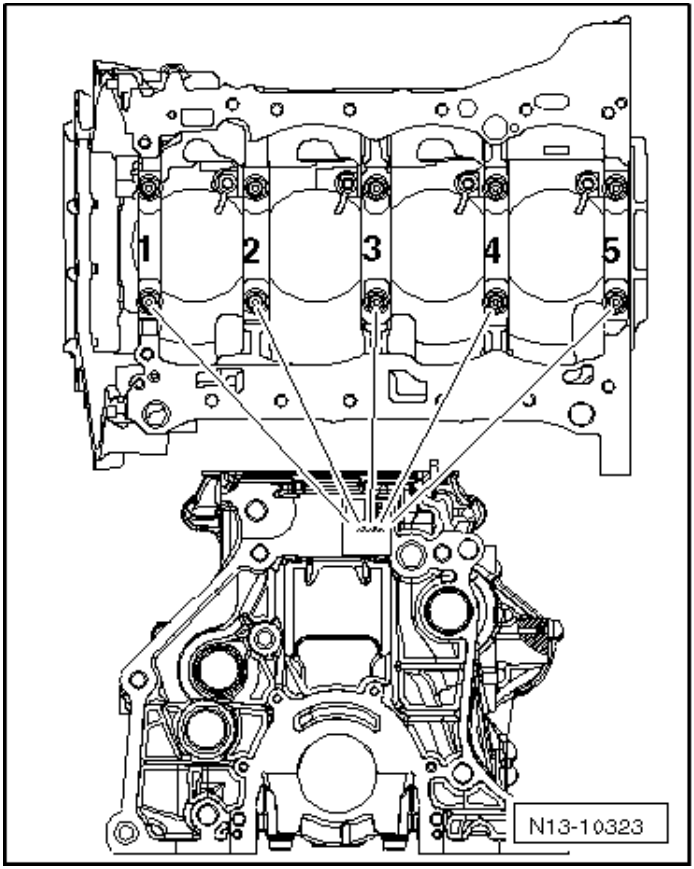
[1)] Replace fastener(s).

Crankshaft, Cylinder Block – 2.0L CAED, CPMB

Cylinder Block Bearing Shell Identification



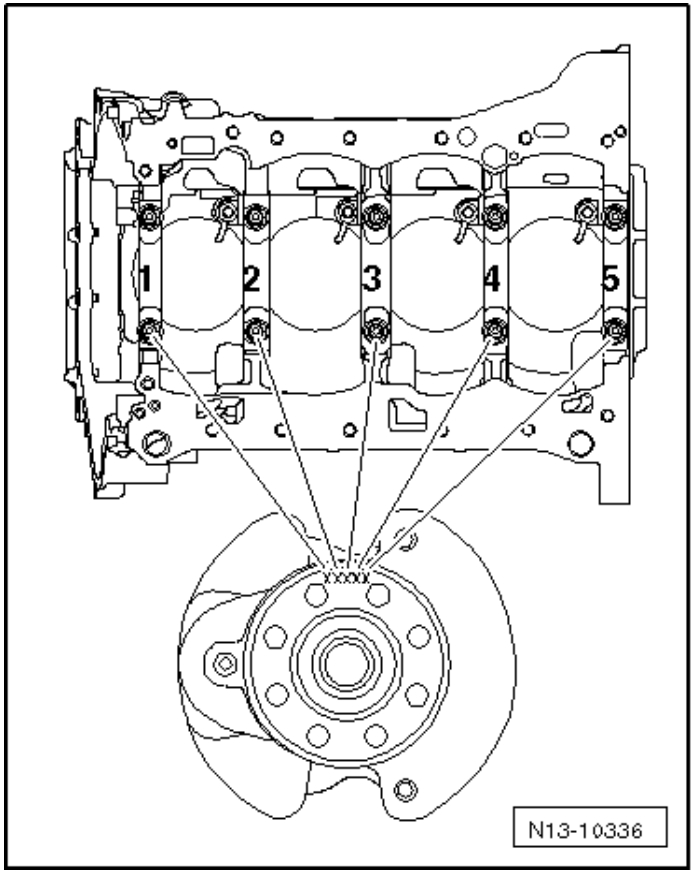
The cylinder block bearing shell identification is located either on the oil pan sealing surface or on the top (transmission side) of the cylinder block.



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

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

Bearing Cap Bearing Shell Identification



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

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

Fastener Tightening Specifications

Component	Nm
Balance shaft bolt (intake side) bolt [1)]	9
Connecting rod bearing cap-to-connecting rod [1)]	45 plus an additional 90° (¼ turn)
Drive plate-to-crankshaft [1)]	60 plus an additional 90° (¼ turn)
Pressure relief valve	27
Sensor wheel-to-crankcase [1)]	10 plus an additional 90° (¼ turn)
Vehicles with Electro-Mechanical Power Steering	
Ribbed belt tensioning damper-to-auxiliary components bracket	8 plus an additional 45° (⅛ turn)
Vibration damper-to-crankshaft [1)]	150 plus an additional 90° (¼ turn)
Vehicles with Hydraulic Power Steering	
Idler roller-to-auxiliary components bracket	20
Ribbed belt tensioning damper	40

[1)] Replace fastener(s).

Crankshaft Dimensions

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

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

Piston Ring End Gaps

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

Piston Ring Clearance

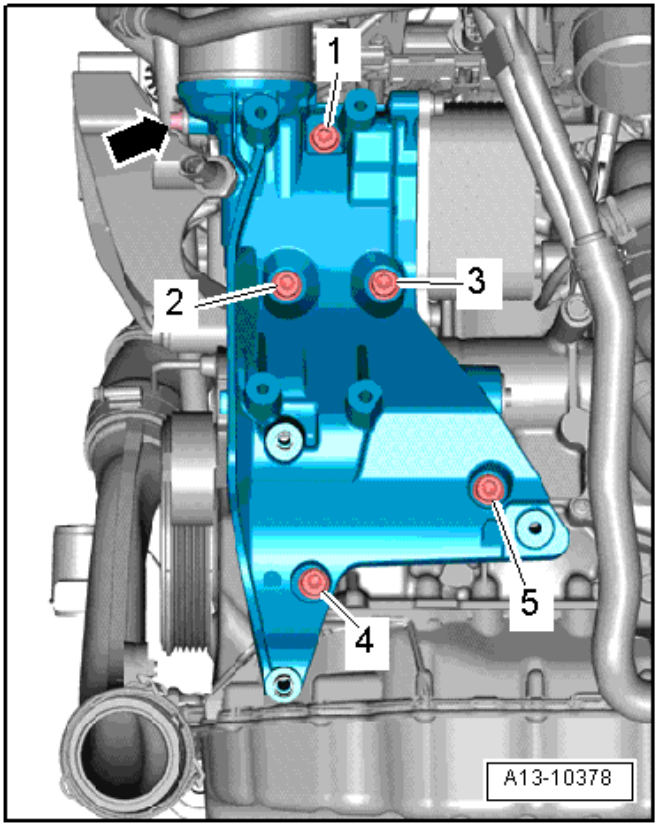
Piston ring dimensions in mm	New	Wear limit
1st compression ring	0.06 to 0.09	0.20
2nd compression ring	0.03 to 0.06	0.15
Oil scraping rings	Cannot be measured	

Piston and Cylinder Dimensions

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

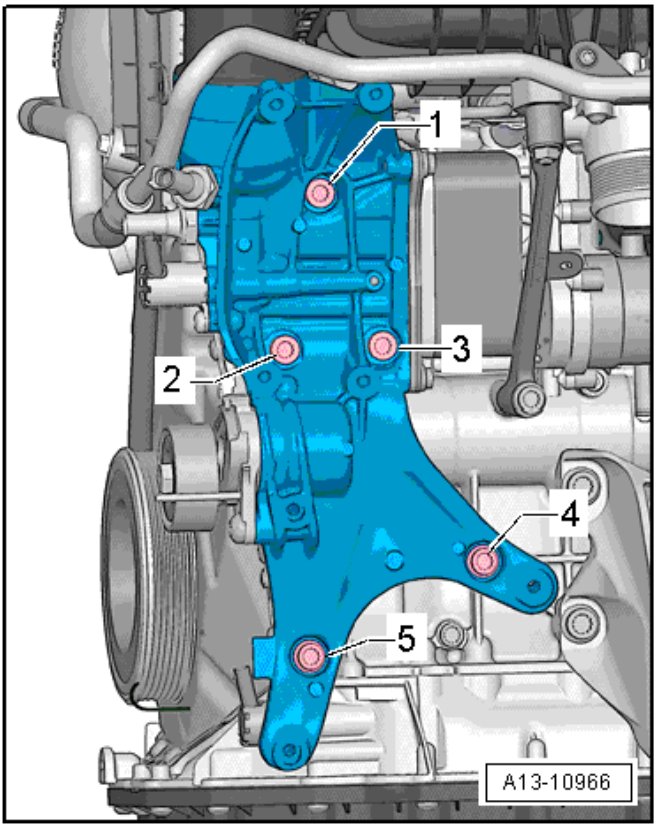
[1)] Measurements without graphite coating (thickness = 0.02 mm). The graphite coating wears off.

Accessory Assembly Bracket Tightening Specifications



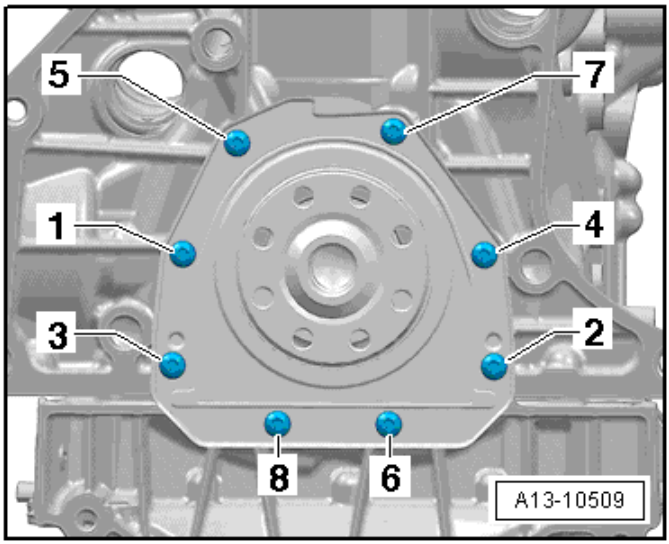
Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	Hand-tighten
2	Tighten bolts 1 through 5 in sequence	20
3	Tighten bolts 1 through 5 in sequence	an additional 90° (¼ turn)

Accessory Assembly Bracket Tightening Specifications



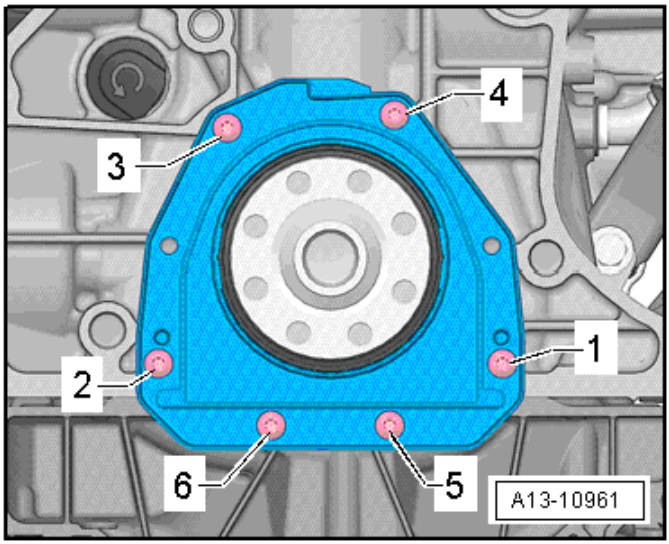
Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	Hand-tighten
2	Tighten bolts 1 through 5 in sequence	20
3	Tighten bolts 1 through 5 in sequence	an additional 90° (¼ turn)

Sealing Flange Tightening Specifications



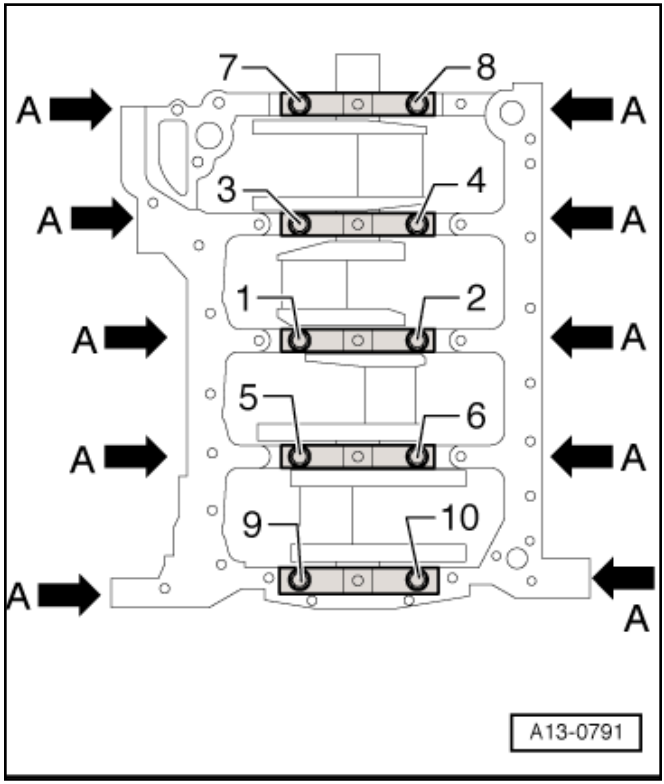
Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	Hand- tighten
2	Tighten bolts 1 through 8 in sequence	9

Sealing Flange with 6 Bolts Tightening 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)

Crankshaft Assembly Tightening Specifications



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

Cylinder Head, Valvetrain – 2.0L CAED, CPMB

Fastener Tightening Specifications

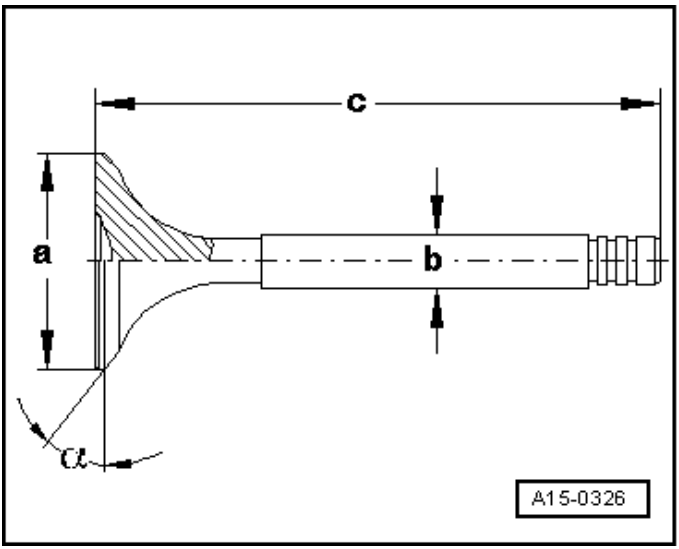
Component	Nm
Bearing bracket TO camshaft housing [1]	9
	20 plus an additional 90° (¼ turn) [2]
Cam adjustment actuator bolt	5
Camshaft Position Sensor bolt	9
Camshaft timing chain guide rail guide pin	20
Chain tensioner	85
Chain tensioner to timing chain tensioning rail bolt	9
Control Valve [5]	35
Glide track guide pin	20
Glide track guide pin (for timing chain)	20
Oil dipstick tube bolt	9
Tensioning rail guide pin (for balance shaft drive chain)	20
Timing chain tensioning rail guide pin	20
Cylinder Head Overview, Engine with Wrench Clearance	
Cam adjustment actuator bolt	5
Cylinder head bolt tighten in 3 steps: [2] [6]	
• Tighten to 40 Nm • Tighten 90° further using a rigid wrench. • Tighten 90° further using a rigid wrench.	
Cylinder head bolt tighten in 2 steps: [3]	
Tighten in 2 stages: • Tighten to 8 Nm • Tighten 90° further using a rigid wrench.	
Heat shield to cylinder head bolt	20
Plug with ball head for the engine cover	5
Retaining plate to connection	9
Transport strap bolt	25
Cylinder Head Overview, Engine without Wrench Clearance	
Cam adjustment actuator bolt	5
Camshaft position sensor bolt	9

Fastener Tightening Specifications *(cont'd)*

Component	Nm
Heat shield to cylinder head bolt	20
Plug with ball head for the engine cover	5
Retaining plate to connection bolt	9
Transport strap bolt	25

1) For bolt tightening clarification, refer to ElsaWeb, *Camshaft Timing Chain Overview*, items 5 and 7.
2) Replace fastener(s).
3) For bolt tightening clarification, refer to ElsaWeb, *Cylinder Head Overview, with Wrench Clearance" item* 4.
4) For bolt tightening clarification, refer to ElsaWeb, *Cylinder Head Overview, with Wrench Clearance" item 6.*
5) Left hand thread.

Valve Dimensions



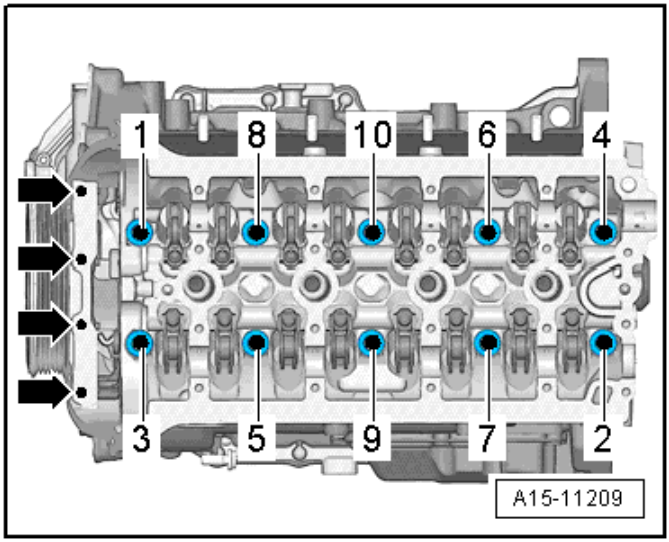
Dimension		Intake valve	Exhaust valve
Diameter a	mm	33.85 ± 0.10	28.0 ± 0.1
Diameter b	mm	5.98 ± 0.01	5.96 ± 0.01
c	mm	104.0 ± 0.2	101.9 ± 0.2
α	∠°	45	45

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

Compression Pressures

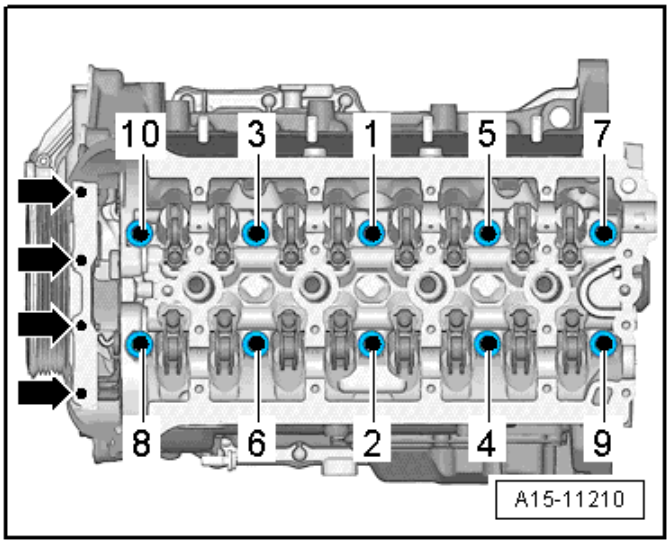
New bar positive pressure	Wear limit bar positive pressure	Difference between cylinders bar positive pressure
11.0 to 14.0	7.0	Max. 3.0

Cylinder Head Removal Specifications



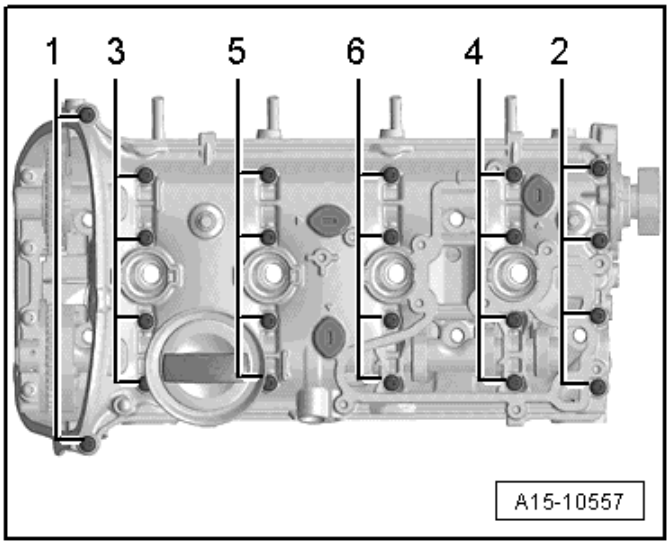
Remove cylinder head bolts (➡) and 1 through 10 in sequence.

Cylinder Head Tightening Specifications



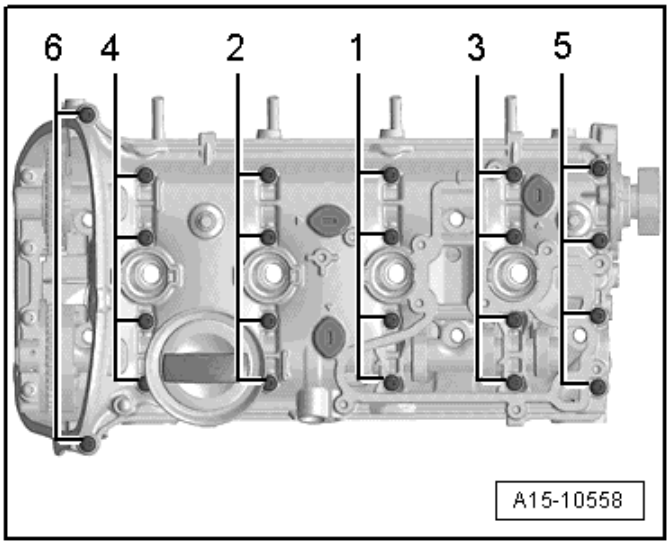
Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	40
2	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)
3	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)
4	Tighten bolts (➡)	8
5	Tighten bolts (➡)	an additional 90° (¼ turn)

Cylinder Head Cover Removal Specifications



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

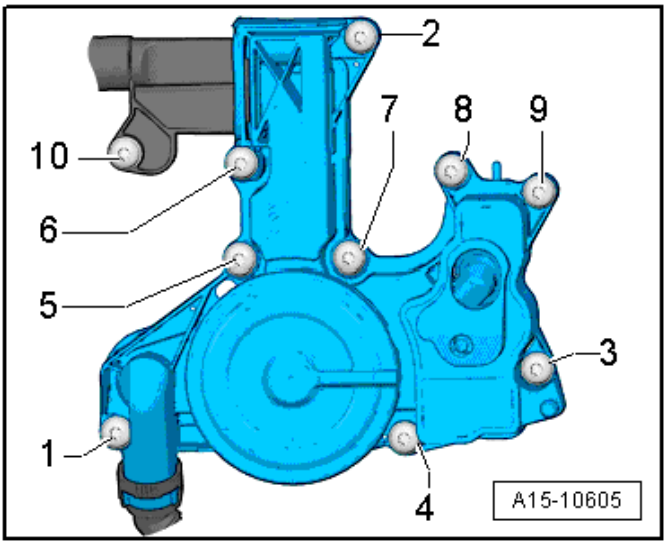
Cylinder Head Cover Tightening Specifications



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

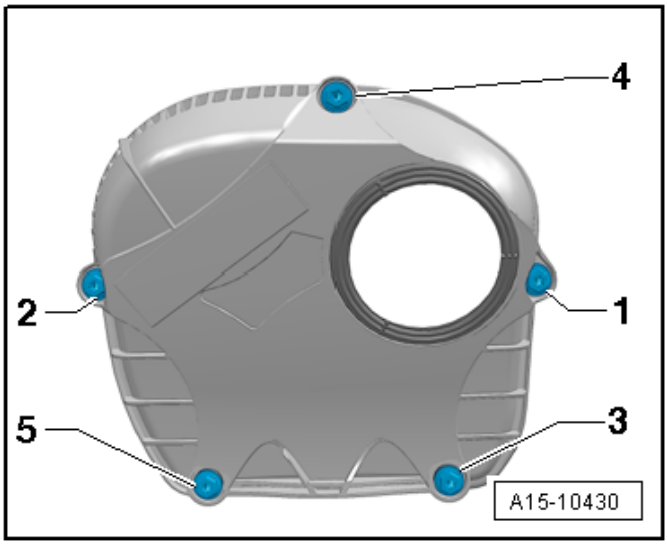
[1)] Replace fastener(s).

Crankcase Ventilation Tightening Specification



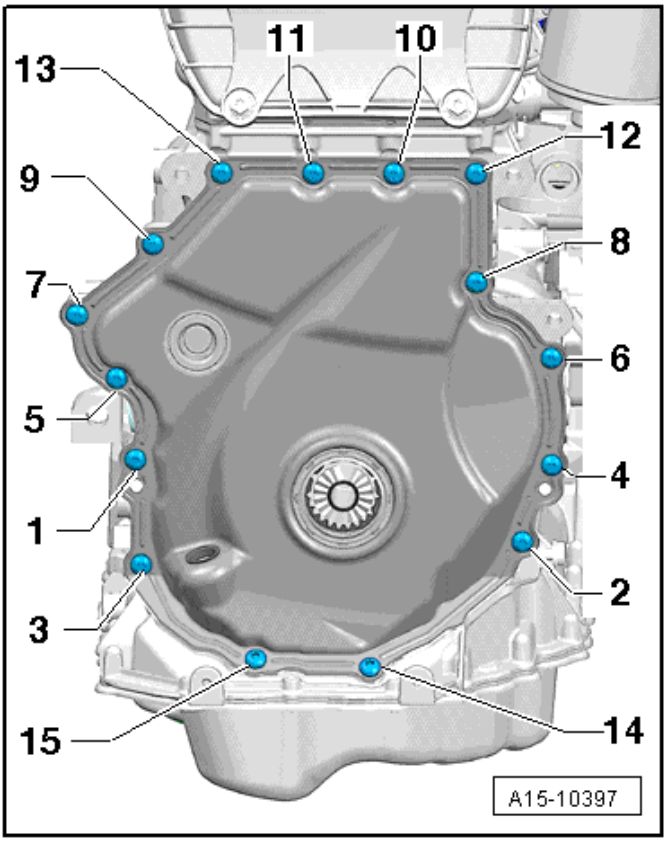
Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	11

Upper Timing Chain Cover Tightening Specification



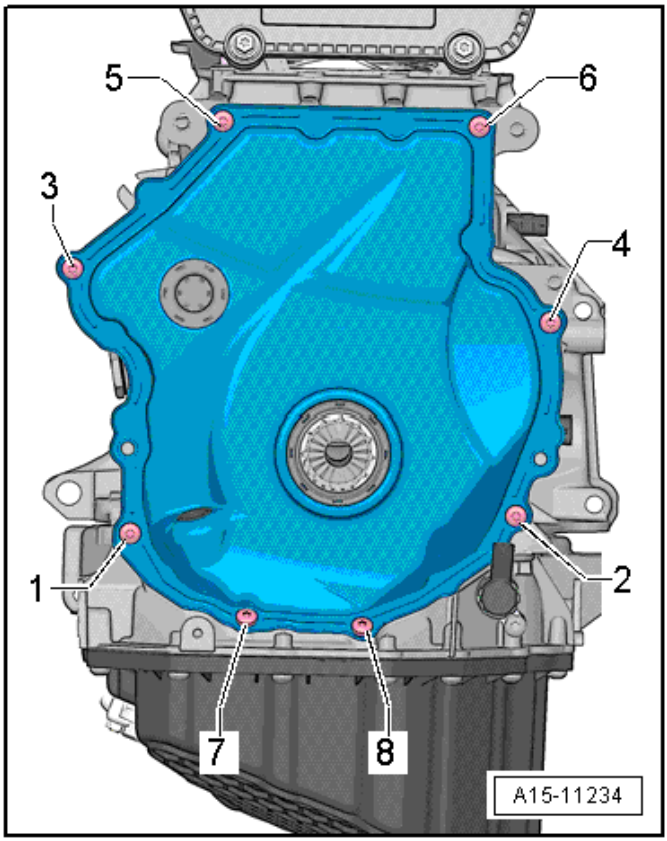
Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	9

Lower Timing Chain Cover for 15 Bolts Tightening Specifications



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

Lower Timing Chain Cover for 8 Bolts Tightening Specifications



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

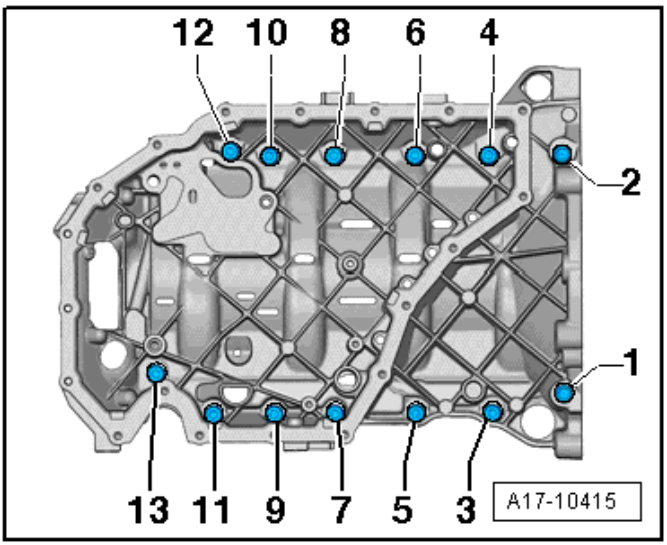
Lubrication – 2.0L CAED, CPMB

Fastener Tightening Specifications

Component	Nm
Chain tensioner-to-engine	9
Engine oil cooler-to-auxiliary components bracket	23
Intake line to oil pump bolt	9
Oil baffle-to-upper oil pan	9
Oil drain plug [1)]	30
Oil 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

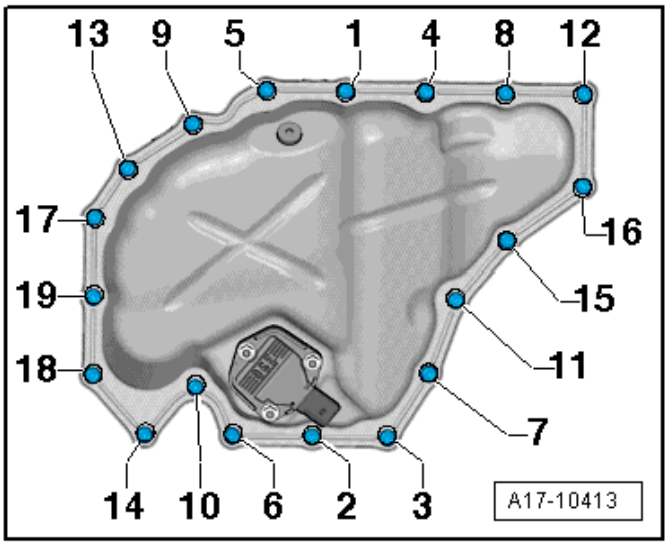
1) Replace fastener(s).

Upper Oil Pan Tightening Specifications



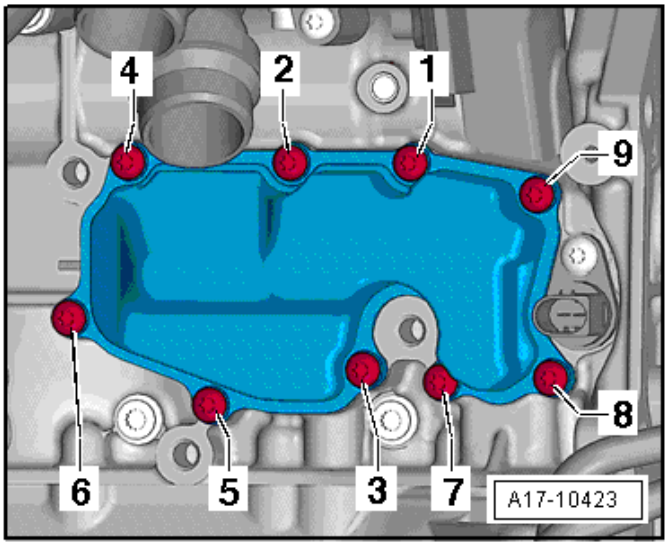
Step	Component	Nm
1	Tighten bolts 1 through 13 in sequence	15
2	Tighten bolts 1 through 13 in sequence	an additional 90° (¼ turn)

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

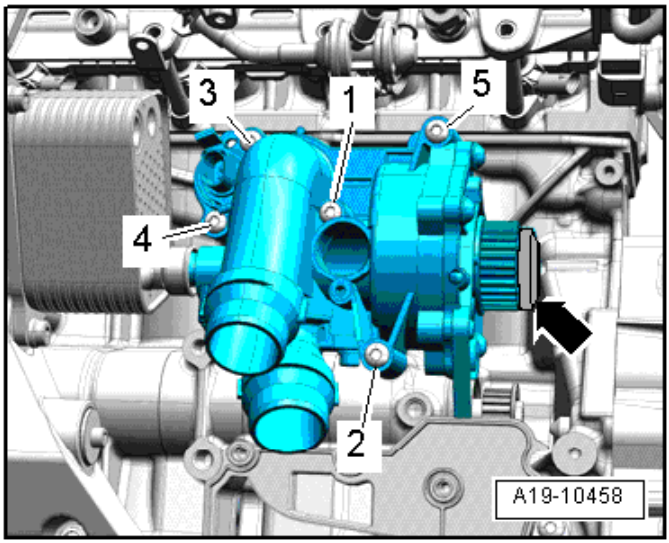
Cooling System – 2.0L CAED, CPMB

Fastener Tightening Specifications

Component	Nm
Bracket bolt [2]	4
Bracket bolt [3]	9
Connection to coolant pump bolt	9
Coolant fan control module to fan shroud bolt	2.5
Coolant hose bolt	9
Fan shroud bolt	5
Retaining plate bolt	4
Rubber buffer bolt	3.5
Small coolant pipe	6
Toothed belt drive gear to balance shaft bolt [1]	10 plus an additional 90° (¼ turn)
Toothed belt cover to coolant pump bolt	9

[1] Replace fastener(s).
[2] For bolt tightening clarification, refer to ElsaWeb, *Coolant Pipes Overview*, item 14.
[3] For bolt tightening clarification, refer to ElsaWeb, *Coolant Pipes Overview*, item 16.

Coolant Pump Tightening Specification



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

Fuel Supply – 2.0L CAED, CPMB

Fastener Tightening Specifications

Component	Nm
Accelerator pedal module mounting bolt	8
Carrier plate to fuel tank bolt	20
EVAP canister bolt	16
Fuel filler neck to body bolt	20
Fuel pump control module bolt	2.5
Fuel tank heat shield nut	2
Leak detection pump nut	5
Leak detection pump to EVAP canister bolt	4
Locking flange cover bolt	1.5
Shield to fuel filler tube bolt	8
Union nut [1)]	120

[1)] Replace fastener(s).

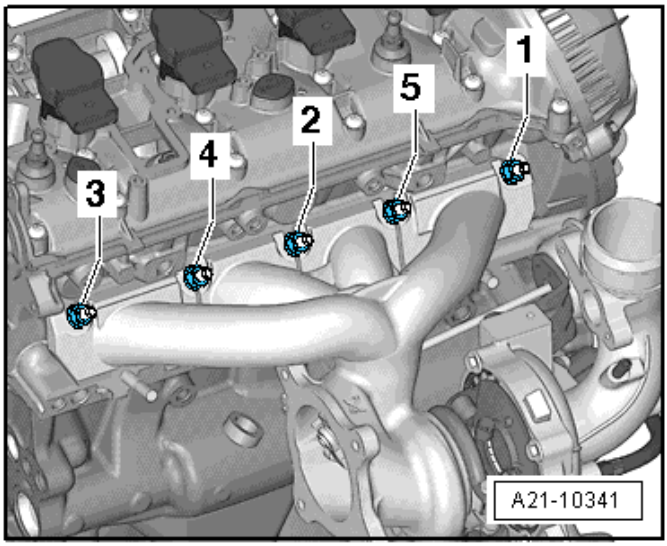
Turbocharger – 2.0L CAED, CPMB

Fastener Tightening Specifications

Component	Nm
Air guide pipe-to-bracket	10
Bracket bolt	30
Charge Air Cooler (CAC) bolt	7
Charge air pressure sensor bolt	5
Clamping strip nut [3) 5)]	30
Connection-to-turbocharger bolt	9
Coolant return line [3)]	9
	35
Crankcase ventilation pipe-to-turbocharger	9
Fastening strip nut [1)]	30
Hose clamp	5.5
Oil return line	9
Oil supply line to turbocharger [1)]	9
	30
Right air guide pipe-to-oil pan	10
Rubber grommet nut	9
Support bolt [3) 4)]	30
Turbocharger recirculating valve	7
Turbocharger vacuum diaphragm nut [6)]	9
Turbocharger vacuum diaphragm bolt	10
Wastegate bypass regulator valve	3

1) For bolt tightening clarification, refer to ElsaWeb, *Turbocharger Overview*, Part II items 6 and 8.
2) For bolt tightening clarification, refer to ElsaWeb, *Turbocharger Overview*, Part II items 12, 13 and 14.
3) Coat the bolt with hot bolt paste; Refer to the Parts Catalog
4) For bolt tightening clarification, refer to ElsaWeb, *Turbocharger Overview*, Part III items 11 and 12.
5) Replace fastener(s).
6) Secure with sealing wax; Refer to the Parts Catalog

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 CAED, CPMB

Fastener Tightening Specifications

Component	Nm
Bracket bolt	23
Catalytic converter nuts [1), 2)]	25
	40 [1) 4)]
Catalytic converter nut [3)]	25
	40 [1) 4)]
Front clamping sleeve nut	25
Rear clamping sleeve nut	25
Suspended mount [1)]	23

1) Replace fastener(s).
2) For bolt tightening clarification, refer to ElsaWeb, *Muffler Overview, Vehicles with a Rear Muffler*, items 10 and 12.
3) For bolt tightening clarification, refer to ElsaWeb, *Muffler Overview, Vehicles with two Rear Mufflers*, items 21 and 22 and 22.
4) Coat turbocharger stud bolts with hot bolt paste.

Fuel Injection and Ignition – 2.0L CAED, CPMB

Fastener Tightening Specifications

Component	Nm
Bonded rubber bushing	10
Bracket for the connectors bolt	4
Clamp for the high pressure line	5
Connection for fuel return line 3	40
Fuel line with bracket bolt	9
Fuel pressure sensor 2	27
Fuel Rail bolt (engine code CAED)	5
Fuel rail bolt (engine code CPMB)	9
Fuel return pipe union nut 2	27
High pressure line union nut 1	27
Intake air temperature sensor bolt	5
Intake manifold bolt/nut	
- Pre-tightening	3
- Final tightening	10
Intake manifold support	
- Bolt	20
- Nut	10
Intake manifold runner position sensor to intake manifold bolt	0.8
Low fuel pressure sensor	27
Oxygen sensor	55
Throttle valve control module to intake manifold bolt	7
Throttle valve control module to upper intake manifold bolt	9
Vacuum hose bolt	4

1) Coat the thread on the union nut with clean engine oil.
2) Coat the threads with clean engine oil.
3) Replace after removing.

Ignition/Glow Plug System – 2.0L CAED, CPMB

Technical Data

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

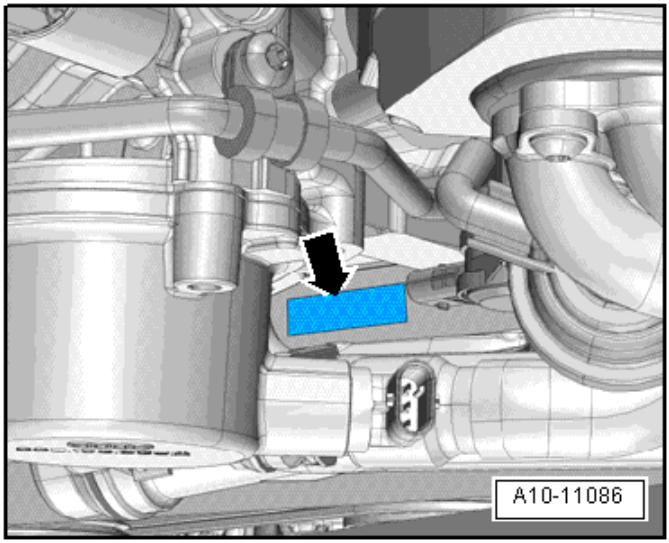
Fastener Tightening Specifications

Component	Nm
Camshaft Position Sensor (CMP)	9
Engine speed sensor	4.5
Knock Sensor (KS)	20

ENGINE MECHANICAL - 3.0L CGXC, CTUB

General, Technical Data

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. The fourth digit describes the engine output and torque.

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	95 [1)]
Fuel injection and ignition system		Simos
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		Yes
Secondary Air Injection (AIR) system		Yes
Valves per cylinder		4

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

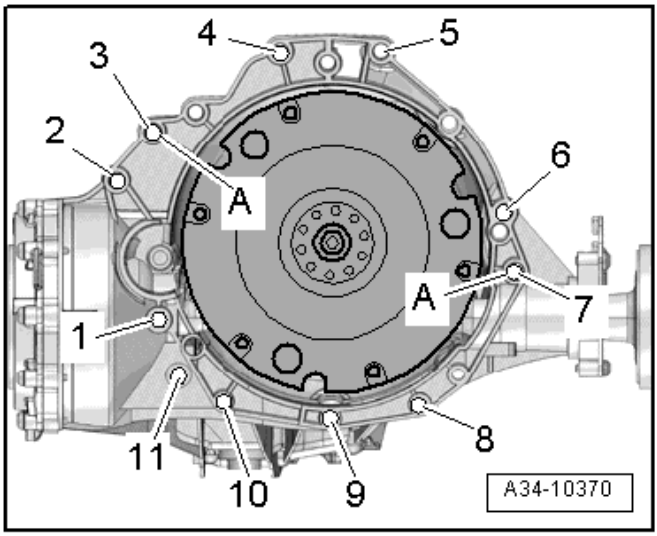
Engine Assembly – 3.0L CGXC, CTUB

Fastener Tightening Specifications

Component	Fastener size	Nm
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Engine mount [1)]	-	90 plus an additional 90° (¼ turn)
Engine support	-	40
Heat shield	-	10
Hydraulic oil hose bracket nut	-	9
Mounting plate	-	20
Power steering fluid hose bracket for vehicles with hydraulic power steering bolt	-	9
Strut tower ground bolt	-	9
Subframe	-	55

[1)] Replace fastener(s).

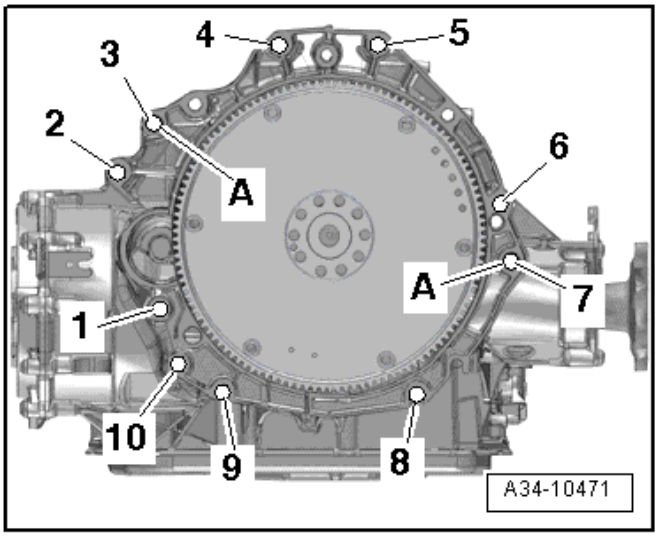
Engine to Manual Transmission Tightening Specifications



Item	Bolt	Nm
1	M10 x 50 [1)]	65
2 - 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 and 11	M10 x 60 [2)]	15 plus an additional 90° (¼ turn)
9 and 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
Tightening Specifications

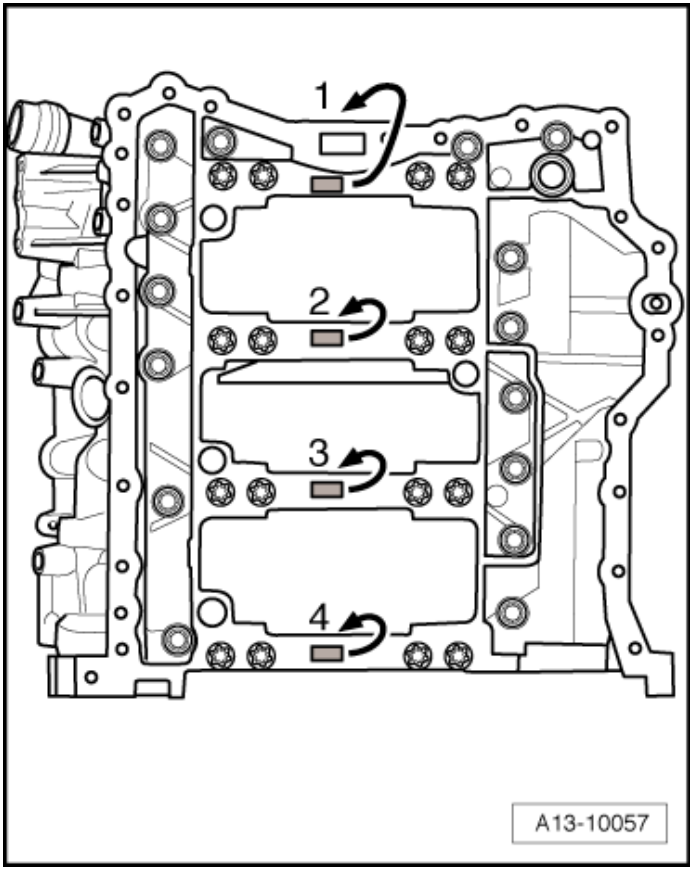


Item	Bolt	Nm
1	M10 x 50 [1)]	65
2 - 6	M12 x 100 [2)]	30 plus an additional 90° (¼ turn)
7	M12 x 125 [2)]	30 plus an additional 90° (¼ turn)
8	M10 x 60 [2)]	15 plus an additional 90° (¼ turn)
9 and 10	M10 x 95 [2)]	15 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	

• [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, CTUB

Allocation of Crankshaft Bearing Shells for Cylinder Block

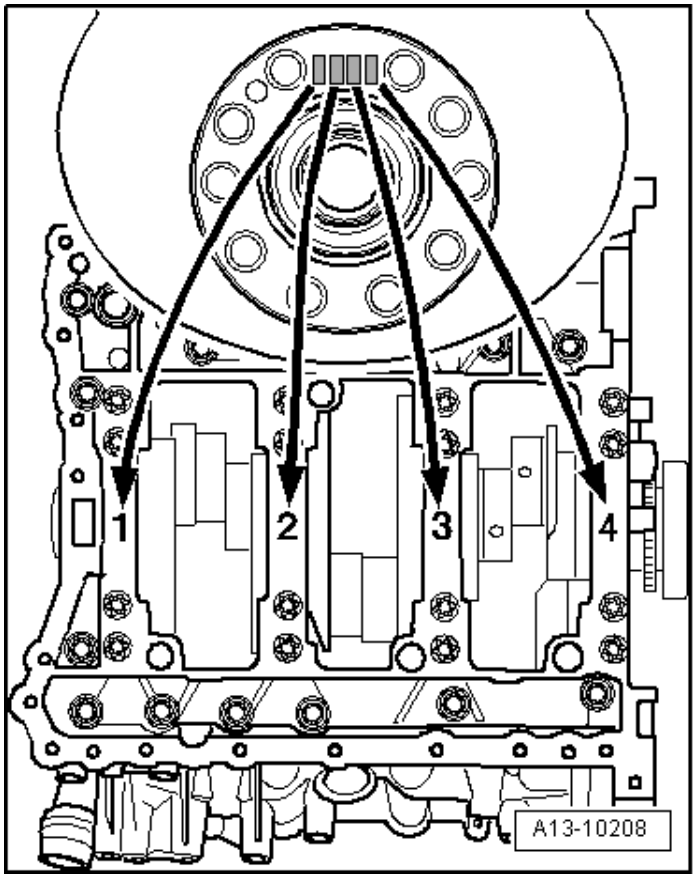


Bearing shells with the correct thickness are allocated to the cylinder block in the factory. Colored dots on the sides of the bearing shells identify the bearing shell thickness.

Allocation of the bearing shells to the cylinder block is marked by a letter on the respective bearing on the guide frame.

Letter on guide frame	Color of bearing
R	Red
G	Yellow
B	Blue
S	Black

Allocation of Crankshaft Bearing Shells for Guide Frame



Bearing shells with the correct thickness are allocated to the guide frame at the factory. Colored dots on the sides of the bearing shells identify the bearing shell thickness.

Allocation of the bearing shells to the guide frame is marked on the flywheel flange of the crankshaft by a row of letters. The first letter represents bearing 1, the second letter is for bearing 2, etc.

Letter on guide frame	Color of bearing
R	Red
G	Yellow
B	Blue
S	Black

Fastener Tightening Specifications

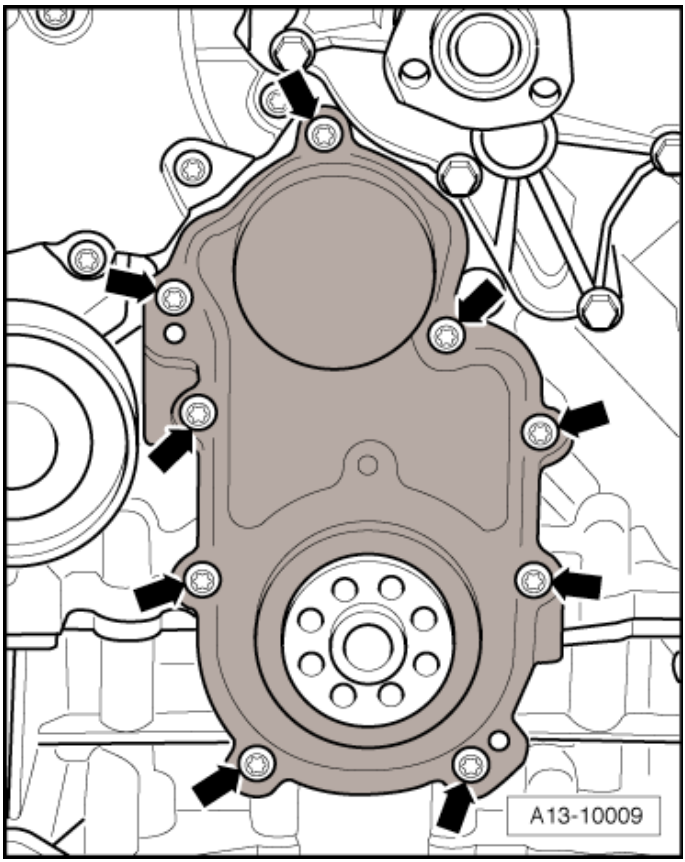
Component	Nm
Connecting rod [1]	50 plus an additional 90° (¼ turn)
Drive plate [1]	60 plus an additional 90° (¼ turn)
Oil pressure regulation valve	9
Piston cooling oil spray jet	9
Ribbed belt idler roller [3]	40
Ribbed belt idler roller [2]	40
Ribbed belt tensioning damper	40
“TDC” marking locking bolt	14
Vibration damper [1]	20 plus an additional 90° (¼ turn)

[1] Replace fastener(s).

[2] For bolt tightening clarification, refer to ElsaWeb, *Ribbed Belt Drive, Vehicles with Hydraulic Power Steering Overview*, item 6.

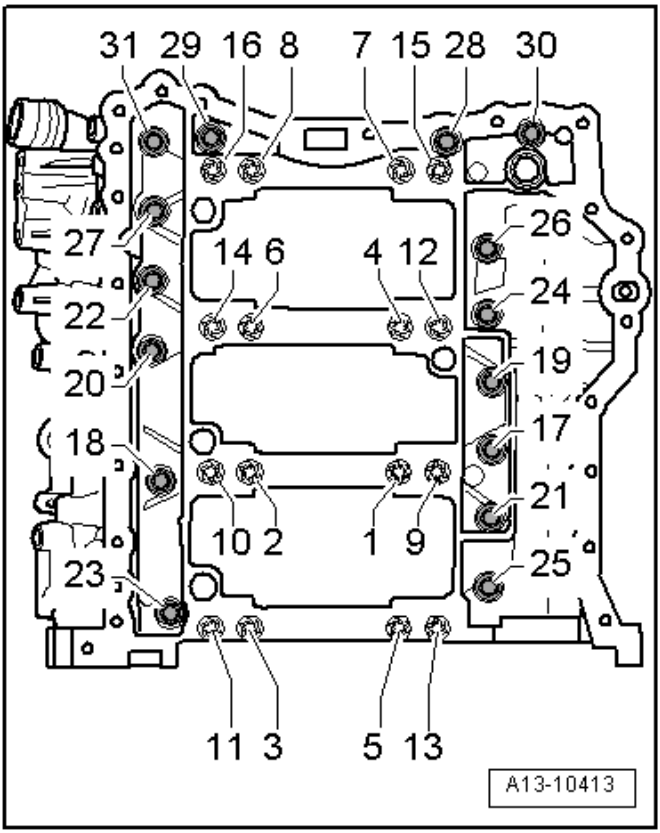
[3] For bolt tightening clarification, refer to ElsaWeb, *Supercharger Ribbed Belt Drive Overview*, item 2.

Ribbed Belt Sealing Flange Tightening Specification



Component	Nm
Tighten bolts (➡) in a diagonal sequence	9

Guide Frame Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 16 in sequence [1]	50
2	Tighten bolts 1 through 16 in sequence	an additional 90° (¼ turn)
3	Tighten bolts 17 through 31 in sequence	23
4	Tighten bolts 17 through 31 in sequence	an additional 90° (¼ turn)

[1] Replace fastener(s).

Crankshaft Dimensions

Honing dimension in mm	Crankshaft bearing pin diameter		Crankshaft connecting rod journal diameter	
Basic dimension	65.000	-0.022	56.000	-0.022
		-0.042		-0.042

Piston Ring End Gaps

Piston ring dimensions in mm	New	Wear limit
1st compression ring	0.20 to 0.30	0.80
2nd compression ring	0.50 to 0.70	0.80
Oil scraping ring	0.25 to 0.50	– [1]

[1] Not determined.

Piston Ring Clearance

Piston ring dimensions in mm	New	Wear limit
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] Dimension without graphite coating (thickness 0.02 mm). The graphite coating wears away.

Cylinder Head, Valvetrain – 3.0L CGXC, CTUB

Fastener Tightening Specifications

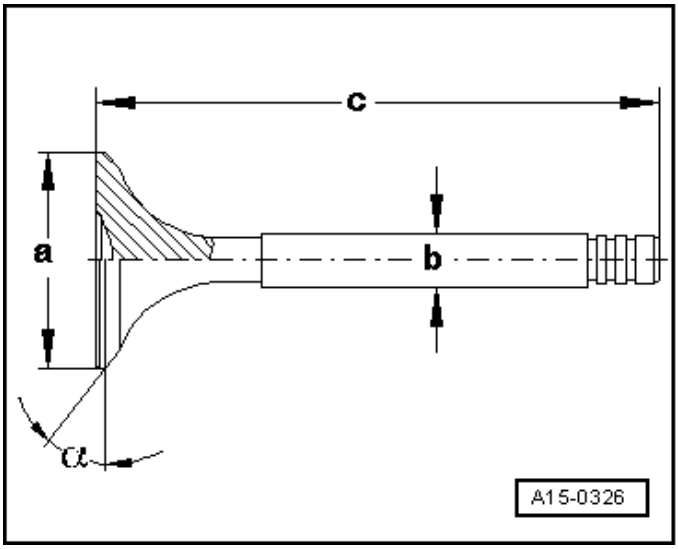
Component	Nm
Balance shaft belt pulley side	60
Balance shaft chain sprocket [1)]	15 plus an additional 90° (¼ turn)
Balance shaft transmission side	60
Camshaft adjustment solenoid valve	5
Chain tensioner [2)]	9
Chain tensioner with glide track [1), 3)]	10 plus an additional 45° (⅛ turn)
Drive chain sprocket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

1) Replace fastener(s).
2) For bolt tightening clarification, refer to ElsaWeb, *Timing Mechanism Drive Chain Overview,* item 7.
3) For bolt tightening clarification, refer to ElsaWeb, *Power Take-Off Drive Chain Overview,* item 8.

Compression Checking Specifications

Compression Pressure	Bar Pressure
New	11.0 to 14.0
Wear limit	10.0
Maximum difference between cylinders	3.0

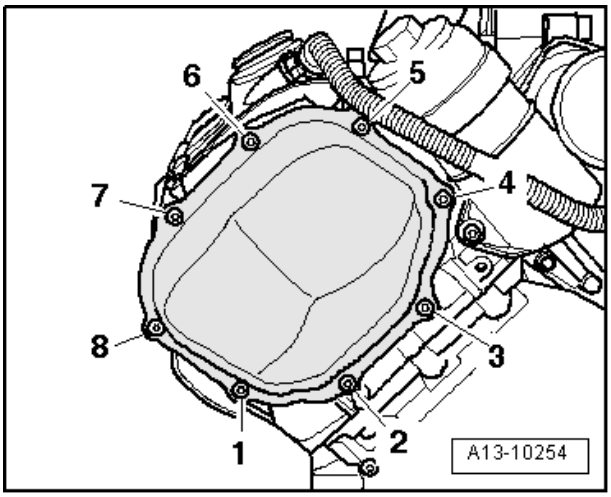
Valve Dimensions



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

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

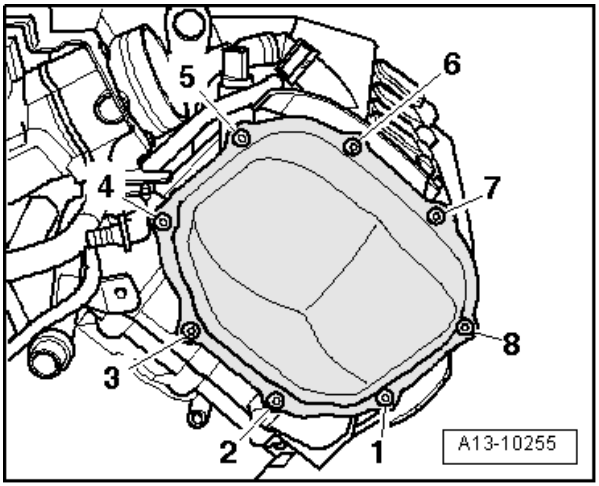
Left Timing Chain Cover Tightening Specifications



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

[1] Replace fastener(s).

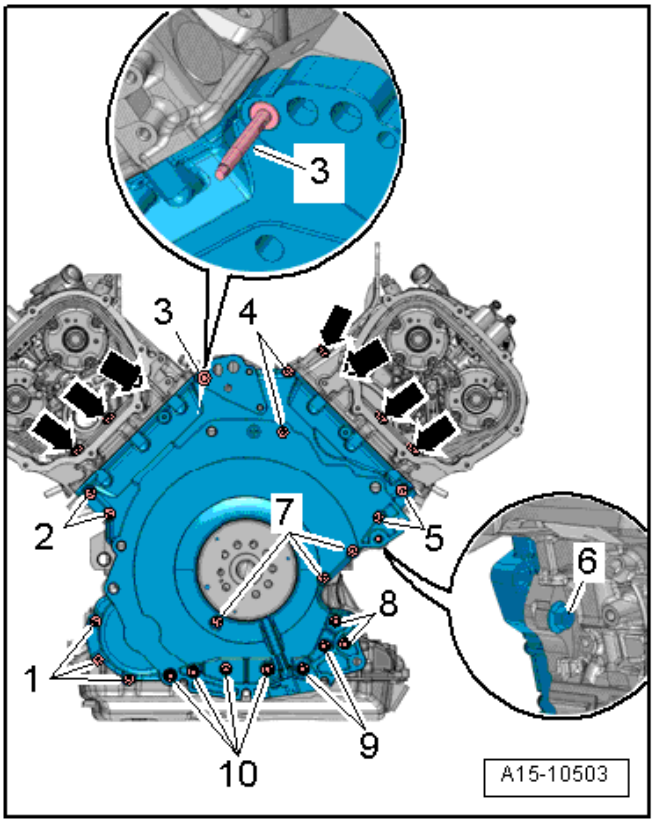
Right Timing Chain Cover Tightening Specifications



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

[1] Replace fastener(s).

Lower Timing Chain Cover with Aluminum Bolts Tightening Specifications



Step	Component	Nm
1	Tighten bolts (➡) [1]	3
2	Tighten bolts 1 through 10 in a diagonal sequence [1]	3
3	Tighten bolts 1, 2, 4, 5, 7, and ➡	an additional 90° (¼ turn)
4	Tighten bolts 8, 9 and 10	8
5	Tighten bolts 8, 9 and 10	an additional 90° (¼ turn)
6	Tighten bolt 3	16
7	Tighten bolt 6	20
8	Tighten bolt 6	an additional 90° (¼ turn)

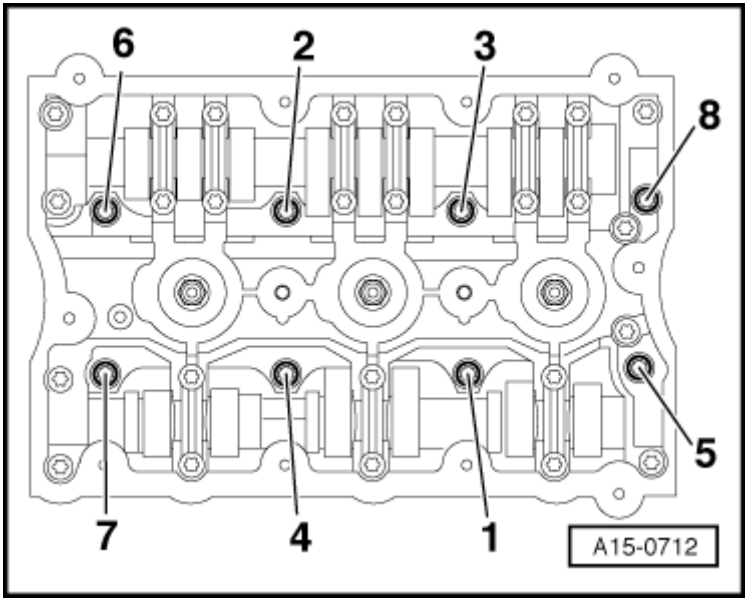
[1] Replace fastener(s) except bolt 3.

Lower Timing Chain Cover with Aluminum Bolts Tightening Specifications

Step	Component	Nm
1	Tighten bolts (➡) [1]	3
2	Tighten bolts 1 through 10 in a diagonal sequence [1]	3
3	Tighten bolts 1, 2, 4, 5, 7, and ➡	9
4	Tighten bolts 8, 9 and 10	20
6	Tighten bolt 3	16
7	Tighten bolt 6	70

[1] Replace fastener(s) except bolt 3.

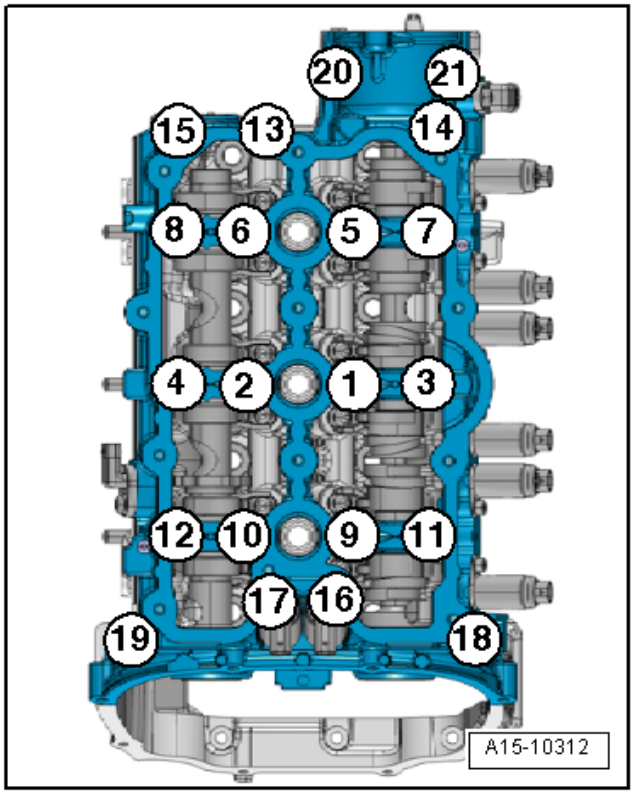
Cylinder Head Tightening Specifications



NOTE: The left cylinder head is shown. The right cylinder head is identical.

Step	Component	Nm
1	Replace and tighten bolts 1 through 8 in sequence	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)

Camshaft Guide Frame Tightening Specifications

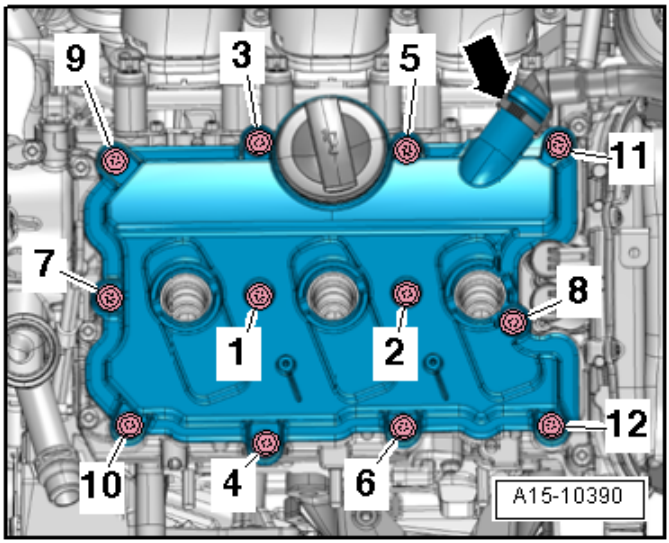


NOTE: The left cylinder head camshaft guide frame is shown.
The right cylinder head camshaft guide frame is identical.

Step	Component	Nm
1	Tighten bolts 1 through 21 in sequence [1) 2)]	Hand-tighten
2	Tighten bolts 1 through 21 in sequence	8
3	Tighten bolts 1 through 21 in sequence	an additional 90° (¼ turn)

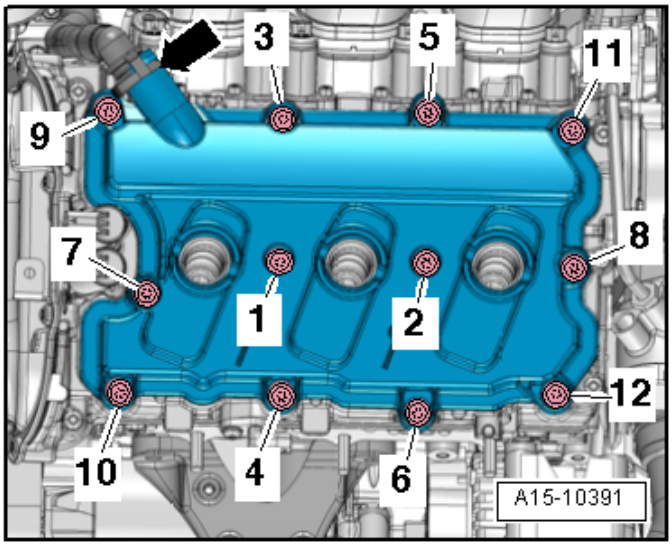
1) Replace fastener(s)
2) The guide frame must contact the entire contact surface of the cylinder head.

Left Cylinder Head Cover Tightening Specification



Step	Component	Nm
1	Tighten bolts 1 through 12 in sequence	9

Right Cylinder Head Cover Tightening Specification



Step	Component	Nm
1	Tighten bolts 1 through 12 in sequence	9

Lubrication – 3.0L CGXC, CTUB

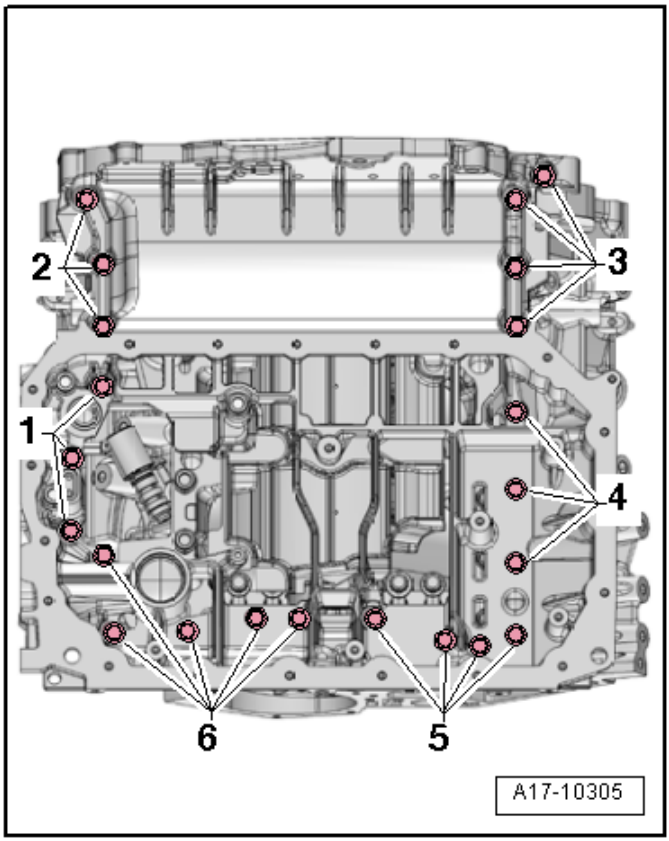
Fastener Tightening Specifications

Component	Nm
Bracket for driveshaft for oil pump	9
Chain sprocket for oil pump [1]	3 plus an additional 90° (¼ turn)
Cover with oil separator	2.5
Crankcase ventilation hose	2.5
Engine oil cooler	9
Lower oil baffle	
- Aluminum bolts [1]	3 plus an additional 90° (¼ turn)
- Steel bolts	9
Oil drain plug	30
Oil filter housing [2]	13
	9
Oil check valve	20
Oil filter housing cap	25
Oil level thermal sensor nut	9
Oil pressure switch	20
Oil pump	20
Oil pump chain sprocket [1]	30 plus an additional 90° (¼ turn)
Oil pump driveshaft bracket	9
Reduced oil pressure switch	20
Upper oil baffle	9

[1] Replace fastener(s).

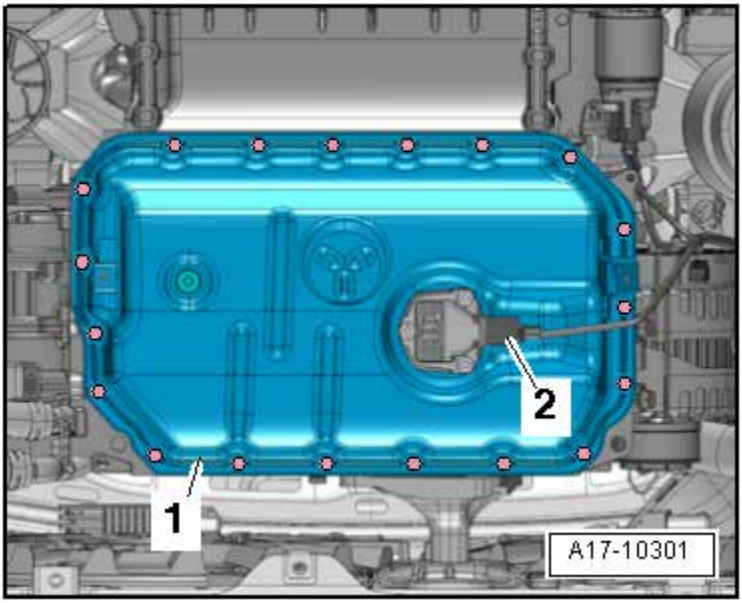
[2] For bolt tightening clarification, refer to ElsaWeb, *Oil Filter Housing and Oil Pressure Switch Overview,* items 1, 4, 5 and 13.

Upper Oil Pan Tightening Specifications



Bold Threads	Tightening Specification
M7	Diagonally in steps at least to 16 Nm
M8	Diagonally in steps at least to 20 Nm

Oil Pan Tightening Specifications



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

Cooling System – 3.0L CGXC, CTUB

Fastener Tightening Specifications

Component	Nm
After-run coolant pump-to-engine	4
After-run coolant pump bracket-to-engine	9
Bracket for front left coolant pipes	22
Bracket for left charge air cooling circuit radiator, nut	9
Bracket for charge air coolant pump, nut	9
Connecting piece for coolant hose	9
Coolant thermostat	9
Coolant pump	9
Engine temperature control sensor	3
Fan shroud, version 1	4.5
Fan shroud, version 2	3.5
Front charge air cooling circuit radiator	4.5
Front coolant pipe [3]	
- Bolt	2.5
- Bolt	9
Idler roller for ribbed belt	42
Left front coolant pipes [2]	3 plus an additional 90° (¼ turn)
Supercharger lower coolant pipe	5
Supercharger upper coolant pipe	9
Radiator bracket [1]	4.5
	5
Upper coolant piper on supercharger	9

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

[2] Replace

[3] For bolt tightening clarification, refer to ElsaWeb, *Coolant Pipes Overview*, items 6 and 7.

Fuel Supply – 3.0L CGXC, CTUB

Fastener Tightening Specifications

Component	Nm
Accelerator pedal module to pedal bracket bolt	8
Carrier plate to fuel tank bolt	20
EVAP canister bolt	16
Fuel filler neck to body bolt	20
Fuel pump control module bolt	2.5
Fuel tank heat shield nut	2
Locking flange cover bolt	1.5
Leak detection pump nut	5
Leak detection pump to EVAP canister bolt	4
Leak detection pump to EVAP canister bolt	8
Union nut [1)]	120

[1)] Replace fastener(s).

Turbocharger – 3.0L CGXC, CTUB

Fastener Tightening Specifications

Component	Nm
Bleeder screw	1.5 to 3.0
Changeover valves bracket	9
Charge air pressure sensor	10
Drive head [1)]	25
Engine lifting eye	27
Insulation plate	5
Left Charge Air Cooler (CAC) [1)]	10
Right Charge Air Cooler (CAC) [1)]	10
Structure borne sound actuator	5
Structure borne sound control module	5
Supercharger nut	20
Supercharger threaded pin	17

[1)] Replace fastener(s).

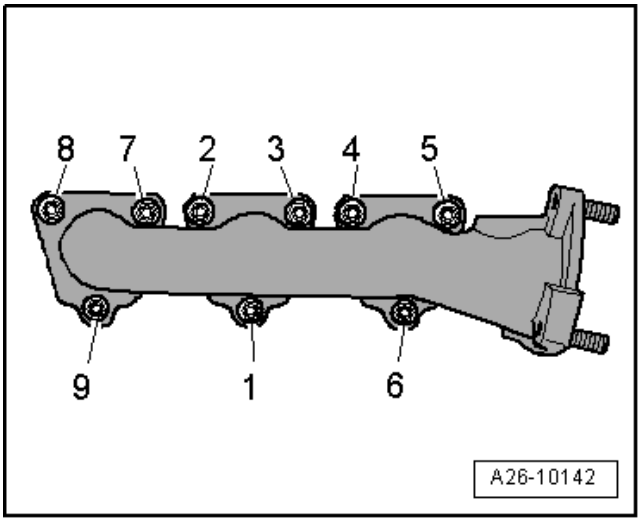
Exhaust System, Emission Controls – 3.0L CGXC, CTUB

Fastener Tightening Specifications

Component	Nm
Bracket for Secondary Air Injection (AIR) pump motor, nut and bolt	9
Bracket for the secondary air injection hose	9
Catalytic converter, nut [1) 4)]	23
Center muffler, nut [1)]	23
Front clamping sleeve, nut	23
Heat shield	9
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 bolt	9
Secondary air hose	9
Suspended mount [2)]	23
Suspended mount [1) 3)]	20

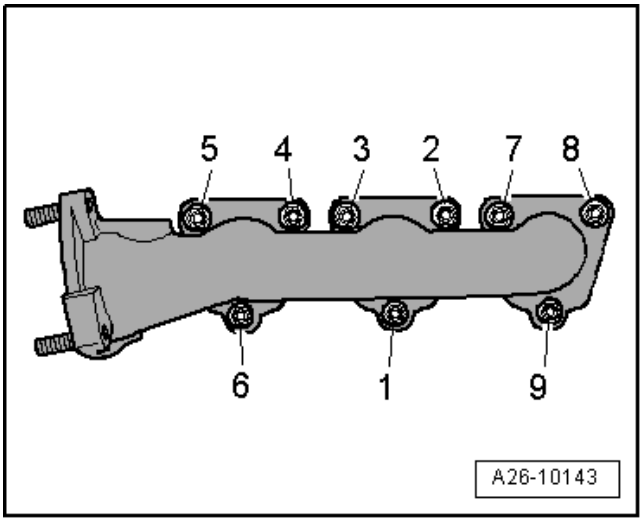
1) Replace fastener(s).
2) For bolt tightening clarification, refer to ElsaWeb, *Muffler Overview*, item 2 and 22.
3) For bolt tightening clarification, refer to ElsaWeb, *Muffler Overview,* item 16.
4) Coat the thread with hot bolt paste.

Left Exhaust Manifold Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 9 in sequence	Hand-tighten
2	Tighten bolts 1 through 9 in sequence	15
3	Tighten bolts 1 through 9 in sequence	25

Right Exhaust Manifold Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 9 in sequence	Hand-tighten
2	Tighten bolts 1 through 9 in sequence	15
3	Tighten bolts 1 through 9 in sequence	25

Multiport Fuel Injection – 3.0L CGXC, CTUB

Technical Data

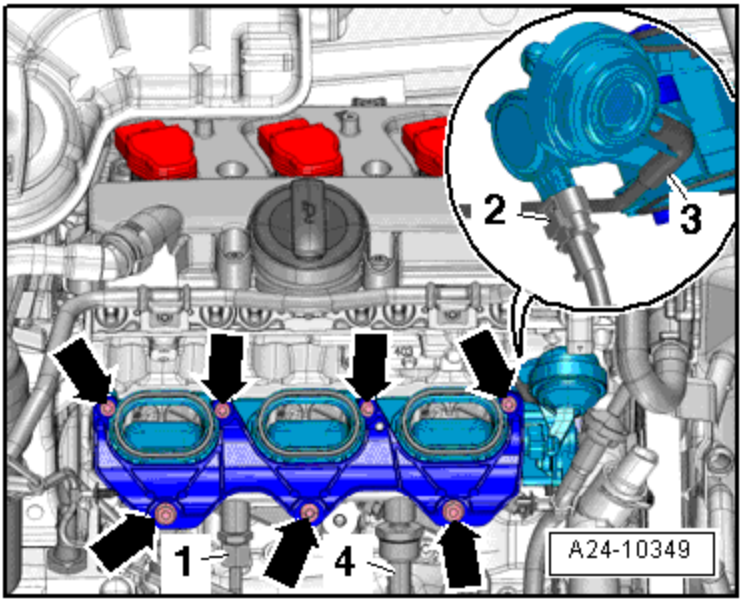
3.0L TFSI Engine	
Engine idle speed	Cannot be adjusted, it is regulated by idle stabilization
Fuel pressure before high pressure pump	3.0 to 6.0 bar pressure
Fuel pressure after high pressure pump	30 to 125 bar pressure

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 [1)]	22
Fuel rail retaining bracket [2)]	2.5
	9
High pressure fuel line	27
High pressure lines	27
High- pressure lines to bracket bolt	9
High pressure line shield nut	9
High Pressure Pump	
- Tighten by hand in a diagonal sequence	5
- Final tightening specification	20
Housing double bolt	9
Intake manifold runner position sensor to intake manifold runner control vacuum actuator bolt	2.5
Low fuel pressure sensor	15
Oxygen sensor [3)]	55
Threaded connection to fuel rail	40
Threaded connection to high pressure pump	27

1) Coat the thread with oil.
2) For bolt tightening clarification, ElsaWeb, *Lower Intake Manifold Overview*, items 10, 11 and 12.
3) Coat new oxygen sensors with an assembly paste

Lower Intake Manifold Tightening Specification



Component	Nm
Tighten bolts and nuts (➡) diagonally in stages	10

Ignition – 3.0L CGXC,CTUB

Technical Data

3.0L TFSI Engine		
Engine idle speed		Cannot be adjusted, it is regulated by idle stabilization
Ignition timing		Not adjustable, regulated by the Engine Control Module (ECM)
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 the Parts Catalog
	Tightening specifications	Maintenance Procedures Rep. Gr. 03
Ignition sequence		1-4-3-6-2-5

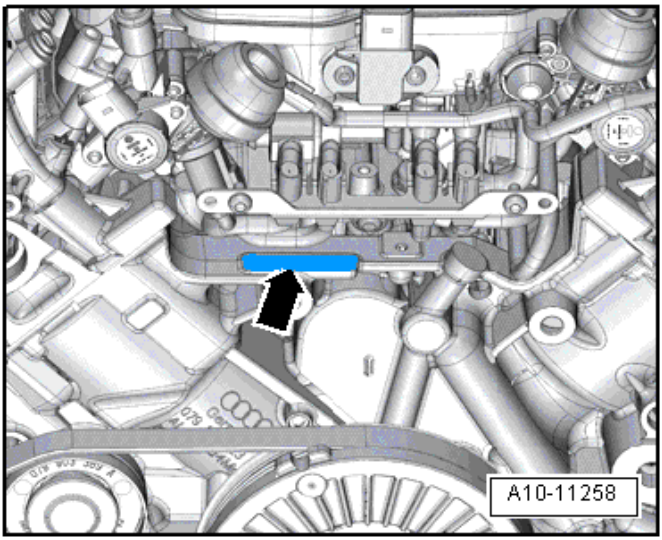
Fastener Tightening Specifications

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

ENGINE MECHANICAL - 4.2L CFSA

General, Technical Data

Engine Number Location



The engine number (➡) (engine code and serial number) is located at the front of the engine on top of the cylinder block. In addition, a sticker with the engine code and the serial number is affixed to the intake manifold. Engine codes beginning with "C" are four-digit. The first 3 digits of the engine code stand for 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 (ECM).

Engine Data

Identification codes		CFSA
Displacement	liter	4.163
Output	kW at RPM	331 @ 7000
Torque	Nm at RPM	440 @ 3500
Bore	diameter mm	84.5
Stroke	mm	92.8
Compression ratio		12.5
RON	at least	98 [1)]
Fuel injection and ignition system		Bosch Motronic
Ignition sequence		1-5-4-8-6-3-7-2
Turbocharger		No
Oxygen Sensor (O2S) regulation		2 sensors before catalytic converter 2 sensors after catalytic converter
Variable valve timing		Intake exhaust
Variable intake manifold		Yes
Secondary Air Injection (AIR) system		Yes
Valves per cylinder		4

1) Unleaded RON 95 is also permitted but performance is reduced.

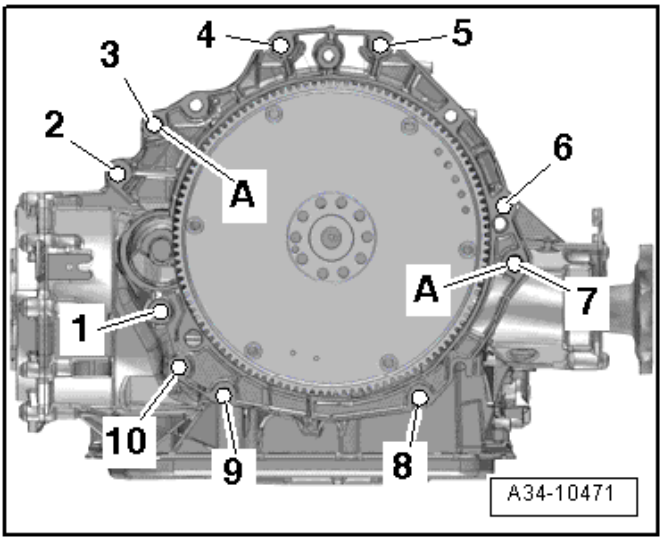
Engine Assembly – 4.2L CFSA

Fastener Tightening Specifications

Component	Fastener size	Nm
Air guide-to-tunnel crossmember	-	3
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Engine mount-to-engine support [1)]	-	90 plus an additional 90° (¼ turn)
Engine support	-	40
Ground wires-to-longitudinal member	-	9
Heat shield-to-engine support	-	10
Retaining plate-to-engine mount	-	20
Strut tower ground bolt	-	9
Subframe-to-retaining plate	-	55

1) Replace fastener(s).

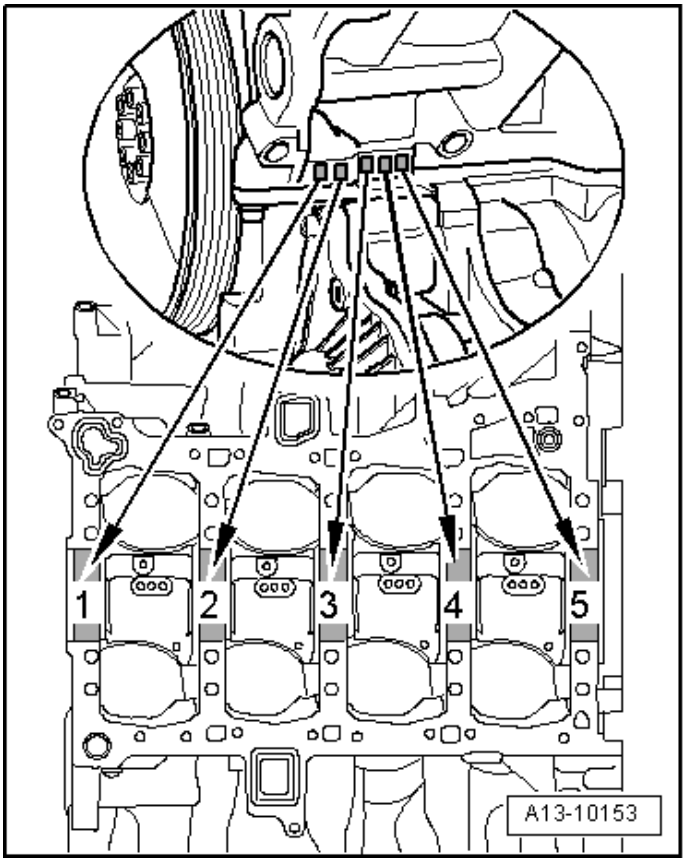
Engine to S tronic Transmission 0B5



Item	Bolt	Nm
1 [1]	M10 x 50 [2]	65
2 [1], 3, 4, 5, 6	M12 x 100 [3]	30 plus an additional 90° (¼ turn)
7	M12 x 175 [3]	30 plus an additional 90° (¼ turn)
8, 9, 10	M10 x 60 [3]	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 the steel bolt can be used again.
- [3] Aluminum bolts may be used two times

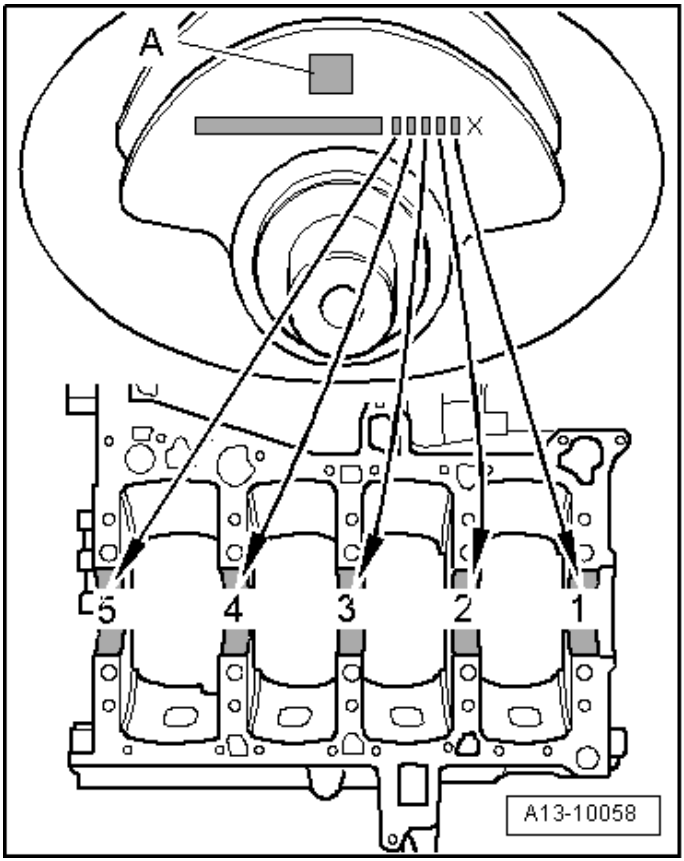
Allocation of Crankshaft Bearing Shells for Cylinder Block



Bearing shells with the correct thickness are allocated to the cylinder block in the factory. Colored dots on the sides of the bearing shells identify the bearing shell thickness. Allocation of the bearing shells to the cylinder block is marked by one letter each at the front left on cylinder block as shown in the illustration.

Letter on cylinder block	Color of bearing
R	Red
S	Black
G	Yellow
U	Green
B	Blue

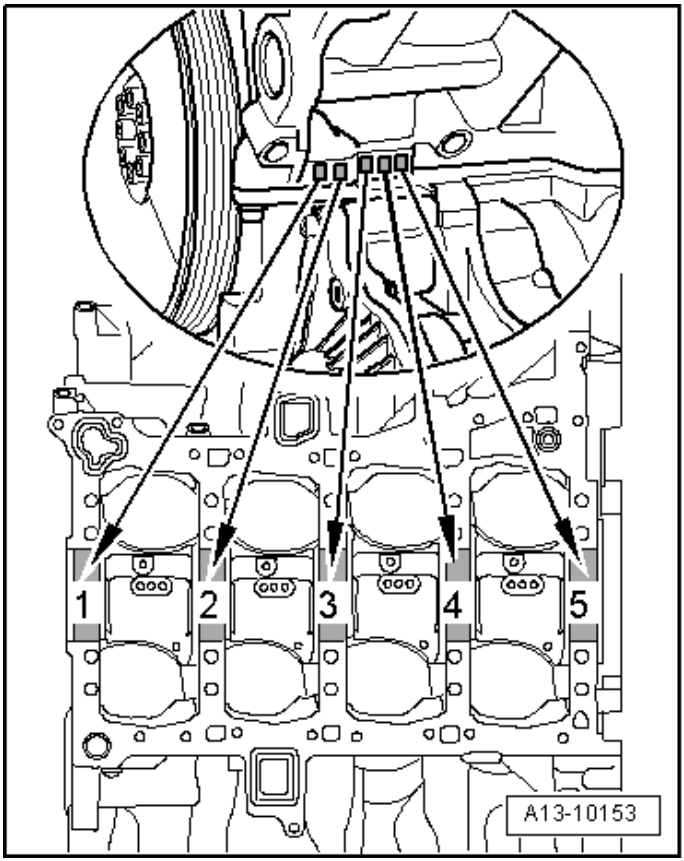
Allocation of Crankshaft Bearing Shells for Guide Frame



Bearing shells with the correct thickness are allocated to the guide frame in the factory. Colored dots on the sides of the bearing shells identify the bearing shell thickness. Allocation of the bearing shells to the guide frame is marked by one colored dot each on the crankshaft counterweight as shown in the illustration.

Letter on cylinder block	Color of bearing
R	Red
S	Black
G	Yellow
U	Green
B	Blue

Allocation of Main Bearing Shells, Used and Refaced Crankshafts



Bearing shells are allocated to cylinder block corresponding to color markings stamped into cylinder block. With used and refaced crankshafts, measure the main crankshaft journals to allocate the appropriate bearing shells. Thicker oversized bearing shells are available for refaced crankshafts. These have the same color markings as the original size bearing shells.

Letter on cylinder block	Color of bearing
R	Red
S	Black
G	Yellow
U	Green
B	Blue

Allocation of Crankshaft Bearing Shells for Guide Frame

- With used and reworked crankshafts, the crankshaft pivot pins must be measured to allocate the appropriate bearing shells.
- Any other markings on the crankshaft are invalid when reworking a crankshaft.
- Allocate bearing shells to the diameter of the main crankshaft pivot pins using the following table.

Crankshaft journal diameter	**Color Identification on the Bearing Shells for Bearings 1, 3 and 5 for the Guide Frame**		
Dimensions in mm	Yellow	Green	Blue
Basic dimension 67.000	66.974 to 66.970	66.969 to 66.964	66.963 to 66.958
Repair stage 66.750 [1)]	66.724 to 66.720	66.719 to 66.714	66.713 to 66.708

[1)] The same color marking applies to the thicker oversized bearing for reworked crankshafts as for a new crankshaft despite the greater bearing thickness

Crankshaft journal diameter	**Color Identification on the Bearing Shells for Bearings 2 and 4 for the Guide Frame**				
Dimensions in mm	Red	Black	Yellow	Green	Blue
Basic dimension 65.000	66.974 to 66.973	66.973 to 66.970	66.969 to 66.964	66.965 to 66.960	66.961 to 66.958
Repair stage 64.750 [1)]	66.724 to 66.723	66.723 to 66.720	66.719 to 66.714	66.715 to 66.710	66.711 to 66.708

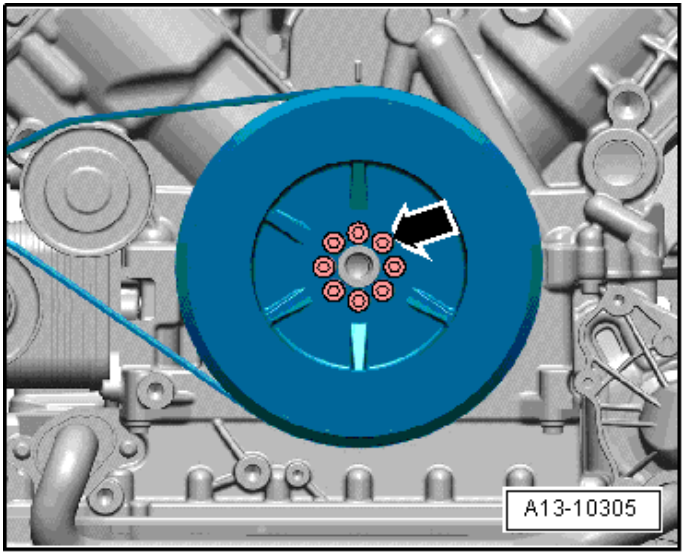
[1)] The same color marking applies to the thicker oversized bearing for reworked crankshafts as for a new crankshaft despite the greater bearing thickness

Fastener Tightening Specifications

Component	Nm
Connecting rod bearing cap [1) 4)]	40 plus an additional 120° (⅓ turn)
Drive plate [1)]	60 plus an additional 90° (¼ turn)
Generator	22
Generator bracket [3)]	46
Idler roller bracket	9
Oil dipstick guide tube	9
Oil spray jet [5)]	9
Ribbed belt idler roller	22
Ribbed belt tensioning damper [2)]	22
	55

1) Replace fastener(s).
2) For bolt tightening clarification, refer to ElsaWeb, *Ribbed Belt Drive Overview*, items 1 and 2.
3) For bolt tightening clarification, refer to ElsaWeb, *Ribbed Belt Drive Overview*, items 7 and 8.
4) Lubricate the threads and contact surface.
5) Insert bolts with locking compound.

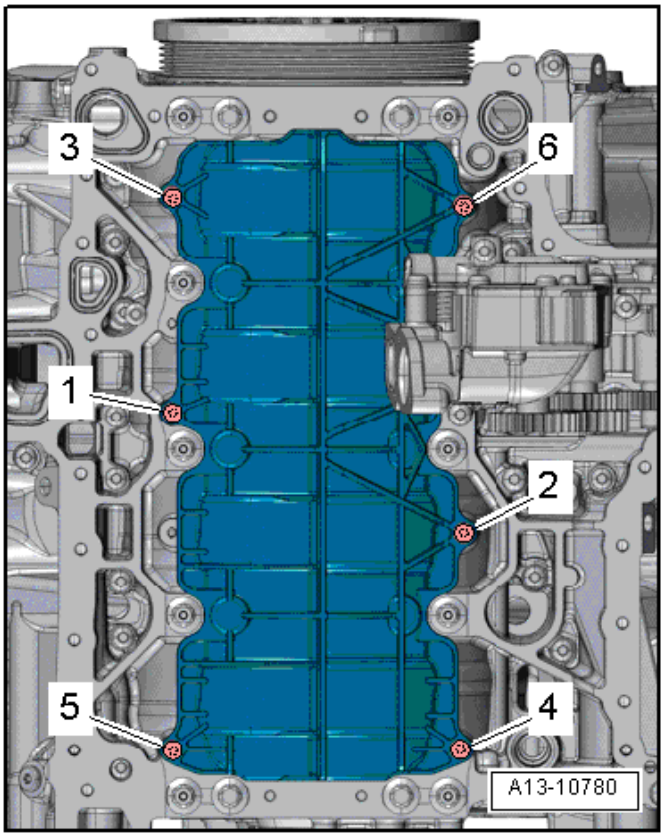
Vibration Damper Tightening Specifications



Step	Component	Nm
1	Tighten bolts in a diagonal sequence [1)]	15
2	Tighten bolts in a diagonal sequence	22
3	Tighten bolts in a diagonal sequence	an additional 90° (¼ turn)

[1)] Replace fastener(s).

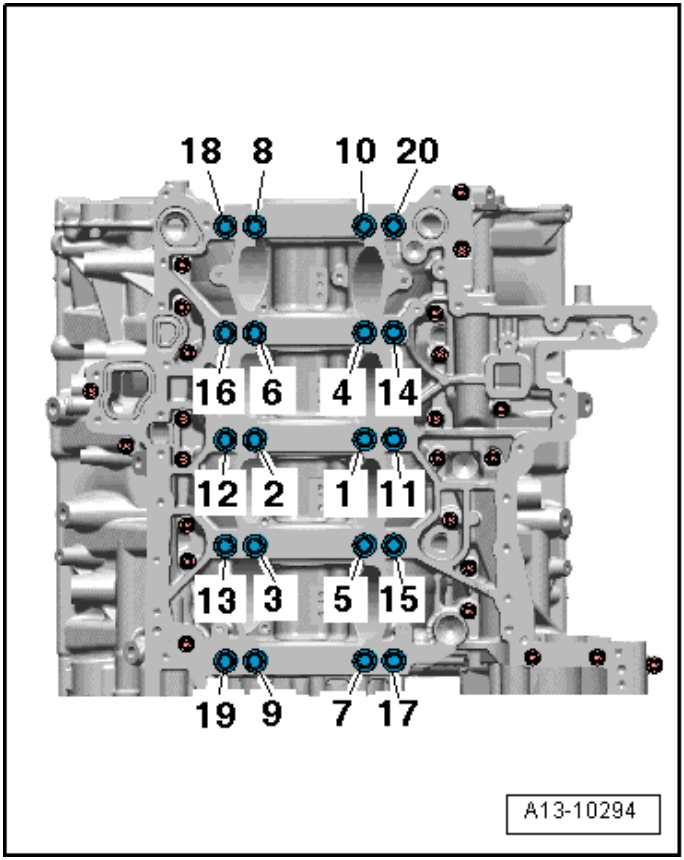
Baffle Plate Tightening Specification



Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence [1)]	5
2	Tighten bolts 1 through 6 in sequence	an additional 90° (¼ turn)

[1)] Replace fastener(s).

Guide Frame Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	30
2	Tighten bolts 11 through 20 in sequence	30
3	Tighten bolts 1 through 10 in sequence	50
4	Tighten bolts 11 through 10 in sequence	an additional 90° (¼ turn)
5	Tighten bolts 11 through 20 in sequence	50
6	Tighten bolts 11 through 20 in sequence	an additional 90° (¼ turn)
Tighten the guide frame to cylinder block sealing surface bolts, -highlighted in dark-, in a diagonal sequence to 9 Nm.		

Crankshaft Dimensions

Honing dimension in mm	Crankshaft bearing journal diameter		Connecting rod journal diameter	
Basic dimension	67.000	-0.026	54.000	-0.024
		-0.042		-0.040
Repair stage	66.750	-0.026	53.750	-0.024
		-0.042		-0.040

Piston Ring End Gaps

Piston ring dimensions in mm	New	Wear limit
1st compression ring	0.20 to 0.35	0.80
2nd compression ring	0.20 to 0.40	0.80
Oil scraping ring	0.20 to 0.40	0.80

Piston Ring Clearance

Piston ring dimensions in mm	New	Wear limit
1st compression ring	0.020 to 0.070	0.200
2nd compression ring	0.005 to 0.045	0.150
Oil scraping ring	0.020 to 0.060	0.200

Piston Dimensions

Piston diameter mm	
Manufacturing stage I nominal size	84.490 [1)]
Manufacturing stage II nominal size	84.590 [1)]

[1)] Measurement with graphite coating (thickness 0.01 mm). The graphite coating wears away.

Cylinder Bore Dimensions

Cylinder bore diameter mm	
Manufacturing stage I nominal size	84.510 ± 0.005
Manufacturing stage II nominal size	84.610 ± 0.005

Cylinder Head, Valvetrain – 4.2L CFSA

Fastener Tightening Specifications

Component	Nm
Camshaft Adjuster for Exhaust Camshaft [1]	80 plus an additional 90° (¼ turn
Camshaft Adjuster for Intake Camshaft [1]	80 plus an additional 90° (¼ turn
Camshaft Adjustment Valve 2	2.4
Exhaust camshaft adjustment valve 2	2.4
Chain Tensioner for the Left Camshaft Control Chain [1]	5 plus an additional 90° (¼ turn)
Chain Tensioner for the left camshaft control chain [1]	5 plus an additional 90° (¼ turn)
Chain Tensioner [1] [2]	5 plus an additional 90° (¼ turn)
Chain Tensioner for the left camshaft control chain [1]	5 plus an additional 90° (¼ turn)
Chain Tensioner with Glide Track [1]	5 plus an additional 90° (¼ turn)
Drive Sprocket Bracket	9
Drive Sprocket for the Left Camshaft Control Chain	22
Guide Track [1]	17 plus an additional 90° (¼ turn)
Heat shield, Nut	9
Idler Sprocket Bracket [1]	5 plus an additional 90° (¼ turn)
Mounting Pin for Idler Sprocket	42
Mounting Pin for the Right Camshaft Timing Chain Drive Sprocket	9
Sealing Plug	45
Thrust Washer for Drive Sprocket	22

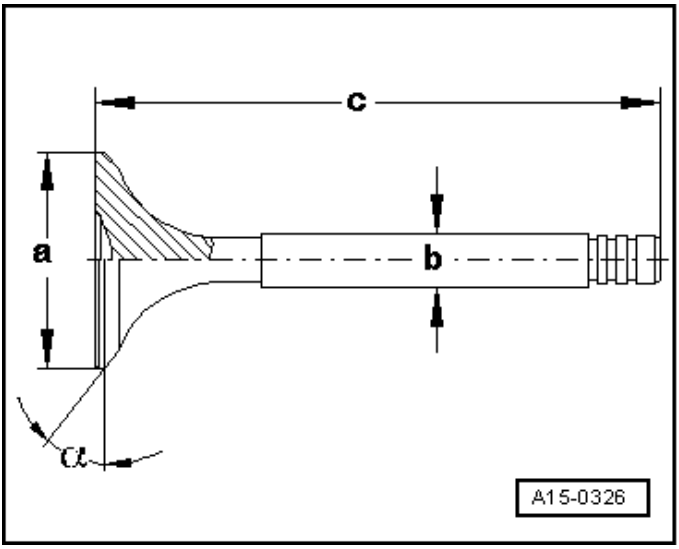
[1] Replace fastener(s).

[2] For bolt tightening clarification, refer to ElsaWeb, *Timing Mechanism Drive Chain Overview*, items 16 and 17.

Compression Checking Specifications

Compression pressure	Bar pressure
New	10.0 to 14.0
Wear limit	9.0
Maximum difference between cylinders	3.0

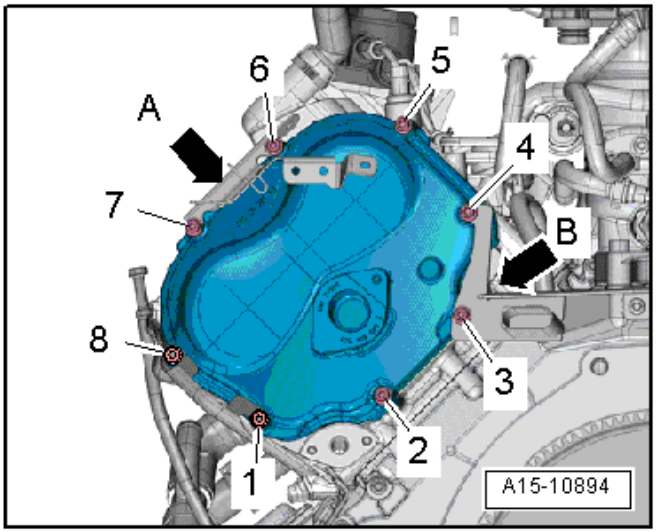
Valve Dimensions



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	103.97 ± 0.20	101.9 ± 0.2
α	∠°	45	45

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

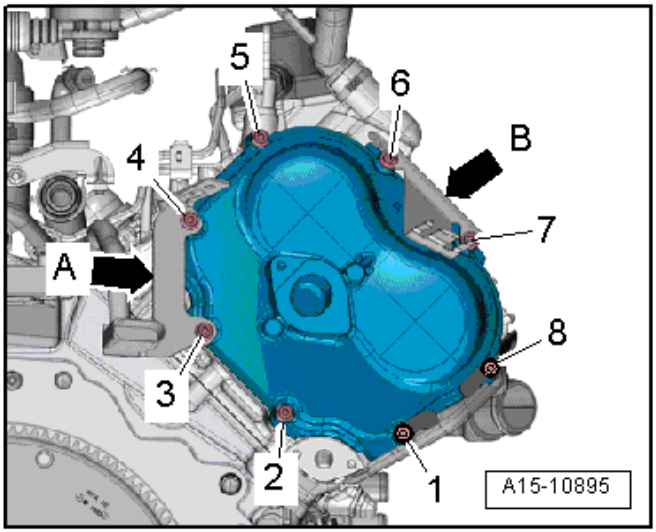
Left Timing Chain Cover Tightening Specification



Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	9

Brackets A and B are connected to the left timing chain cover.

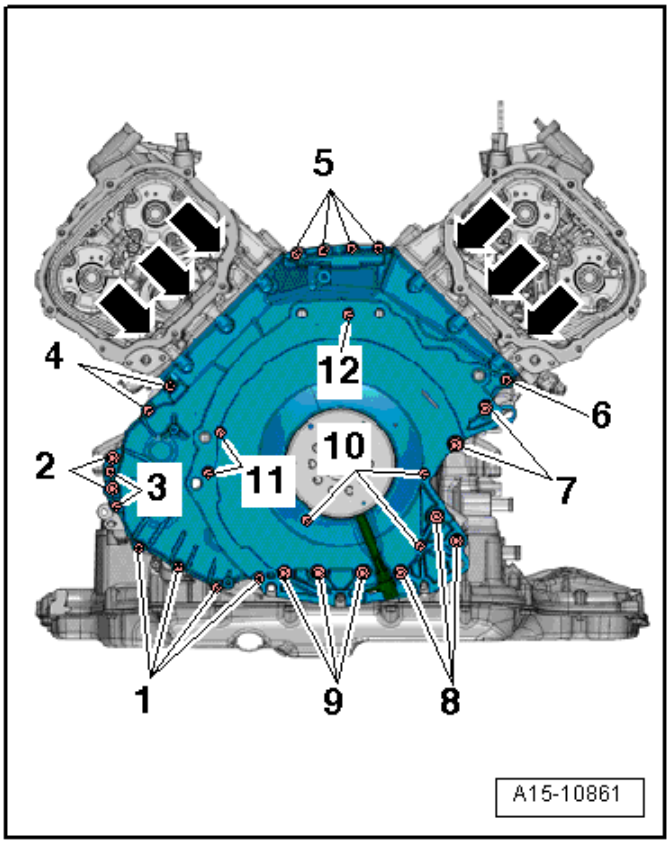
Right Timing Chain Cover Tightening Specification



Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	9

Brackets A and B are connected to the right timing chain cover.

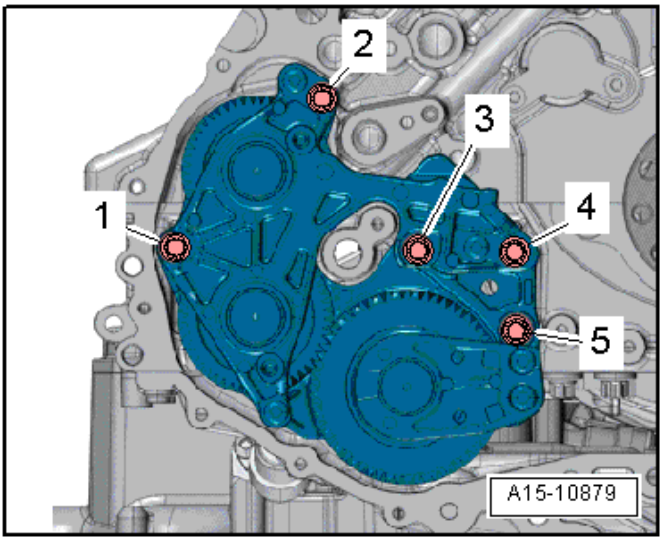
Lower Timing Chain Cover Tightening Specifications



Step	Component	Nm
1	Tighten bolts (➡) [1]	5
2	Tighten bolts 1 through 12 in a diagonal sequence	8
3	Tighten bolts (➡)	11
4	Tighten bolts 2, 7, 8 and 9 in a diagonal sequence	22
5	Tighten bolts 1, 3, 4, 5, 6, 10, 11, and 12 in a diagonal sequence	an additional 90° (¼ turn)
6	Tighten bolts (➡)	an additional 90° (¼ turn)

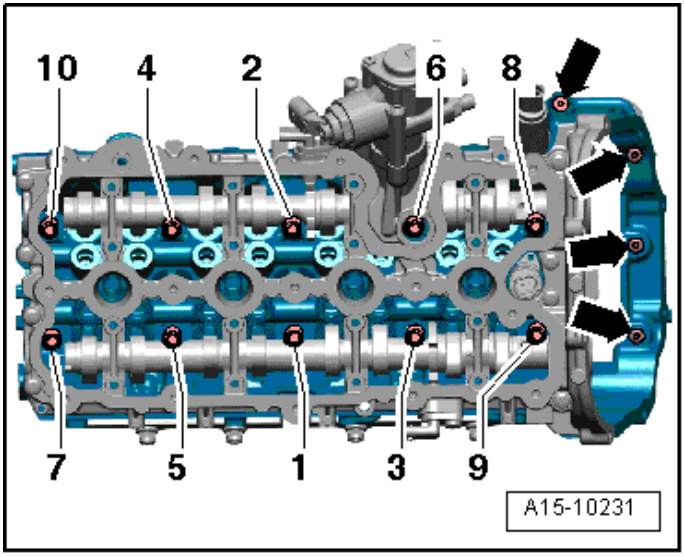
[1] Install using locking fluid for the correct locking fluid refer to the Parts Catalog

Spur Gear Unit Tightening Specification



Step	Component	Nm
1	Tighten bolts 1 through 5 in a diagonal sequence	22

Cylinder Head Tightening Specifications



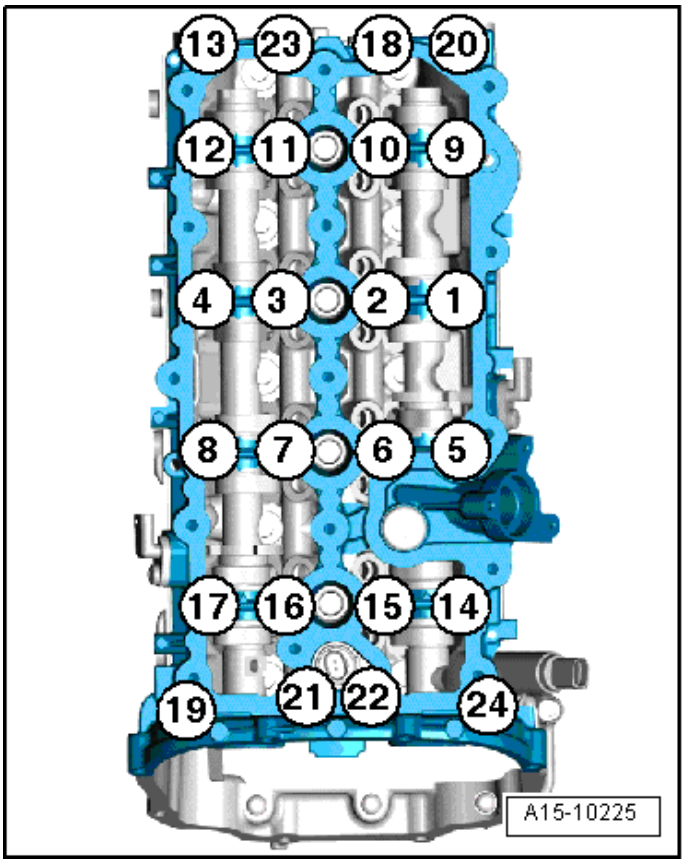
NOTE: Tighten both cylinders heads in the same sequence.

Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence [1]	Hand-tighten
2	Tighten bolts 1 through 10 in sequence	30
3	Tighten bolts 1 through 10 in sequence	60
4	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)
5	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)
6	Tighten bolts (➡) [1] [2]	11
7	Tighten bolts (➡)	an additional 90° (¼ turn)

[1] Replace fastener(s).

[2] Install using locking fluid. For the correct locking fluid, refer to the Electronic Parts Catalog (ETKA).

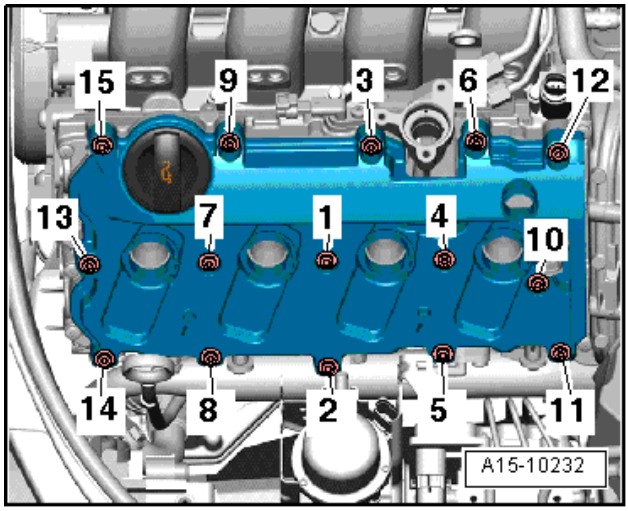
Camshaft Guide Frame Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 24 in sequence [1]	Hand-tighten [2]
2	Tighten bolts 1 through 24 in sequence	8
3	Tighten bolts 1 through 24 in sequence	an additional 90° (¼ turn)

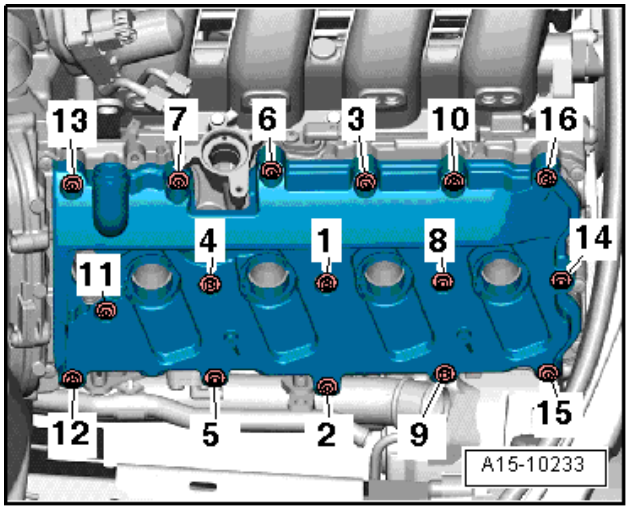
[1] Replace fastener(s).
[2] The guide frame must be in contact with the entire contact surface of the cylinder head.

Left Cylinder Head Cover Tightening Specification



Step	Component	Nm
1	Tighten bolts 1 through 15 in sequence	9

Right Cylinder Head Cover Tightening Specification



Step	Component	Nm
1	Tighten bolts 1 through 16 in sequence	9

Lubrication – 4.2L CFSA

Fastener Tightening Specifications

Component	Nm
Air guide to front engine oil cooler	7
Bracket for ATF pipes, nut	9
Bracket for the front engine oil cooler	
- Bolt	9
- Nut	6
Engine oil temperature regulator	9
Hose/line assembly for engine oil [1]	9
Hose/line assembly for engine oil [2]	9
Housing for oil check valve [3]	5 plus an additional 90° (¼ turn)
Intake tube for oil pump [3]	5 plus an additional 45° (⅛ turn)
Lock carrier	9
Oil drain plug	25
Oil filter housing lower bolt	9
Oil filter housing upper bolt	22
Oil filter housing cap	25
Oil filter housing bracket	9
Oil level thermal sensor nut	9
Oil pipe	9
Oil pipes [4]	9
Oil pressure regulation valve	9
Oil pressure switch	20
Oil pump [3]	8 plus an additional 90° (¼ turn)
Oil return pipe	9
Oil temperature sensor	9
Reduced oil pressure switch	20
Sealing plug	50
Spray nozzle valve cover [3]	5 plus an additional 90° (¼ turn)

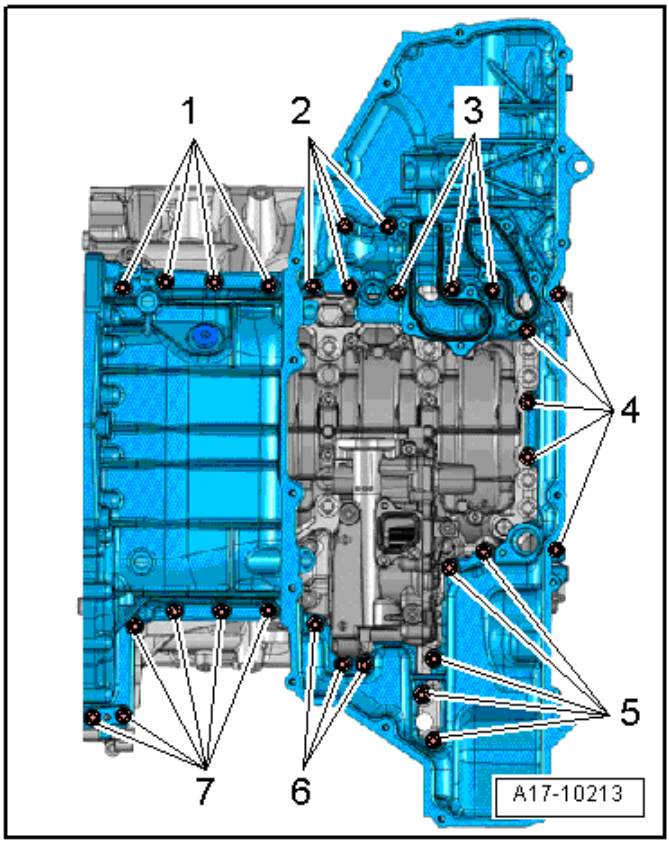
[1] For bolt tightening clarification, refer to ElsaWeb, *Engine Oil Cooler Overview,* items 5 and 18

[2] For bolt tightening clarification, refer to ElsaWeb, *Engine Oil Cooler Overview,* items 6, 7, 9, 10 and 11.

[3] Replace fasteners

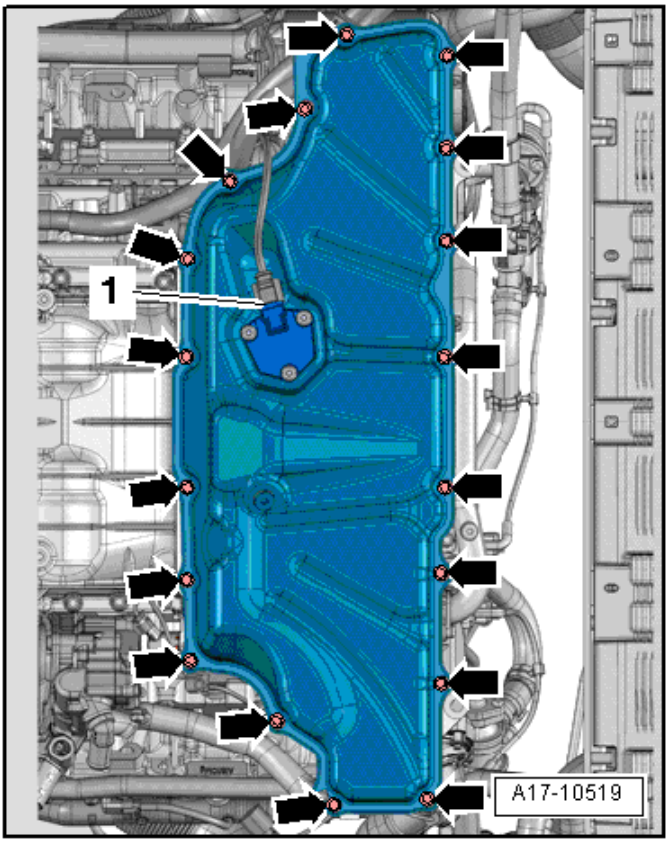
[4] For bolt tightening clarification, refer to ElsaWeb, *Engine Oil Pump and Lower Oil Pan Overview,* items 7, 8, 14, 15 and 18

Upper Oil Pan Tightening Specifications



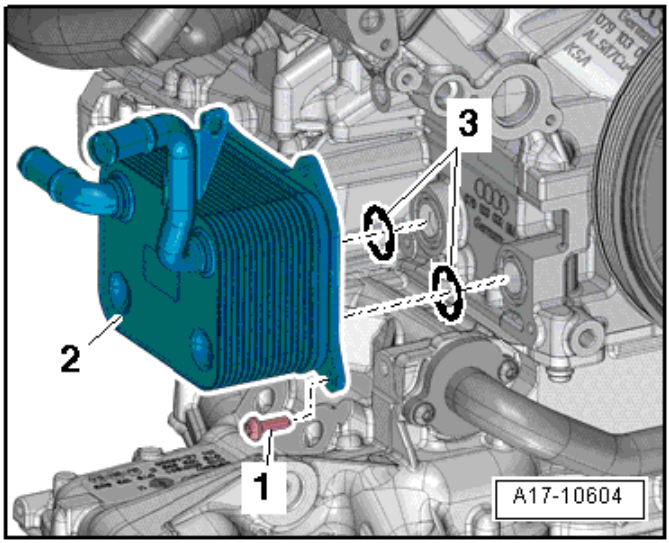
Step	Component	Nm
1	Tighten bolts 1 through 7 in a diagonal sequence	Hand-tighten
2	Tighten bolts 1 through 7 in a diagonal sequence	5
3	Tighten bolts 1 through 7 in a diagonal sequence	an additional 90° (¼ turn)

Lower Oil Pan Tightening Specifications



Step	Component	Nm
1	Tighten bolts in a diagonal sequence	Hand-tighten
2	Tighten bolts in a diagonal sequence	5
3	Tighten bolts in a diagonal sequence	9

Oil Cooler Tightening Specifications



Step	Component	Nm
1	Tighten bolt	3
2	Tighten bolt	9

Cooling System – 4.2L CFSA

Coolant Thermostat Opening Data

The coolant thermostat cannot be checked with workshop equipment.

Opening Begins	Opening Ends	Opening Lift	Voltage at Thermostat
Approximately 105 °C (221 °F)	Approximately 117 °C (243 °F)	Minimum 8 mm	0 V
-	Approximately 105 °C (221 °F)	Minimum 8 mm	14 V

Fastener Tightening Specifications

Component	Nm
After-Run coolant pump	5
Bracket for auxiliary cooler	
- Bolt	3.5
- Nut	8
Bracket for the electrical connectors	9
Bracket for radiator [2)]	4.5
Clamp	9
Coolant pump housing	9
Coolant pump	9
Drain plug for front coolant pipe	15
Drain plug for map controlled engine cooling thermostat	4
Engine Coolant Temperature (ECT) sensor	9
Fan shroud	5
Front coolant pipe [1)]	8 plus an additional 90° (¼ turn)
Front coolant pipe to coolant pump housing	9
Front upper coolant pipe	9
map controlled engine cooling thermostat	9

1) Replace fastener(s)..
2) For bolt tightening clarification, refer to ElsaWeb, *Radiator Overview*, items 26 and 28.

Fuel Supply – 4.2L CFSA

Fastener Tightening Specifications

Component	Nm
Accelerator pedal module mounting bolt	8
Carrier plate	20
EVAP canister bolt	16
Fuel delivery unit union nut [1)]	120
Fuel filler neck-to-body mounting bolt	20
Fuel pump control module mounting bolt	2.5
Fuel tank heat shield mounting nut	2
Leak Detection Pump (LDP) air filter mounting nut	5
Leak detection pump to EVAP canister bolt	4
Locking flange cover mounting bolt	1.5
Protective plate for fuel filler tube	8

1) Replace fastener(s).

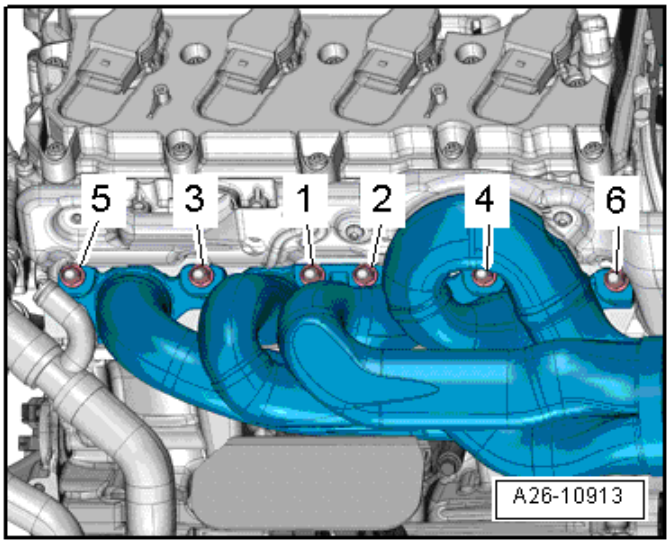
Exhaust System, Emission Controls – 4.2L CFSA

Fastener Tightening Specifications

Component	Nm
Adjusting buffer	23
Air filter housing for secondary air injection pump	9
Bracket [3]	23
Bracket for secondary air injection pump, bolt/nut	9
Center muffler, nut	23
Connecting piece	5
Connecting pipe to the left cylinder head	9
Exhaust manifold with catalytic converter [1] [2]	23
Front clamping sleeve, nut	23
Hose for secondary air	
- Bolt	5
- Nut	9
Rear clamping sleeve, nut	23
Securing strip [1] [2]	25
Suspended mount, nut	20
Tab	23

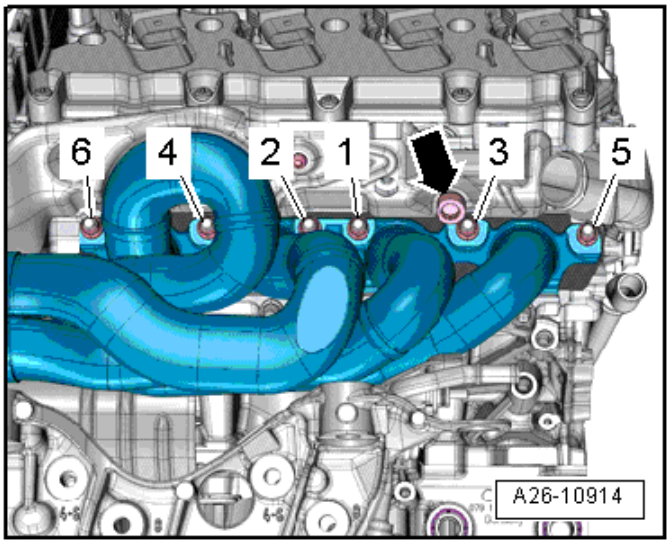
[1] Replace fastener(s).
[2] Lubricate with hot bolt paste.
[3] For bolt tightening clarification, refer to ElsaWeb, *Evaporative Emission Canister and Leak Detection System Overview*, items 4 and 5.

Left Exhaust Manifold Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence	Hand-tighten
2	Tighten bolts 1 through 6 in sequence	20
3	Tighten bolts 1 through 6 in sequence	30

Right Exhaust Manifold Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence	Hand-tighten
2	Tighten bolts 1 through 6 in sequence	20
3	Tighten bolts 1 through 6 in sequence	30

Multiport Fuel Injection – 4.2L CFSA

Technical Data

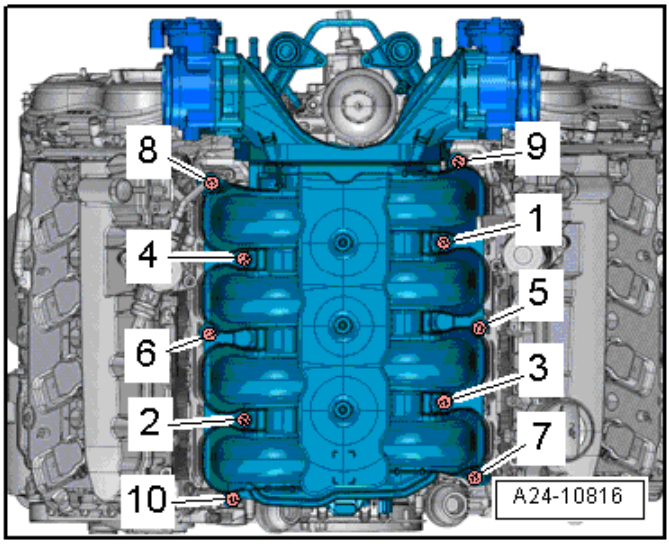
Engine data		4.2L FSI engine
Idle speed cannot be adjusted. It is regulated by idle stabilization		620 to 720 RPM
Engine speed limitation via fuel injector shut-off		8500 RPM
Fuel pressure	Fuel supply-pressure up to high-pressure pump, (is produced by an electric fuel pump in the fuel tank)	5.0 to 6.5 bar (72.51 to 94.27 psi) pressure
	Fuel high pressure (produced by a mechanical single-piston pump) at approximately 85 °C (185 °F) coolant temperature	Depending on the operating conditions, 25 to 135 bar (362.59 to 1958 psi) positive pressure

Fastener Tightening Specifications

Component	Nm
Air guide	2.5
Bracket for air filter nut	9
Bracket for fuel rail	2.5
Clamp for upper air filter housing to air guide hose	3.5
Connection to throttle valve control unit 2 to upper intake manifold	9
Drain plug to fuel rail	25
Heat shield	2.5
High pressure line	9
High pressure line connection	40
High pressure line union nut 1	25
High pressure pump	22
Low fuel pressure sensor	15
Intake manifold runner control valve to upper intake manifold	5
Intake manifold runner position sensor to lower intake manifold	2.5
Oxygen sensor	55
Pressure regulating valve to upper intake manifold	4.5
Threaded pin to lower air filter housing	9
Throttle valve control module to upper intake manifold	9
Upper air filter to lower air filter housing	3.5
Vacuum actuator to lower intake manifold	2.5

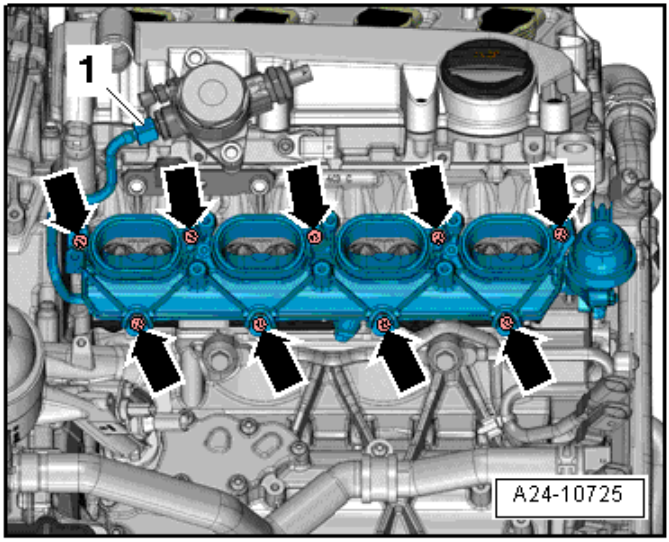
[1)] Coat the threads with engine oil.

Upper Intake Manifold Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	8
2	Tighten bolts 1 through 10 in sequence	11

Lower Intake Manifold Tightening Specification



Step	Component	Nm
1	Tighten bolts (➡) in a diagonal sequence	9

Ignition – 4.2L CFSA

Ignition Technical Data

Engine data	4.2L FSI engine
Engine idle speed	Cannot be adjusted, it is regulated by idle stabilization
Ignition timing	Not adjustable, regulated by the Engine Control Module (ECM)
Ignition system	Single coil ignition system with 8 ignition coils (output stages integrated) that are connected directly to spark plugs via the ignition cables.
Spark plugs	See Parts Catalog
Tightening specification	See Maintenance Intervals; Rep. Gr.03;
Ignition sequence	1-5-4-8-6-3-7-2

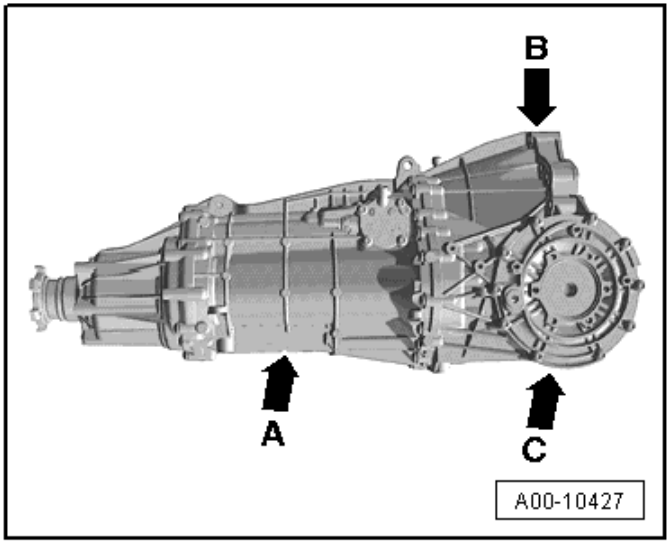
Fastener Tightening Specifications

Component	Nm
Camshaft Position (CMP) sensor	9
Knock Sensor (KS)	25

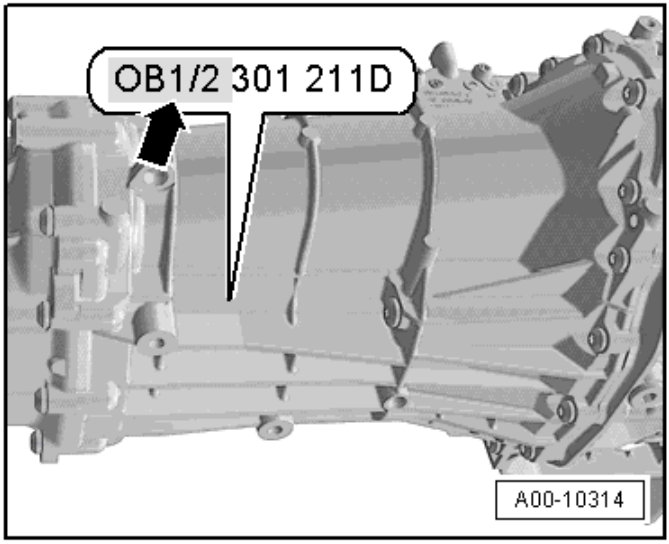
MANUAL TRANSMISSION – 0B2

General, Technical Data

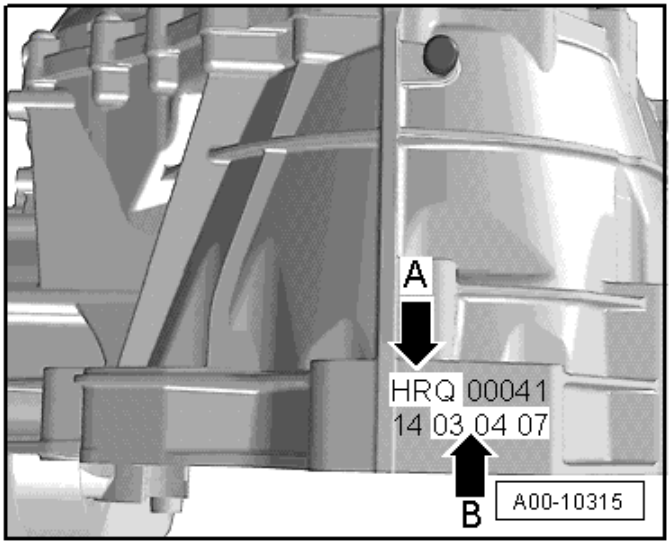
Transmission Identification



A - Manual transmission 0B1/2. B - Code letters and production date.
C- Code letters and date of manufacture on the bottom of the transmission housing (not on all versions)



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

Code Letters, Assembly Allocation, Ratios, Capacities

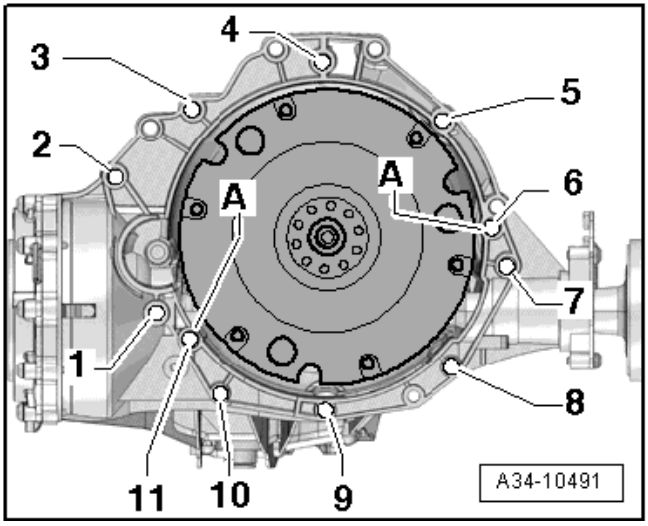
The following information can be found in the Electronic Parts Catalog (ETKA):

- Production date
- Transmission fluid specification
- Individual gear ratios
- Flange shaft allocation
- 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 A5 from MY 2008	Audi A5 from MY 2008	Audi A5 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**	**PJA**
Allocation	Type	Audi A5 from MY 2008	Audi A5 from MY 2008	Audi A5 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		

Securing Transmission to 4-Cylinder Engine



Item	Fastener size	Nm
1[1)]	M10 x 50 [2)]	65
2[3)], 7	M12 x 100 [4) 5)]	30 plus an additional 90° (¼ turn)
3[6)], 6	M12 x 75 [4) 5)]	30 plus an additional 90° (¼ turn)
4, 5[6)]	M12 x 120 [4) 5)]	30 plus an additional 90° (¼ turn)
8, 9, 10	M10 x 75 [4) 5)]	15 plus an additional 90° (¼ turn)
11	M12 x 50 [4) 5)]	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 may be used.
3) Also secures the starter with an additional spacer sleeve between the starter and the transmission.
4) Audi A5 through VIN 8T-9-007999: Replace the aluminum bolts.
5) Audi A5 from VIN 8T-9-008000: Aluminum bolts can only be used twice. Mark the bolts by making two notches (X) with a chisel after they have been used the first time. To prevent damaging the bolts when marking them, do not clamp them in a vise. Insert the bolts in a ½" drive 14 mm socket clamped into a vise. Do not use bolts that have been marked with an X.
6) Also attaches the bracket for the electric wire.

Clutch – 0B2

Fastener Tightening Specifications

Component	Nm
Ball studs	25
Bleeder screw	5.5
Clutch module-to-drive plate	60
Clutch slave cylinder-to-transmission	20
Guide sleeve securing plate	8
Pipe line bracket mounted on the transmission	20
Pressure plate [1)]	22 plus an additional 90° (¼ turn)

[1)] Replace fastener(s).

Controls, Housing – 0B2

Fastener Tightening Specifications

Component	Fastener size	Nm
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Clamping plate-to-shift lever support	-	23
Connecting rod	-	20
Drive axle heat shield	-	23
Gearshift lever nut [1)]	-	20
Joint piece between the selector rod and shift lever bolt	-	23
Joint piece between the selector rod and shift lever nut	-	10
Transmission mount lower stop [1)]	-	20 plus an additional 90° (¼ turn)
Shift lever support mount	-	8
Push rod	-	20
Sealing boot	-	4
Selector shaft cover [1)]	-	10 plus an additional 45° (⅛ turn)
Shift lever support	-	23
Transmission fluid filler plug	-	45

Component	Fastener size	Nm
Transmission neutral position sensor [1)]	-	10 plus an additional 45° (⅛ turn)
Transmission range gear recognition switch	-	20
Transmission shift lever [1)]	-	20
Tunnel crossmember bolt	-	70
Tunnel crossmember nut	-	20
Tunnel support bolt	-	40
Tunnel support nut	-	20

[1)] Replace fastener(s).

Internal Fastener Tightening Specifications

Component	Fastener size	Nm
Ball studs	-	25
Bearing bracket-to-transmission cover	M8 x 30	20 plus an additional 30° ($\frac{1}{12}$ turn)
Center differential housing [1), 2)]		
Bolt	-	10 plus an additional 90° (¼ turn)
Double bolt	-	15 plus an additional 90° (¼ turn)
Bolt	-	15 plus an additional 90° (¼ turn)
Final drive cover	M8 x 38	20 plus an additional 90° (¼ turn)
Left flange shaft	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

Internal Fastener Tightening Specifications *(cont'd)*

Component	Fastener size	Nm
Selector shaft with selector cover [1)]	M8 x 22	10 plus an additional 45° (⅛ turn)
Side shaft[1]	-	150 plus an additional 90° (¼ turn)
Transmission cover	M8 x 50	15 plus an additional 90° (¼ turn)
	M8 x 33	10 plus an additional 90° (¼ turn)[1)]
Transmission neutral position sensor [1)]	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)] Replace fastener(s).
[2)] For bolt tightening clarification, refer to ElsaWeb, *Center Differential and Center Differential Housing 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

Fastener Tightening Specifications

Component	Fastener size	Nm
Balance weight bolt [1]	-	20 plus an additional 90° (¼ turn)
Center differential housing [2]		
- Aluminum bolts [1]	M8 x 35	10 plus an additional 90° (¼ turn)
- Aluminum bolts [1]	-	10 plus an additional 90° (¼ turn)
- Steel bolts	M8/M8 x 38	15 plus an additional 90° (¼ turn)
- Steel bolts	M8 x 55	15 plus an additional 90° (¼ turn)
Center differential housing [3]		
- Aluminum bolts	-	8 plus an additional 120° turn
- Steel bolts	-	15 plus an additional 90° (¼ turn)
Drive axle heat shield-to-transmission	-	23

[1] Replace fastener(s).

[2] For bolt tightening clarification, refer to ElsaWeb, *Center Differential Housing with Bolted Driveshaft Overview*, items 2, 3 and 4.

[3] For bolt tightening clarification, refer to ElsaWeb, *Center Differential Housing with Connected Driveshaft Overview*, items 2 and 11.

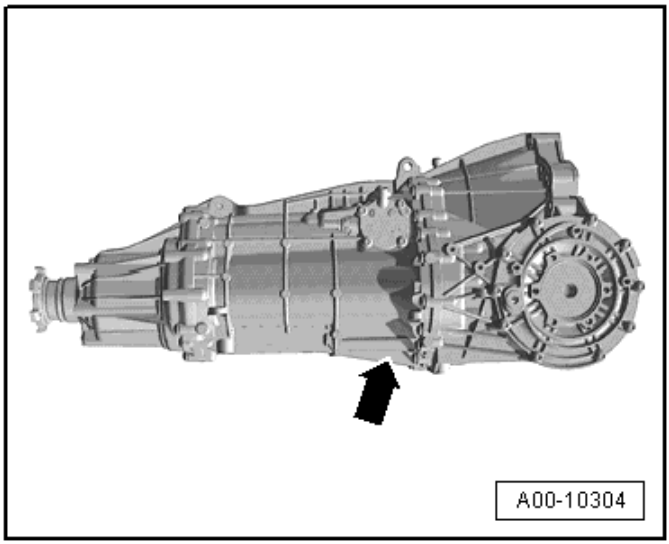
Internal Fastener Tightening Specifications

Component	Fastener size	Nm
Final drive cover	M8 x 38	20 plus an additional 90° (¼ turn)
Left flange shaft	M8 x 25	15 plus an additional 45° (⅛ turn)

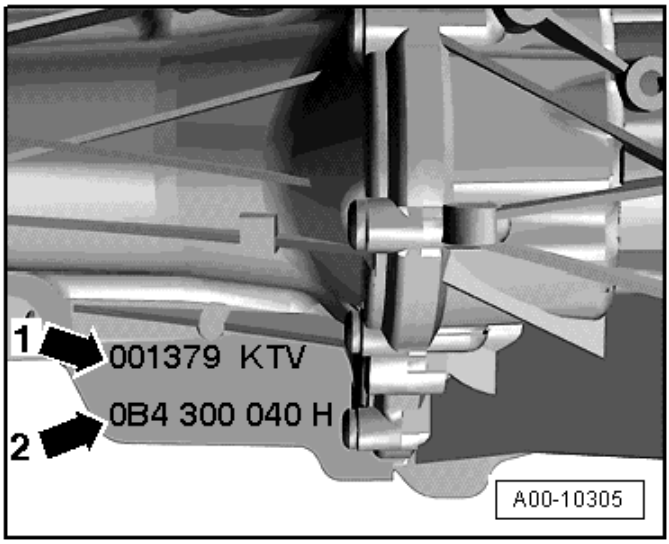
MANUAL TRANSMISSION – 0B4

General, Technical Data

Transmission Identification



Code, serial number and transmission part number (➡).



1 - Transmission code letters and serial number.

2 - Manual transmission 0B4 with transmission part number. For example 0B4 300 040 H.

Example:	**001379**	**KTV**
	Serial number	Identification codes

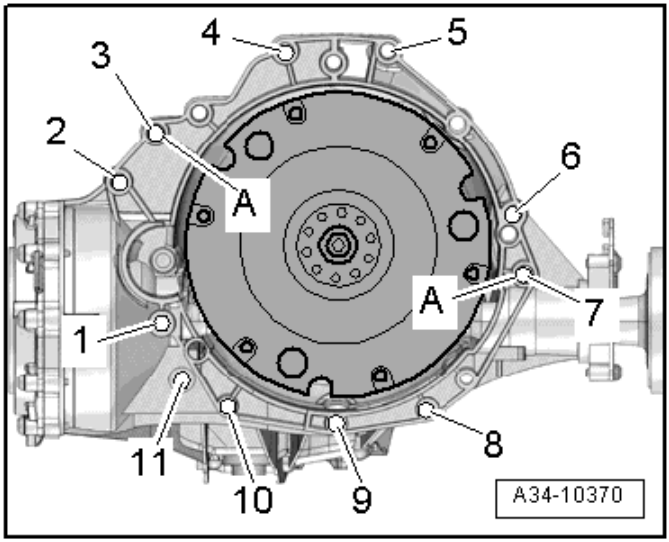
Engine Codes, Transmission Allocation, Ratios and Capacities

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

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

plus an additional		**6-speed 0B4 AWD**	
Identification codes		**KMR**	**LPE**
Manufactured	from	01.09	03.10
	through	03.10	
Allocation	Type	Audi A5 2008 ►	Audi A5 2008 ►
	Engine	3.0 l TFSI - 245 kW S4	3.0 l TFSI - 245 kW S4
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
i_{ges} in the highest gear		2.864	2.864
Capacity		3.8 liters	

Securing Transmission to 3.0L TFSI Engine



Item	Fastener size	Nm
1 [1]	M10 x 50 [2]	65
2 [1]	M12 x 100 [3] [4] [5]	30 plus an additional 90° (¼ turn)
3 through 6	M12 x 100 [3] [4] [5]	30 plus an additional 90° (¼ turn)
7	M12 x 125 [3] [4] [5]	30 plus an additional 90° (¼ turn)
8, 11	M10 x 60 [3] [4] [5]	15 plus an additional 90° (¼ turn)
9, 10	M10 x 95 [3] [4] [5]	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] Also secures the starter with an additional spacer sleeve between the starter and the transmission.

[4] Audi A5 through VIN 8T-9-007999: Replace the aluminum bolts.

[5] Audi A5 from VIN 8T-9-008000: Aluminum bolts can only be used twice. Mark the bolts by making two notches (X) with a chisel after they have been used the first time. To prevent damaging the bolts when marking them, do not clamp them in a vise. Insert the bolts in a ½" drive 14 mm socket clamped into a vise. Do not use bolts that have been marked with an X.

Clutch – 0B4

Fastener Tightening Specifications

Component	Nm
Clutch slave cylinder bleeder screw	5.5
Clutch slave cylinder-to-transmission	20
Dual flywheel mounting bracket-to-drive plate [1)]	60
Pipeline bracket-to-transmission	20

[1)] Replace fastener(s).

Internal Fastener Tightening Specifications

Component	Nm
Ball studs	25
Guide sleeve securing plate [2)]	8
Self-Adjusting Clutch (SAC) pressure plate [1)]	22 plus an additional 90° (¼ turn)

[1)] Replace fastener(s).
[2)] Different bolt lengths.

Controls, Housing – 0B4

Fastener Tightening Specifications

Component	Fastener size	Nm
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Shift lever support base block nut	-	8
Center differential housing aluminum bolts [1) 2)]	-	10 plus an additional 90° (¼ turn)
Center differential housing steel bolts [2)]	-	24
Clamping plate	-	23
Connecting rod	-	20
Driveshaft heat shield-to-center differential housing	-	25
Gearshift lever [1)]	-	20
Joint piece between the selector rod and shift lever nut	-	10
Joint piece between the selector rod and shift lever bolt	-	23
Oil filler plug	-	40
Push rod	-	20
Sealing boot	-	4
Selector shaft cover	-	24
Shift lever support	-	23
Shift lever support mount nut	-	8
Transmission fluid filler plug	-	40
Transmission mount lower stop [1)]	-	20 plus an additional 90° (¼ turn)
Transmission range gear recognition switch (F208)-to-transmission	-	20
Transmission shift lever nut	-	20
Transmission support nut	-	20
Transmission support bolt	-	40
Tunnel crossmember nut	-	20
Tunnel crossmember bolt	-	70

1) Replace fastener(s).

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

Internal Fastener Tightening Specifications

Component	Fastener size	Nm
Transmission housing ball studs	-	25
Bearing bracket-to-transmission cover steel bolts (30 mm long) [2]	M8	27
Cap steel bolts (25 mm long) [2]	M8	24
Center differential housing steel bolts (63 mm long)	M8	24
Center differential housing aluminum bolts (42 mm long) [1]	M8	10 plus an additional 90° (¼ turn)
Clutch release lever with release bearing and spring [2]	-	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 [1]	-	110
Plate [2]	-	24
Reverse shaft-to-transmission cover	-	24
Securing plate	-	8
Selector shaft with selector cover steel bolts (25 mm long) [2]	M8	24
Transmission cover steel bolts (42 mm long)	M8	24
Transmission neutral position sensor steel bolt (25 mm long) [2]	M8	24
Transmission range gear recognition switch	-	20
Vibration damper [2]	-	24

[1] Replace fastener(s).
[2] Insert with locking fluid (AMV 185 101 A1).

Gears, Shafts – 0B4

Fastener Tightening Specification

Component	Fastener size	Nm
Bearing bracket steel bolts (45 mm long) [1)]	-	24

[1)] Insert with locking fluid (AMV 185 101 A1).

Rear Final Drive, Differential – 0B4

Fastener Tightening Specifications

Component	Fastener size	Nm
Drive axle heat shield-to-transmission	-	23
Final drive cover	M8	24

Internal Fastener Tightening Specifications

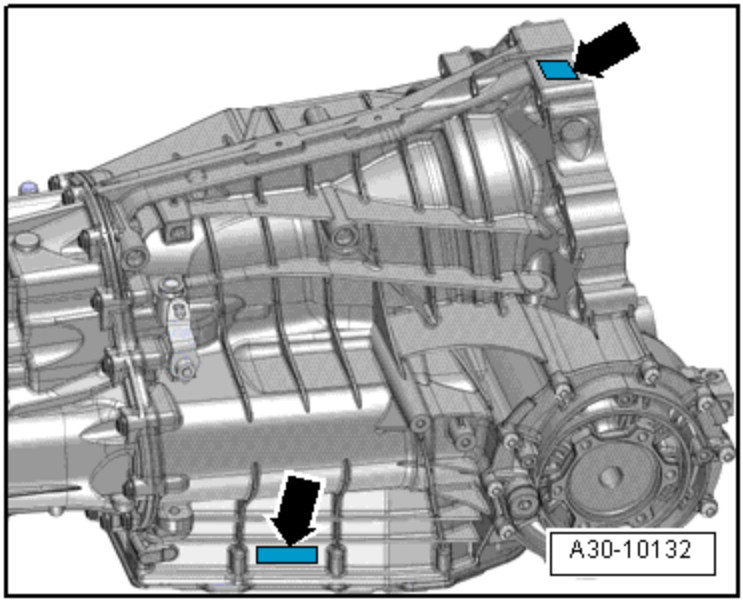
Component	Fastener size	Nm
Final drive cover steel bolts (42 mm long)	M8	24
Left flange shaft steel bolts (25 mm long) [1)]	M8	24

[1)] Insert with locking fluid.

S TRONIC TRANSMISSION (DSG) – 0B5

General, Technical Data

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

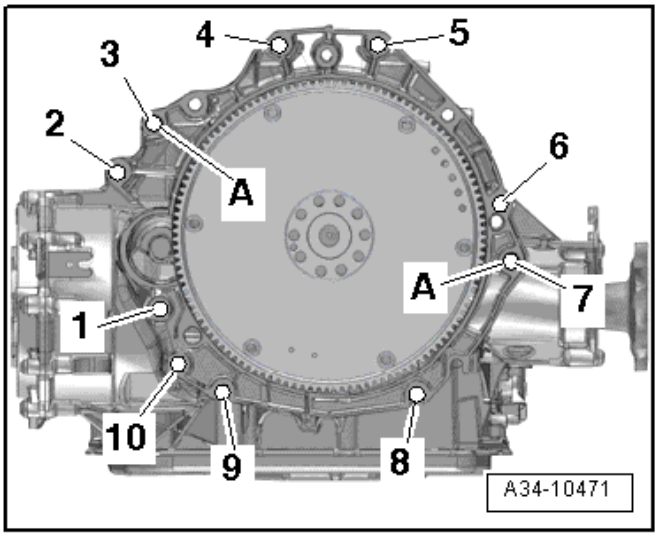
Code Letters, Transmission Allocations, Ratios and Equipment

DSG transmission		0B5 AWD	
Transmission	Identification codes	LHK, LJD, MNL, MSE, NGY	NHS, NSC
Allocation	Model	A5 Coupe from MY 2008 A5 Cabriolet from MY 2009	A5 Coupe from MY 2008 A5 Cabriolet from MY 2009
	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 = 0.519
	Reverse gear	53:18 = 2.944	53:18 = 2.944
Front Axle	Gear wheel	31:29 = 1.069	31:29 = 1.069
	Bevel gear	29:8 = 3.625	29:8 = 3.625
	Translation “i“	3.875	3.875
Rear axle	Bevel gear	37:9 = 4.111	37:9 = 4.111
Total ratio “i_{total}“ in the highest gear		2.390	2.011
Spread		7.1	7.1

Code Letters, Transmission Allocations, Ratios and Equipment *(cont'd)*

DSG transmission		**0B5 AWD**	
Transmission	Identification codes	MCQ, MNE, NGZ, NNB, NSD	
Allocation	Model	A5 Coupé from MY 2008 RS5	
	Engine	4.2L FSI 331 kW	
Gear ratios	1st gear	48:13 = 3.692	
	2nd gear	47:21 = 2.238	
	3rd gear	53:34 = 1.559	
	4th gear	47:40 = 1.175	
	5th gear	43:47 = 0.915	
	6th gear	38:51 = 0.745	
	7th gear	37:60 = 0.617	
	Reverse gear	53:18 = 2.944	
Front Axle	Gear wheel	35:31 = 1.129	
	Bevel gear	31:8 = 3.875	
	Translation "i"	4.375	
Rear axle	Bevel gear	35:8 = 4.375	
Total ratio "i_{total}" in the highest gear		2,698	
Spread		6.0	

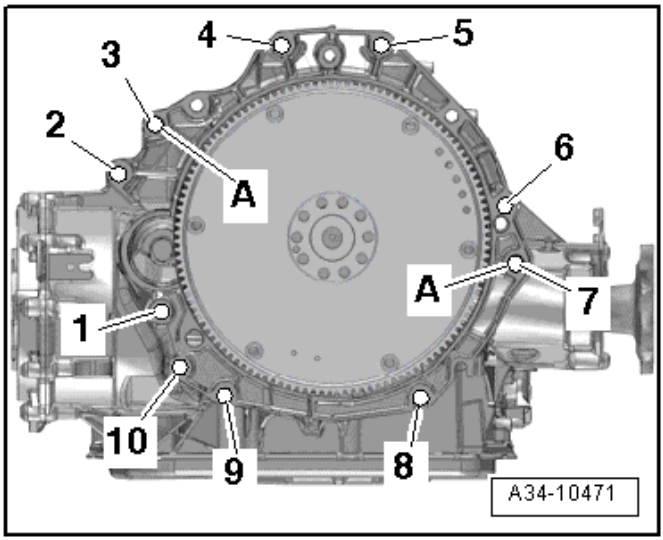
Securing Transmission to 6-Cylinder Engine



Item	Bolt	Nm
1	M10 x 50 [1)]	65
2 - 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 and 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.

Securing Transmission to 8-Cylinder Engine



Item	Bolt	Nm
1 [1)]	M10 x 50 [2)]	65
2 [1)], 3, 4, 5, 6	M12 x 100 [3)]	30 plus an additional 90° (¼ turn)
7	M12 x 175 [3)]	30 plus an additional 90° (¼ turn)
8, 9, 10	M10 x 60 [3)]	15 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	

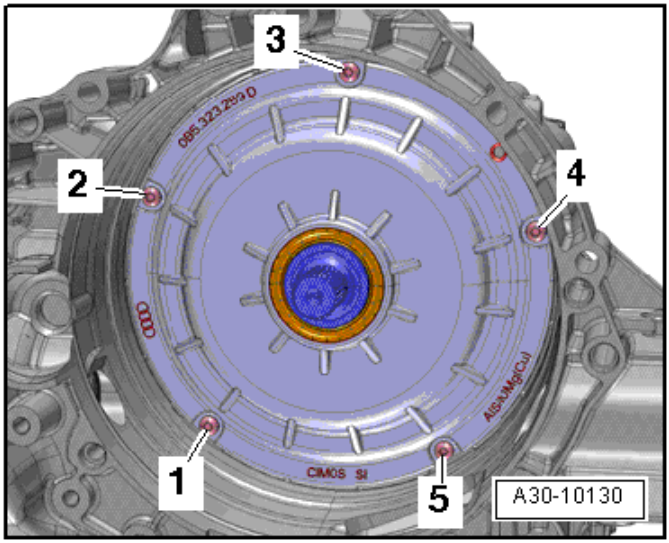
- [1)] Also secures the starter.
- [2)] Bolt strength rating 10.9. There is no limit to the number of times the steel bolt can be used again.
- [3)] Aluminum bolts may be used two times

Clutch – 0B5

Fastener Tightening Specification

Component	Nm
Dual mass flywheel bolts (replace)	60

Dual Clutch and Clutch Cover Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 5 in a diagonal sequence until the bolt head contacts the clutch cover	Hand-tighten
2	Tighten bolts 1 through 5 in a diagonal sequence	Tighten one after the other in 90° steps until the clutch cover contact the transmission housing.
3	Tighten bolts 1 through 5 in a diagonal sequence	8

Fastener Tightening Specifications

Component	Fastener size	Nm
Air guide to transmission	-	3
Automatic Transmission Fluid (ATF) drain plug	-	45
Automatic Transmission Fluid (ATF) fill and inspection plug	-	45
Automatic Transmission Fluid (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		
- Bolts	-	9
- Union nut	-	29
ATF supply pipe/hose/line assembly to ATF cooler	-	5
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Cable mounting bracket	-	8
Drive axle heat shield to front final drive	-	23
Filter housing to transmission	-	10
Lower stop to transmission mount	-	20
Transmission Fluid (MTF) Drain Plug		45
Transmission Fluid (MTF) Fill & Check Plug		45
Transmission support to transmission	-	40
Transmission support to transmission mount nut	-	20
Securing shift mechanism to the body, nut	-	10
Selector Lever Cable adjustment to the selector mechanism function unit	-	13

[1)] For bolt tightening clarification, refer to ElsaWeb A*TF Cooler, ATF Pipes and ATF Filter Overview* items -12 and 14-

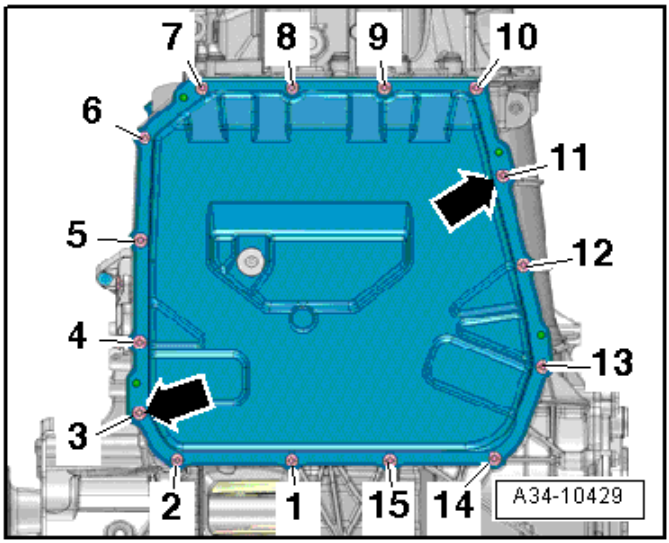
Gears, Shafts – 0B5

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 Housing	8
Connector Housing to Transmission	8
Oil Pump to Transmission Housing	25
Retaining Plate to ATF Pressure Pipes	10
Sensor module to Transmission Intermediate Housing	8
Side Shaft to Transmission Intermediate Housing [1)]	150 plus an additional 90° (¼ turn)
Suction Jet Pump to Transmission Housing	4.5

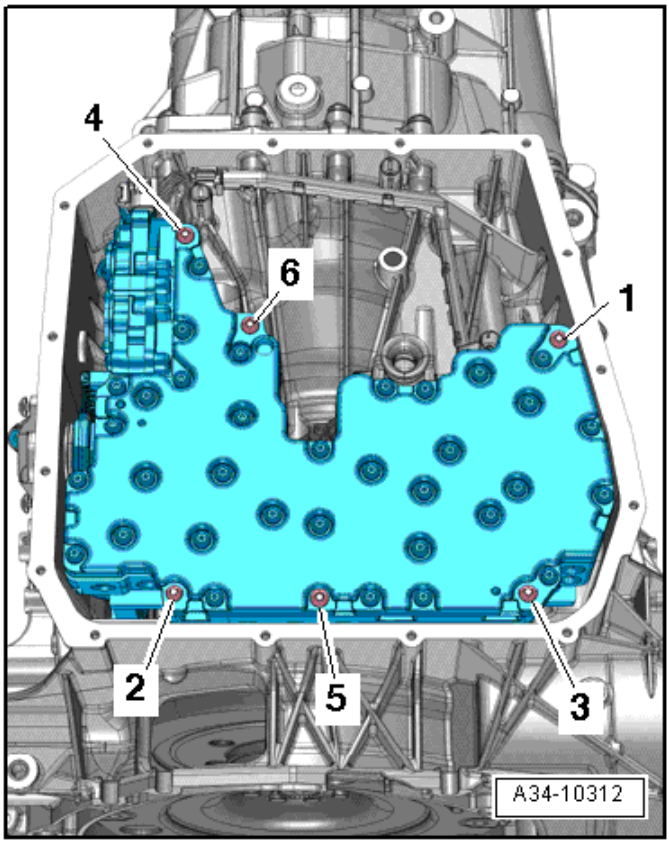
[1)] Replace fastener

Oil Pan Tightening Specifications



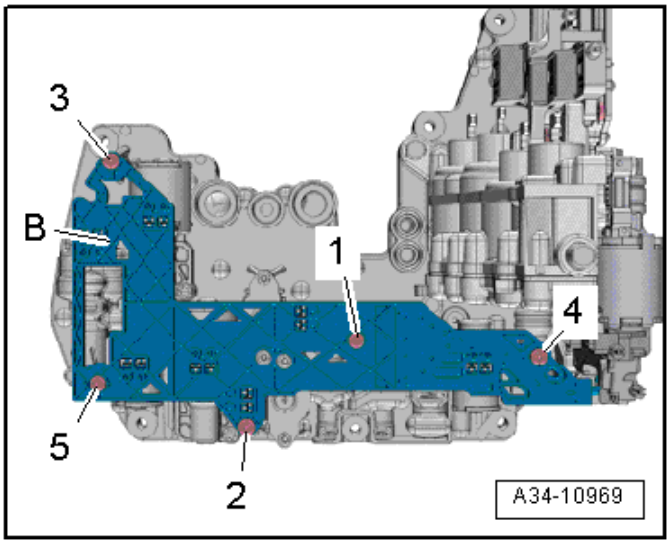
Component	Nm
Tighten bolts (➡)	Hand-tighten
Tighten bolts 1 through 15 diagonally in steps	10

Mechatronic Tightening Specification



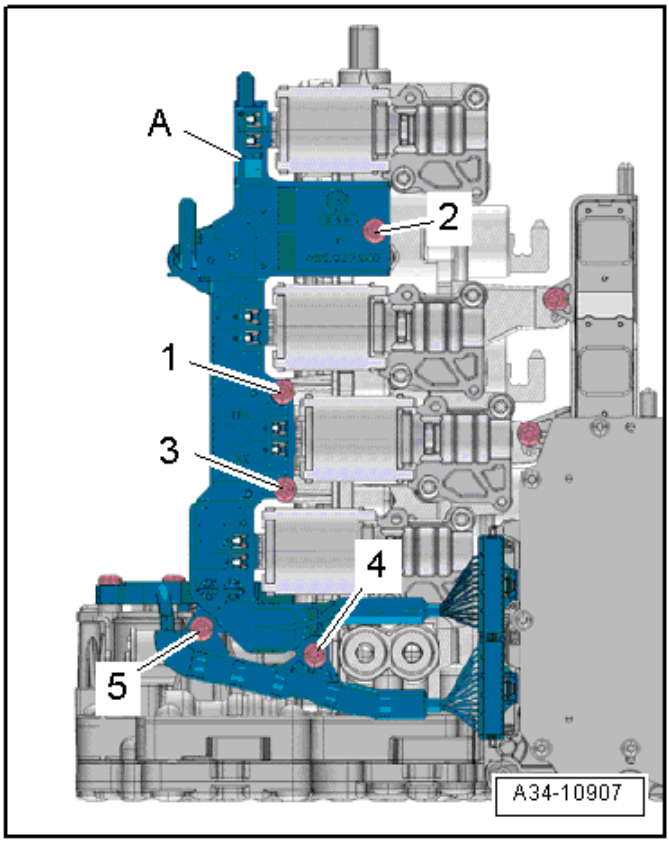
Component	Nm
Tighten bolts 1 through 6 in sequence	10

Circuit Board 1 Tightening Specifications



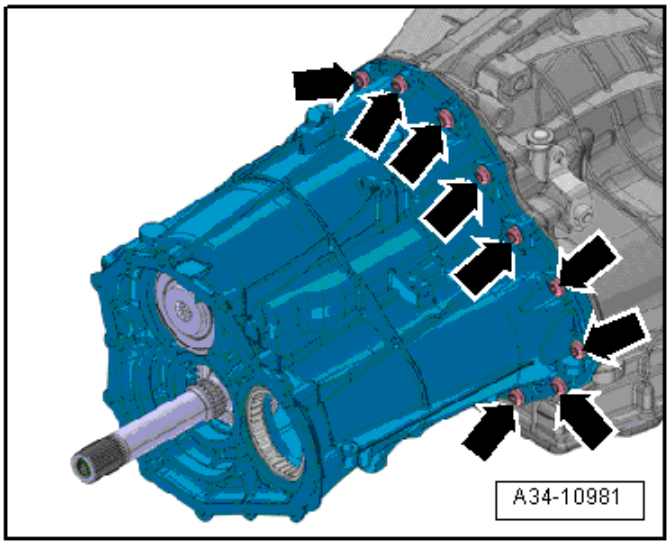
Component	Nm
Tighten bolts 1 through 5 diagonally	3

Circuit Board 2 Tightening Specifications



Component	Nm
Tighten bolts 1 through 5 diagonally	3

Transmission Intermediate Housing to Transmission Housing Tightening Specifications



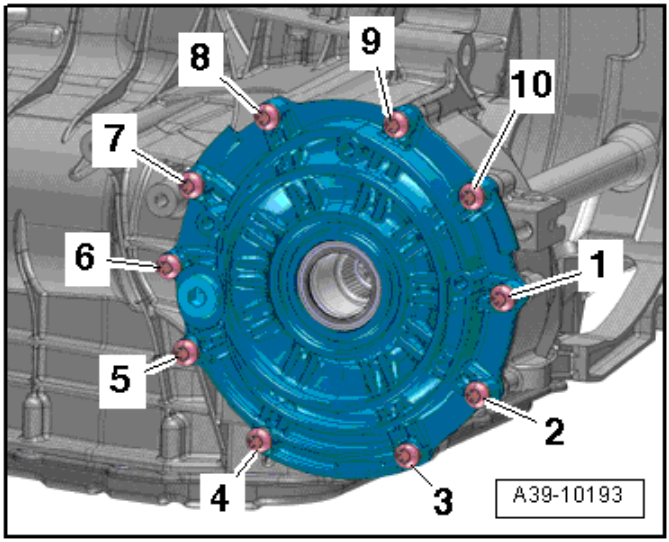
Step	Bolts	Nm
1	Tighten bolts (➡)	8 Nm diagonally
2	Tighten bolts (➡)	120° additional turn, diagonally

Rear Final Drive, Differential – 0B5

Fastener Tightening Specifications

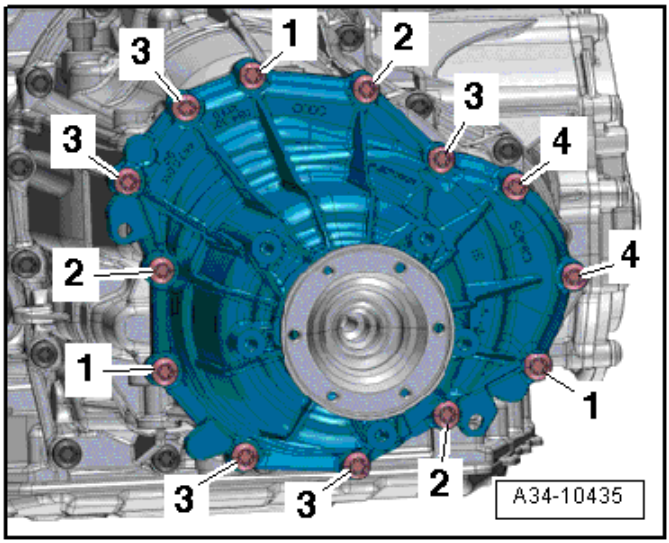
Component	Nm
Balance weight to center differential housing (replace)	20 plus an additional 90° (¼ turn)
Bracket to the left flange shaft with the bearing	10 plus an additional 45° (⅛ turn)
Transmission fluid (MTF) drain plug	45
Transmission fluid (MTF) fill and check plug	45

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



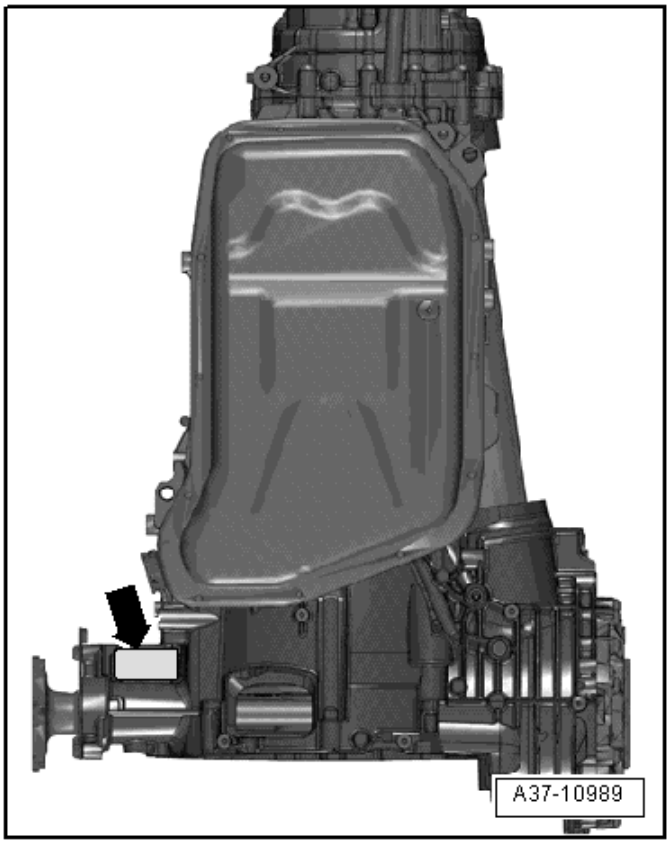
Step	Component	Nm
1	Tighten bolts 1 in a diagonal sequence [1]	8
2	Tighten bolts 2 in a diagonal sequence [1]	Hand-tighten
3	Loosen bolts 1 then tighten in a diagonal sequence	Hand-tighten
4	Tighten bolts 3 in a diagonal sequence [1]	Hand-tighten
5	Tighten bolts 4 in a diagonal sequence [2]	Hand-tighten
6	Tighten bolts 1 through 4 in a diagonal sequence	10
7	Tighten bolts 4 in a diagonal sequence	15
8	Tighten bolts 1 through 4 in a diagonal sequence	an additional 90° (¼ turn)

[1] Aluminum bolts.
[2] Steel bolts.

AUTOMATIC TRANSMISSION – 0BK

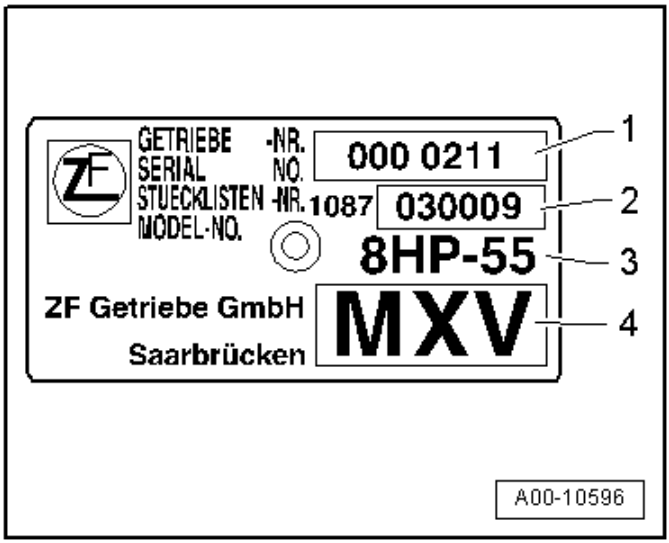
General, Technical Data

Transmission Identification



The transmission code letters are located on the data plate under the transmission. The (➡) indicates the location of the type plate.

Transmission Type Plate



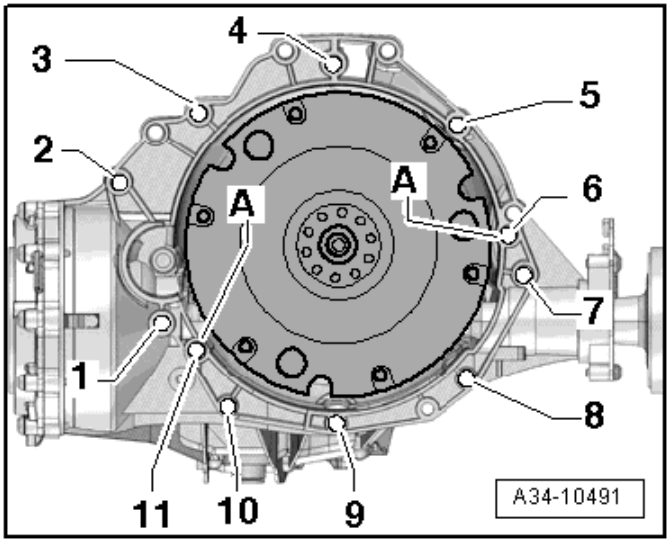
1 - Transmission serial number
2 - Parts list number
3 - Manufacturer transmission identification: 8HP-55
4 - Example of a transmission code: MXV
NOTE: The transmission code letters are also included on the vehicle data labels.

Code Letters, Transmission Allocations, Ratios and Equipment

Automatic Transmission		**0BK AWD**	
Transmission	Identification codes	MXW	NES
Month of manufacture	from through	06.2010 07.2010	07.2010
Torque converter	Identification codes	NW235	NW235
Allocation	Type	Audi A4 from MY 2008 Audi A5 from MY 2008 Audi A5 Cabriolet from MY 2009	Audi A4 from MY 2008 Audi A5 from MY 2008 Audi A5 Cabriolet from MY 2009
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	Fastener size	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 may be used.

[3)] Aluminum bolts can only be used twice. Mark the bolts by making two notches (X) with a chisel after they have been used the first time. To prevent damaging the bolts when marking them, do not clamp them in a vise. Insert the bolts in a ½" drive 14 mm socket clamped into a vise. Do not use bolts that have been marked with an X.

[4)] With a bracket for the wiring.

[5)] Installed from the engine side.

Fastener Tightening Specifications

Component	Fastener size	Nm
Automatic Transmission Fluid (ATF) drain plug [1)]	-	12
Automatic Transmission Fluid (ATF) pipe nut	-	29
Automatic Transmission Fluid (ATF) check and fill plug [1)]	-	30
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Drive axle heat shield	-	23
Transmission fluid check and fill drain plug (inside transfer case)	-	27
Transmission fluid check and fill drain plug (inside front final drive)	-	27
Transmission fluid oil drain plug (inside transfer case)	-	12
Transmission fluid oil drain plug (inside front final drive)	-	10
Selector mechanism function unit-to-body nut	-	10

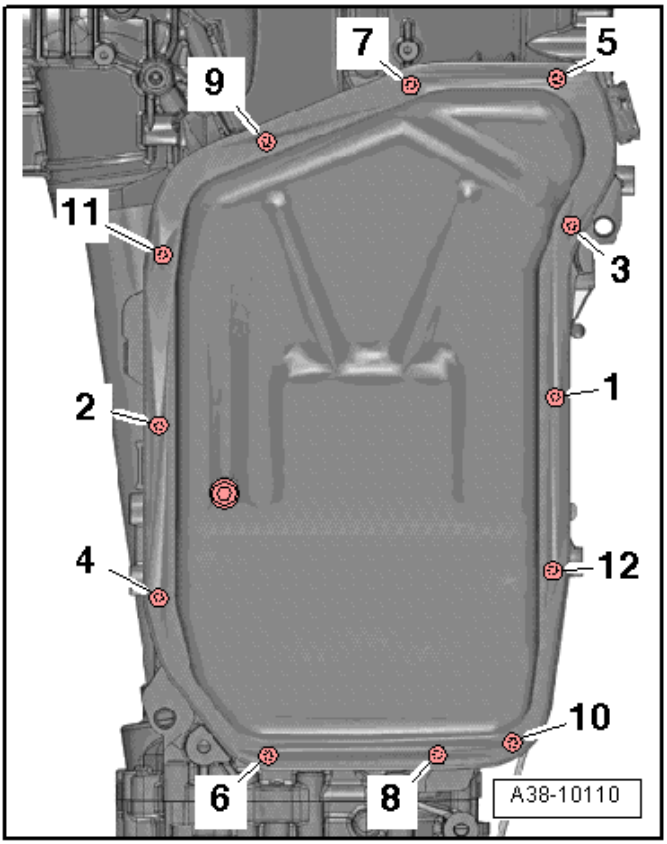
[1)] Replace fastener(s).

Gears, Hydraulic Controls – 0BK

Fastener Tightening Specifications

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

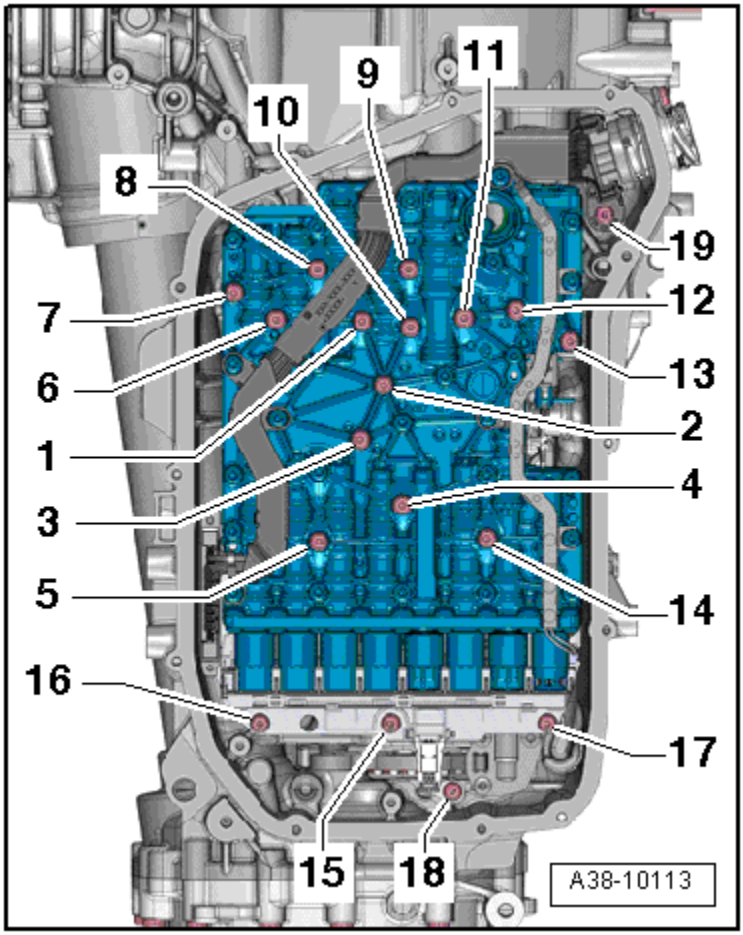
Oil Pan Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 12 in sequence [1]	Hand-tighten
2	Tighten bolts 1 through 12 in sequence	4
3	Tighten bolts 1 through 12 in sequence	an additional 45° (⅛ turn)

[1] Replace fastener(s).

Mechatronic Tightening Specification



Component	Nm
Tighten bolts 1 through 19 in sequence	10

NOTE:

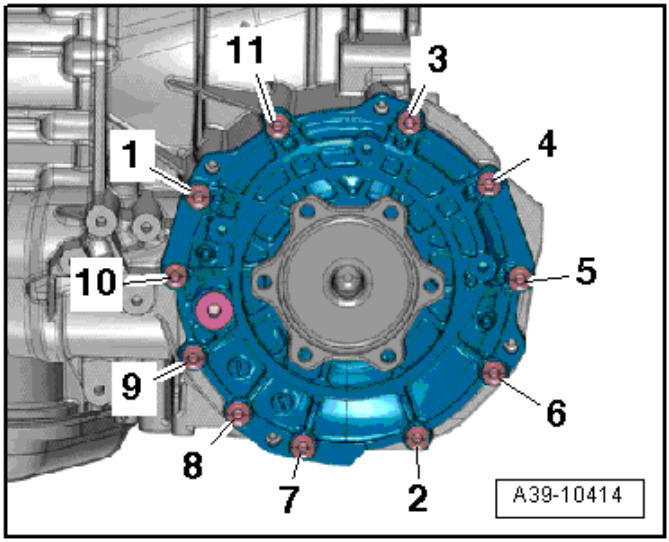
- Bolts 18 and 19 are shorter.
- Bolt 18 attaches the transmission output speed sensor G195) to the transmission housing.
- Bolt 19 attaches the Mechatronic connector to the transmission housing.

Rear Final Drive, Differential – 0BK

Fastener Tightening Specifications

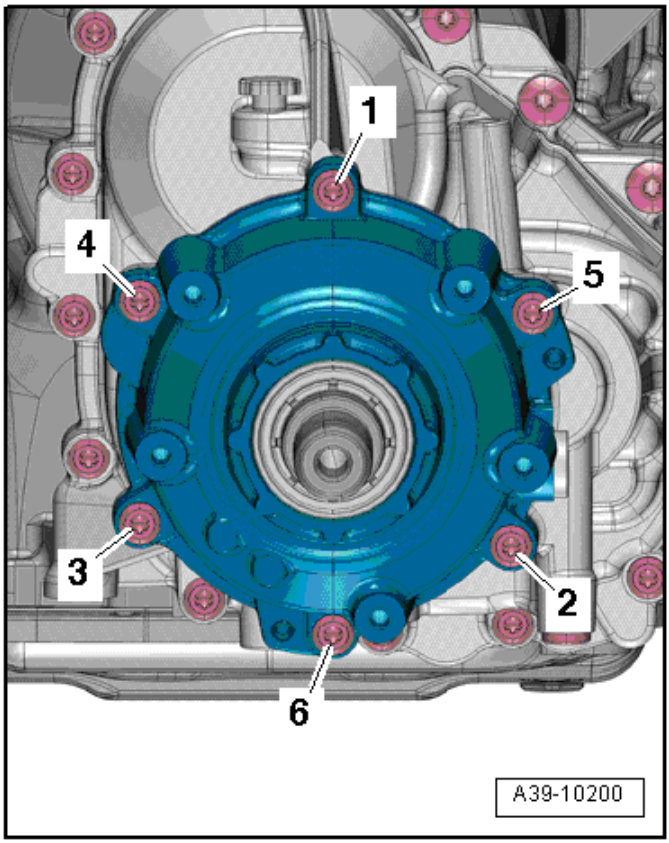
Component	Nm
Drain plug	27
Transmission fluid oil drain plug (inside front final drive)	10
Transmission fluid oil drain plug (inside transfer case)	12

Front Final Drive Cover Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 and 6	3
2	Tighten bolts 1 through 11 in sequence	27

Center Differential Housing Tightening Specifications



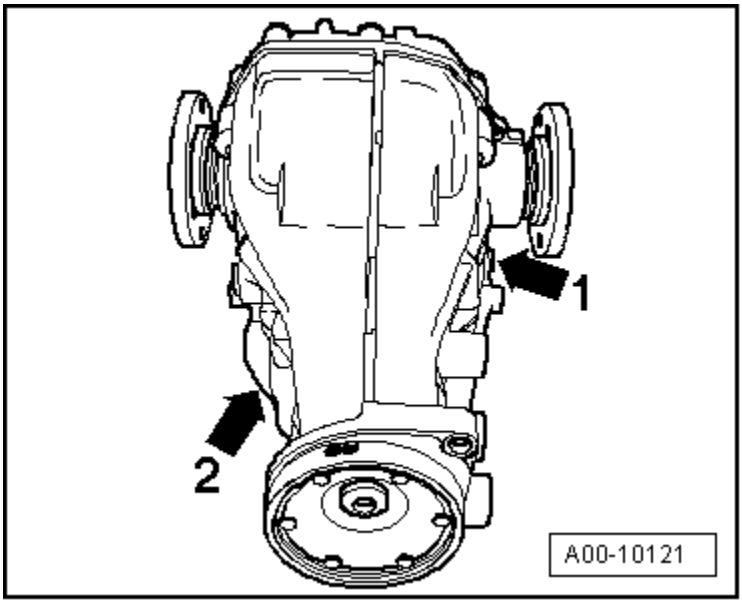
Step	Component	Nm
1	Tighten bolts 1 and 6 [1)]	3
2	Tighten bolts 1 through 6 in sequence [1)]	10
3	Tighten bolts 1 through 6 in sequence	an additional 90° (¼ turn)

[1)] Replace fastener(s).

REAR FINAL DRIVE – 0BC, 0BD, 0BE, 0BF

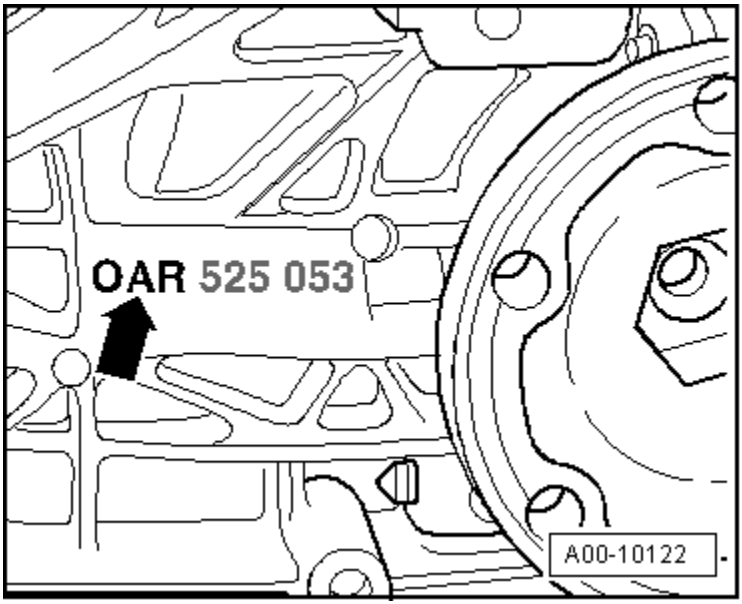
General, Technical Data – 0BC

Rear Final Drive Identification



0BC final drive and 0AR (1➡). Code and build date (2➡).

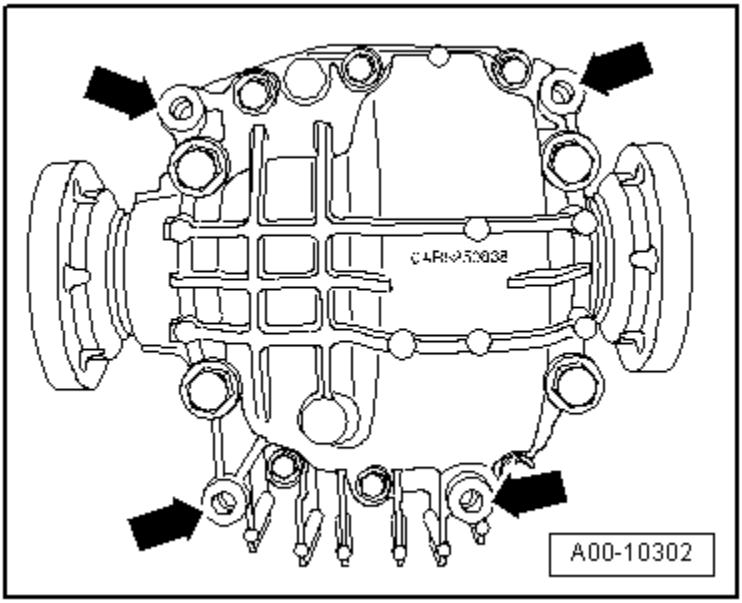
Final Drive Identification



Final Drive 0BC (➡) and 0AR

Note: 0AR is always on the rear final drive housing. The changes to the housing are what differentiate the 0BC final drive from the 0AR final drive.

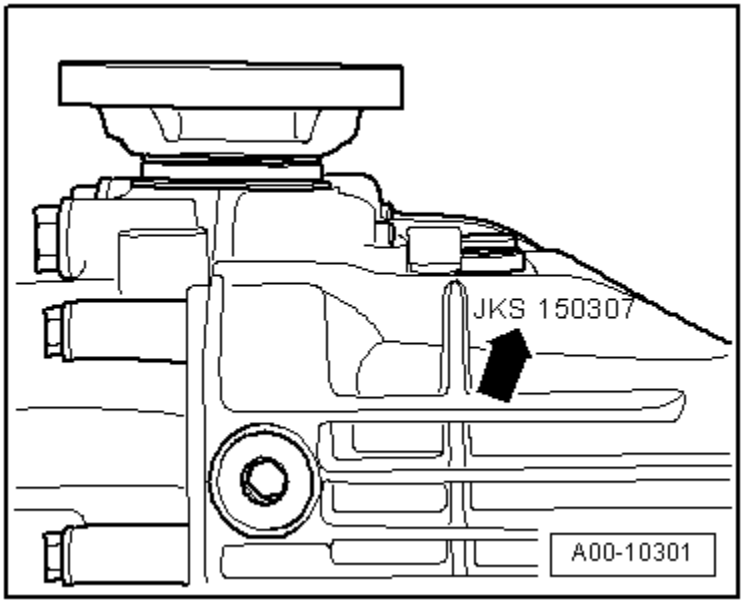
Final Drive Identification *(cont'd)*



The locations of the threaded holes (➡) for attaching the cross member to the rear final drive are also different.

The 0BC final drive has 4 threaded holes (➡) in its housing, used for attaching the cross member. In addition to this, there is an additional threaded hole under the flange/driveshaft used for attaching the final drive to the subframe.

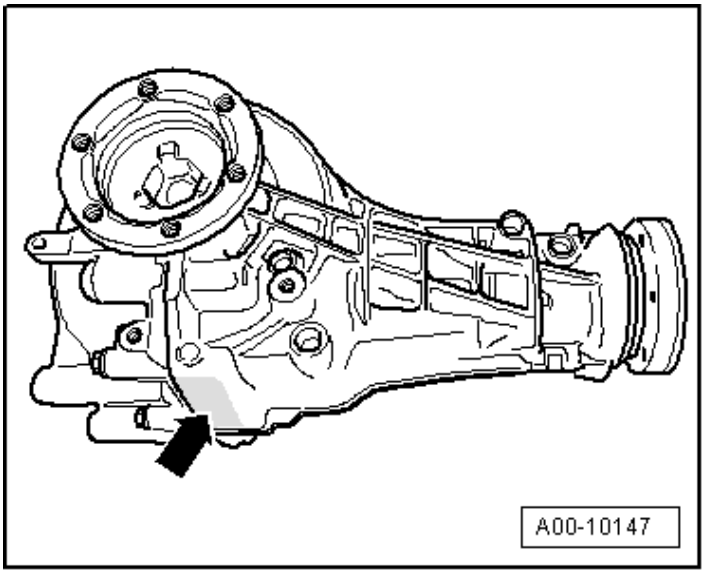
Rear Final Drive Code and Date of Manufacture



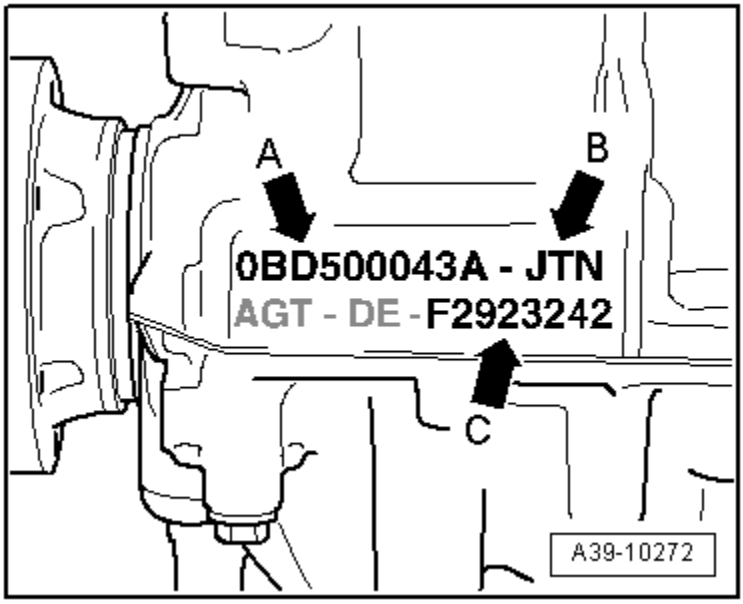
Example:	JKS	15	03	07
	Code letters	Day	Month	Year of manufacture 2007

When installing a new rear final drive unit, the final drive code, the PR number and the vehicle engine code must be verified in the Parts Catalog. This is the only to assure the correct allocation.

Rear Final Drive Identification



Final drive 0BD, code letters and manufacture date (➡).



A➡ front final drive 0BD with replacement part number (example: 0BD 500 043A)

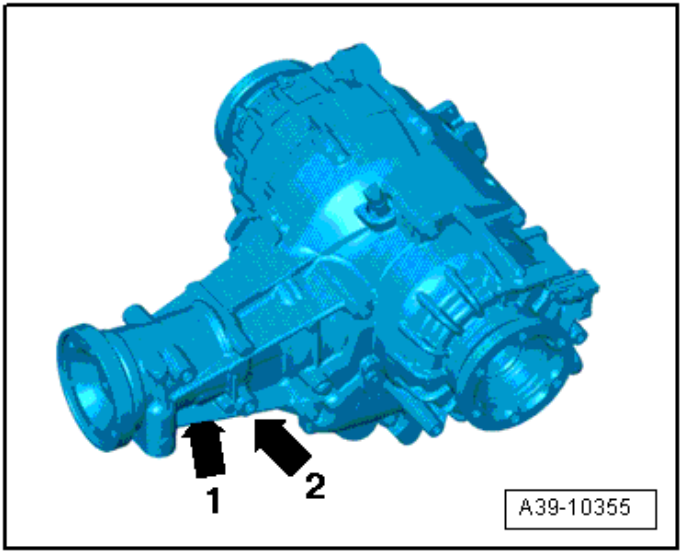
B➡ code letters JTN

C➡ Rear final drive manufacture date

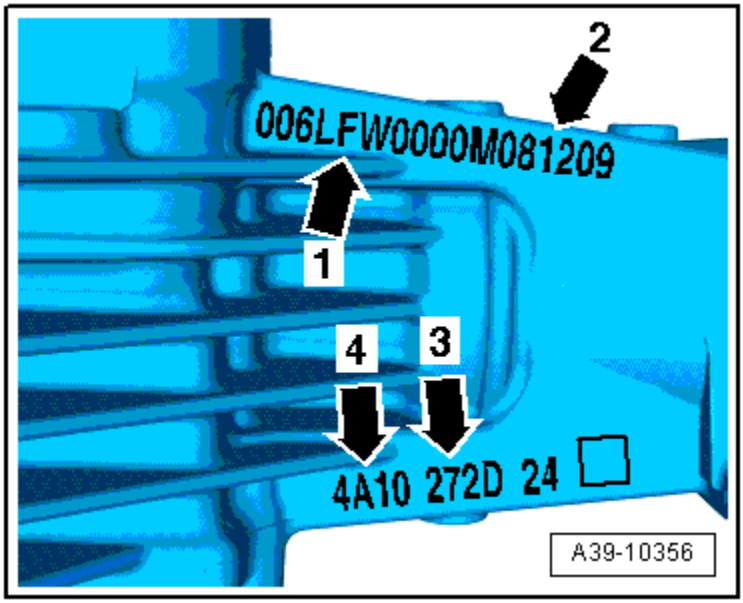
Example

F	292	3242
Production year 2006 F = 2006, G = 2007, H = 2008, etc.	Production date 292nd calendar day (always given in three-digit format)	Day of manufacture serial number

Rear Final Drive Identification



Clutch class -arrow 1-. Engine code and build date-arrow 2-. The way to recognize the rear final drive “0BF and 0BE” is the hydraulic control unit with the side chambers.



1 ➡ Code LFW

2 ➡ Rear final drive build dates

3 ➡ Classification (classification of the clutch wear values) for the right clutch. Example: -272D-

4 ➡ Classification (classification of the clutch wear values) for the left clutch. Example: -4A10-

Example

08	12	09
Production year 2008	Month	Day

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		See the Fluid Capacity Tables; Rep. Gr.03;		

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		See the Fluid Capacity Tables; Rep. Gr.03;		

Rear Final Drive		0BC		
Code letters		KLM	KRR	MFS
Ratio	Final drive Z_2:Z_1	35:8 = 4.375	43:13 = 3.308	48:13 = 3.692
Driveshaft flange diameter		70.7 mm	75.5 mm	70.7 mm
Gear oil capacity		See the Fluid Capacity Tables; Rep. Gr.03;		

Rear Final Drive		0BC		
Code letters		MFT	MNA	NPR
Ratio	Final drive Z_2:Z_1	48:13 = 3.692	37:9 = 4.111	43:13 = 3.308
Driveshaft flange diameter		75.5 mm	70.7 mm	75.5 mm
Gear oil capacity		See the Fluid Capacity Tables; Rep. Gr.03;		

Audi A5 Cabrio

Rear Final Drive		0BC		
Code letters		JKR	JKD	KLM
Ratio	Final drive Z_2:Z_1	37:9 = 4.111	35:9 = 3.889	35:8 = 4.375
Driveshaft flange diameter		70.7 mm	75.5 mm	75.5 mm
Gear oil capacity		See the Fluid Capacity Tables; Rep. Gr.03;		

Rear Final Drive		0BC		
Code letters		MNS	KRR	JKR
Ratio	Final drive Z_2:Z_1	37:9 = 4.111	43:13 = 3.308	48 13 = 3.692
Driveshaft flange diameter		70.7 mm	70.7 mm	70.7 mm
Gear oil capacity		See the Fluid Capacity Tables; Rep. Gr.03;		

Rear Final Drive 0BD Transmission Allocations, Ratios, Capacities

Audi A5 Coupe

Rear Final Drive		0BD		
Code letters		JTN	KBU	
Ratio	Final drive $Z_2:Z_1$	35:8 = 4.375	43:13 = 3.308	
Driveshaft flange diameter		70.7 mm	70.7 mm	
Gear oil capacity		See the Fluid Capacity Tables; Rep. Gr.03;		

Audi A5 Cabrio

Rear Final Drive		0BD		
Code letters		KBU		
Ratio	Final drive $Z_2:Z_1$	43:13 = 3.308		
Driveshaft flange diameter		70.7 mm		
Gear oil capacity		See the Fluid Capacity Tables; Rep. Gr.03;		

Rear Final Drive 0BF Transmission Allocations, Ratios, Capacities

Audi A5 Coupe

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 rear final drive (differential and pinion) • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
Gear oil specification		Refer to the Parts Catalog.		
ATF capacity • For the hydraulic control unit and chambers • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
ATF specification		Refer to the Parts Catalog.		

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 rear final drive (differential and pinion) • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
Gear oil specification		Refer to the Parts Catalog.		
ATF capacity • For the hydraulic control unit and chambers • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
ATF specification		Refer to the Parts Catalog.		

Rear Final Drive		0BF		
Code letters		MBW	MKV	MKW
Ratio	Final drive Z_2:Z_1	37:10 = 3.700	43:13 = 3.308	35:8 = 4.375
Driveshaft flange diameter		75.5 mm	75.5 mm	75.5 mm
Gear oil - capacity • For rear final drive (differential and pinion) • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
Gear oil specification		Refer to the Parts Catalog.		
ATF capacity • For the hydraulic control unit and chambers • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
ATF specification		Refer to the Parts Catalog.		

Rear Final Drive		0BF		
Code letters		MKX	MKY	
Ratio	Final drive Z_2:Z_1	35:9 = 3.889	37:10 = 3.700	
Driveshaft flange diameter		75.5 mm	75.5 mm	
Gear oil - capacity • For rear final drive (differential and pinion) • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
Gear oil specification		Refer to the Parts Catalog.		
ATF capacity • For the hydraulic control unit and chambers • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
ATF specification		Refer to the Parts Catalog.		

Audi A5 Cabrio

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 rear final drive (differential and pinion) • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
Gear oil specification		Refer to the Parts Catalog.		
ATF capacity • For the hydraulic control unit and chambers • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
ATF specification		Refer to the Parts Catalog.		

Rear Final Drive		0BF		
Code letters		MBV	MKU	MKX
Ratio	Final drive $Z_2:Z_1$	35:9 = 3.889	37:9 = 4.111	35:9 = 3.889
Driveshaft flange diameter		75.5 mm	75.5 mm	75.5 mm
Gear oil - capacity • For rear final drive (differential and pinion) • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
Gear oil specification		Refer to the Parts Catalog.		
ATF capacity • For the hydraulic control unit and chambers • No replacement interval		See the Fluid Capacity Tables; Rep. Gr.03;		
ATF specification		Refer to the Parts Catalog.		

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.

Fastener Tightening Specifications

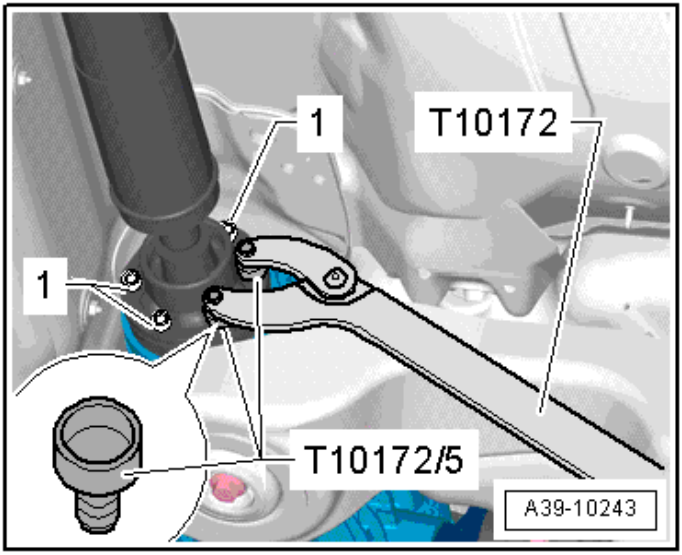
Component	-Fastener Size	Nm
Driveshaft heat shield	-	24
Intermediate bearing bracket	-	20
Lock plate to driveshaft [1]	-	30 plus an additional 90° (¼ turn)
Final Drive 0BC, 0BD		
Balance weight to rear final drive bolt [3]	-	22
Balance weight to rear final drive bolt [4]	-	55
Crossmember to rear final drive bolt	-	55
Heat shield to crossmember bolt	-	20
Subframe [2]		
- Bolt	-	55
- Bolt	-	95
Gear Oil Drain and Inspection Plugs 0BE, 0BF		
Drain plug for gear oil [1]	-	15
Inspection plug for gear oil [1]	-	15
Final Drive 0BE, 0BF		
All Wheel Drive Clutch Valve 2 -N446- to hydraulic control unit housing bolt	-	2.5
All Wheel Drive Pump -V415- to hydraulic control unit housing bolt	-	5
ATF check plug [1]	-	15
ATF drain plug [1]	-	15
Bracket for wiring harness to rear final drive bolt	-	9
Gear oil drain plug [1]		15
Gear oil inspection plug [1]		15
Gear oil checking plug 0BC		30
Gear oil checking plug 0BD		45
Hydraulic control unit [6]		
- Bolt [5]	M8 x 50	20 see tightening sequence → Hydraulic Control Module, 0BE, 0BF
- Bolt	M8 x 30	
Left line to Hydraulic Control Unit Housing nut		30
Oil Pressure/Temperature Sensor		10
Right Flange Shaft to Final Drive bolt [1]		50 + 90°

Fastener Tightening Specifications *(cont'd)*

Component	-Fastener Size	Nm
Right line to Hydraulic Control Unit Housing nut		30
Shuttle valve		8
Gear Oil Drain and Inspection Plugs, 0BE, 0BF		
ATF drain plug [1]		15
ATF inspection plug [1]		15

[1] Replace
[2] For bolt tightening clarification, refer to ElsaWeb, *Final Drive 0BC, 0BD Overview* items 2 and 3
[3] For bolt tightening clarification, refer to ElsaWeb, *Final Drive 0BC, 0BD Overview* item 1
[4] For bolt tightening clarification, refer to ElsaWeb, *Final Drive 0BC, 0BD Overview* item 9
[5] Coat the thread with Sealing Compound -D 176 501 A1-
[6] For bolt tightening clarification, refer to ElsaWeb, *Final Drive 0BE, 0BF Overview* items 7, 8 and 9

Driveshaft to Rear Final Drive Tightening Specification



Always replace the driveshaft bolts 1.

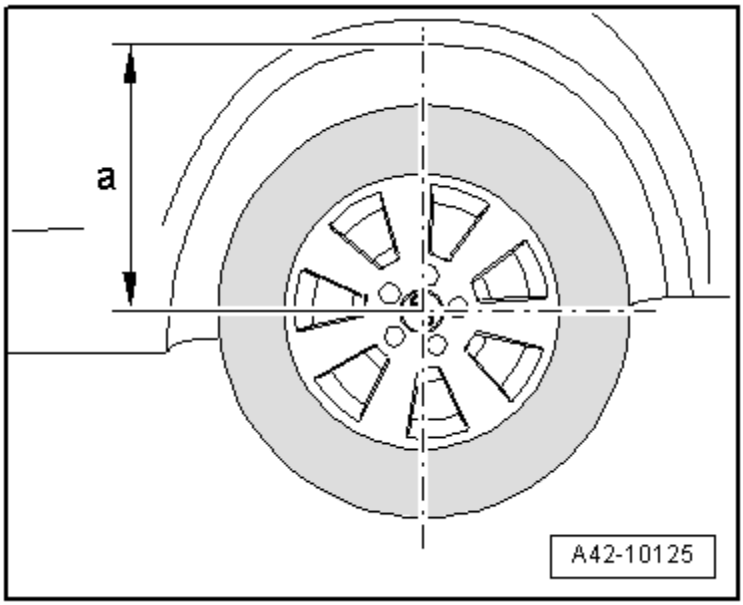
Step	Bolts	Tightening Specification/Additional Turn
1	1	Next to the color dot 30 Nm [1]
2	1	30 Nm
3	1	Plus an additional 90° (¼ turn)

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

SUSPENSION, WHEELS, STEERING

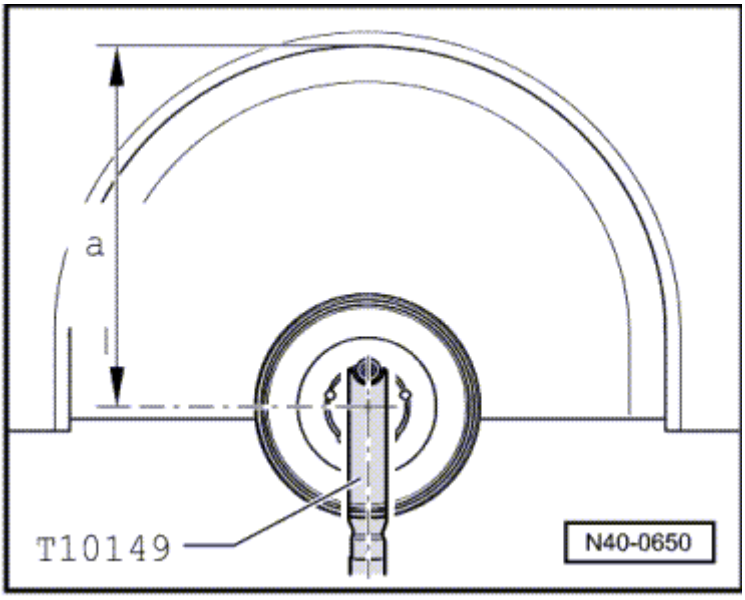
General, Technical Data

Wheel Bearing, with Coil Spring, Lifting to Curb Weight Position



Before starting work, use a tape measure to measure dimension (a) from wheel center to lower edge of wheel housing. Take this measurement in the curb weight position (unloaded condition).

Wheel Bearing, with Air Suspension, Lifting to Curb Weight Position



Dimension (a) is dependent on the standing height of the installed suspension.

Chassis

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

Coupe

FWD/AWD		Standard suspension (1BA) Suspension with electronic damping (1BL)	Sport suspension (1BE) Sport suspension (1BD)
Wheelbase	mm	Approximately 2755	Approximately 2755
Front track	mm	Approximately 1591	Approximately 1591
Rear track	mm	Approximately 1580	Approximately 1580
Maximum steering angle at curved inner wheel		39° 57’	39° 57’
FWD/AWD		**Sport suspension (1BV)**	**Sport suspension (2MS/2MC) (RS 5)**
Wheelbase	mm	Approximately 2756	Approximately 2756
Front track	mm	Approximately 1589	Approximately 1599
Rear track	mm	Approximately 1578	Approximately 1597
Maximum steering angle at curved inner wheel		39° 57’	39° 57’

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

Cabriolet

FWD/AWD		Standard suspension (1BA) Suspension with electronic damping (1BL)	Sport suspension (1BE) Sport suspension (1BD)
Wheelbase	mm	Approximately 2754	Approximately 2754
Front track	mm	Approximately 1591	Approximately 1591
Rear track	mm	Approximately 1580	Approximately 1580
Maximum steering angle at curved inner wheel		39° 57’	39° 57’
FWD/AWD		**Sport Suspension (1BV)**	
Wheelbase	mm	Approximately 2754	
Front track	mm	Approximately 1589	
Rear track	mm	Approximately 1577	
Maximum steering angle at curved inner wheel		39° 57’	

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

Sportback

FWD/AWD		Standard suspension (1BA)	Sport suspension (1BE)
Wheelbase	mm	Approximately 2813	Approximately 2815
Front track	mm	Approximately 1591	Approximately 1591
Rear track	mm	Approximately 1580	Approximately 1580
Maximum steering angle at curved inner wheel		39° 57’	39° 57’
FWD/AWD		**Sport suspension (1BV)**	**Chassis with electronic damping (1BL)**
Wheelbase	mm	Approximately 2816	Approximately 2814
Front track	mm	Approximately 1590	Approximately 1591
Rear track	mm	Approximately 1578	Approximately 1580
Maximum steering angle at curved inner wheel		39° 57’	39° 57’

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

Steering

Steering gear	Maintenance-free rack-and-pinion steering with servo assist
Turning diameter	Approximately 11.40 meters

Front Suspension

Fastener Tightening Specifications

Component	Nm
Ball joint-to-track control arm nut	
- Collar nut, M12 wrench 21 mm	145
- Combination nut, M12 wrench 18 mm	110
- Combination nut, M12 wrench 21 mm	120
- Combination nut, M14 wrench 21 mm	140
Ball joint-to-wheel bearing housing bolt [1)]	40
Brake shield-to-wheel bearing housing bolt	10
Constant Velocity (CV) joint boot clamp (stainless steel)	20
Coupling rod-to-stabilizer bar bolt [1), 3)]	40 plus an additional 90° (¼ turn)
Coupling rod-to-shock absorber fork bolt [1) 3)]	40 plus an additional 90° (¼ turn)
Cover-to-subframe bolt	20
CV joint boot clamp, stainless steel	20
Diagonal brace bolt (Cabriolet) [1) 2)]	50 plus an additional 90° (¼ turn)
Drive axle-to-transmission flange bolt [1)]	70
Drive axle-to-wheel hub bolt [1)]	200 plus an additional 180° (½ turn)
End plate bolt (Cabriolet) [1)]	20 plus an additional 90° (¼ turn)
Guide link-to-subframe nut [1) 3)]	70 plus an additional 180° (½ turn)
Guide link-to-wheel bearing housing nut [1)]	
- Collar nut, M12 wrench 21 mm	145
- Combination nut, M12 wrench 18 mm	110
- Combination nut, M12 wrench 21 mm	120
- Combination nut, M14 wrench 21 mm	140
Level control system sensor bolt	20
Level control system sensor-to-track control arm nut	9
Stabilizer bar-to-subframe nut [1) 3)]	25
Subframe shield-to-subframe bolt	9
	20

Component	Nm
Suspension strut mounting bracket-to-body bolt [1) 6)]	40 plus an additional 90° (¼ turn)
Suspension strut-to-mounting bracket nut [1)]	50
Suspension strut -to-shock absorber fork nut [1)]	40 plus an additional 180° (½ turn)
Tie rod end-to-wheel bearing housing nut	
- Hex collar nut	20 plus an additional 90° (¼ turn)
- 12-point combi-nut	100
- Hex combi-nut	110
Tower brace bolt	7
Tower brace nut	30
Track control arm-to-shock absorber fork nut [1) 3)]	90 plus an additional 90° (¼ turn)
Track control arm-to-subframe nut [1) 3)]	70 plus an additional 180° (½ turn)
Upper control arm-to-mounting bracket bolt [1) 3)]	50 plus an additional 90° (¼ turn)
Upper control arm-to-wheel bearing housing nut [1)]	40
Wheel bearing-to-wheel bearing housing bolt [1)]	80 plus an additional 90° (¼ turn)
Wheel speed sensor bolt	9

1) Replace fastener(s).
2) For bolt tightening clarification, refer to ElsaWeb, *Subframe, Crossbrace, Diagonal Brace, Stabilizer Bar, Coupling Rod and Subframe Shield Assembly Overview*.
3) Tighten in the curb weight position.

Rear Suspension

Fastener Tightening Specifications

Component	Nm
ABS wheel speed sensor bolt	9
Brake disc-to-wheel hub bolt	5
Brake shield-to-wheel bearing housing bolt	10
Constant Velocity (CV) joint boot clamp	20
Coupling rod-to-lower transverse link bolt [1) 2)]	40 plus an additional 90° (¼ turn)
Coupling rod-to-stabilizer bar bolt [1) 2)]	40 plus an additional 90° (¼ turn)
Drive axle-to-rear final drive bolt [1)]	
- 88 mm diameter outer CV joint and 100 mm diameter inner CV joint	20 plus an additional 90° (¼ turn)
- 100 mm diameter outer CV joint and 108 mm diameter inner CV joint	70
- 89/98 mm diameter outer CV joint and 100/108 mm diameter inner CV joint - M10	70
Drive axle-to-wheel bearing bolt (AWD) [1)]	200 plus an additional 180° (½ turn)
Diagonal brace-to-body bolt (Cabriolet) [1) 3)]	50 plus an additional 90° (¼ 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 [1) 2)]	70 plus an additional 180° (½ turn)
Lower transverse link-to-wheel bearing housing bolt [1) 2)]	120 plus an additional 360° (1 full turn)
Shock absorber-to-upper shock absorber mount bolt [1)]	35
Shock absorber-to-wheel bearing housing bolt [1) 2)]	150 plus an additional 180° (½ turn)
Stabilizer bar-to-subframe bolt [1)]	25 plus an additional 90° (¼ turn)

Component	Nm
Subframe-to-body bolt [1]	115 plus an additional 90° (¼ turn)
Support-to-body bolt	55
Tie rod-to-subframe nut [1] [2]	95
Tie rod-to-wheel bearing housing bolt [1] [2]	90 plus an additional 90° (¼ turn)
Upper shock absorber mount-to-body bolt [1]	50 plus an additional 45° (⅛ turn)
Upper transverse link-to-subframe bolt [1] [2]	70 plus an additional 180° (½ turn)
Upper transverse link-to-wheel bearing housing nut [1] [2]	95
Wheel bearing unit-to-wheel bearing housing bolt (AWD) [1]	80 plus an additional 90° (¼ turn)
Wheel bearing unit-to-wheel bearing housing bolt (FWD) [1]	200 plus an additional 180° (½ turn)

[1] Replace fastener(s).
[2] Tighten in the curb weight or control position.
[3] Pre-tightening to 5 Nm

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Self-Leveling Suspension

Fastener Tightening Specifications

Component	Nm
Central valve-to-bracket bolt	20
Central valve bracket bolt	20
Front suspension strut connection	14
Dynamic Ride Control (DRC) line-to-rear shock absorber	14
Electronic damping control module nut	2
Front body acceleration sensor nut	5
Rear body acceleration sensor bolt	5
Shut-off valve	5
Shut-off valve locking nut	12

Wheels, Tires

Fastener Tightening Specifications

Component	Nm
Adaptive cruise control sensor bracket bolt	8
Level control system control module bracket nut	6
Level control system control module to bracket bolt	8
Tire pressure monitoring control module nut	2
Tire pressure monitoring sensor to rim union nut	8

Wheel Alignment Data

Wheel Alignment Specified Values – Coupe

Front suspension	Standard suspension (1BA)	Sport suspension (1BE/1BD)	Suspension with electronic damping (1BL)
Camber	- 1°5′ ± 23′	- 1°5′ ± 23′	- 1°5′ ± 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 [1)]	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°

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

Front Suspension	Sport suspension (1BV)	Variable damping RS 5 (2MC) Standard suspension RS 5 (2MS)	Sport suspension RS 5 (1BU)
Camber	- 1°13′ ± 23′	- 1°18′ ± 23′	- 1°31′ ± 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 [1)]	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°

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

Rear suspension	Standard suspension (1BA)	Sport suspension (1BE/1BD)	Suspension with electronic damping (1BL)
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′

Rear suspension	Sport suspension (1BV)	Variable damping RS 5 (2MC) Standard suspension RS 5 (2MS)	Sport suspension RS 5 (1BU)
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′

Wheel Alignment Specified Values – Cabriolet

Front suspension	Standard suspension (1BA)	Sport suspension (1BE/1BD)
Camber	- 1°5′ ± 23′	- 1°5′ ± 23′
Maximum permissible difference between both sides	30′	30′
Toe per wheel (adjustment value)	+ 10′ ± 5′	+ 10′ ± 5′
Toe per wheel (control value)	+ 10′ ± 7′	+ 10′ ± 7′
Toe-out angle at 20 degrees [1)]	1° 49′ ± 30′	1° 49′ ± 30′
Outer wheel steering angle at maximum steering angle	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°

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

Front suspension	Suspension with electronic damping (1BL)	Sport suspension (1BV)
Camber	- 1°5′ ± 23′	- 1°14′ ± 23′
Maximum permissible difference between both sides	30′	30′
Toe per wheel (adjustment value)	+ 10′ ± 5′	+ 10′ ± 5′
Toe per wheel (control value)	+ 10′ ± 7′	+ 10′ ± 7′
Toe-out angle at 20 degrees[1)]	1° 49′ ± 30′	1° 49′ ± 30′
Outer wheel steering angle at maximum steering angle	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°

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

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

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

Steering

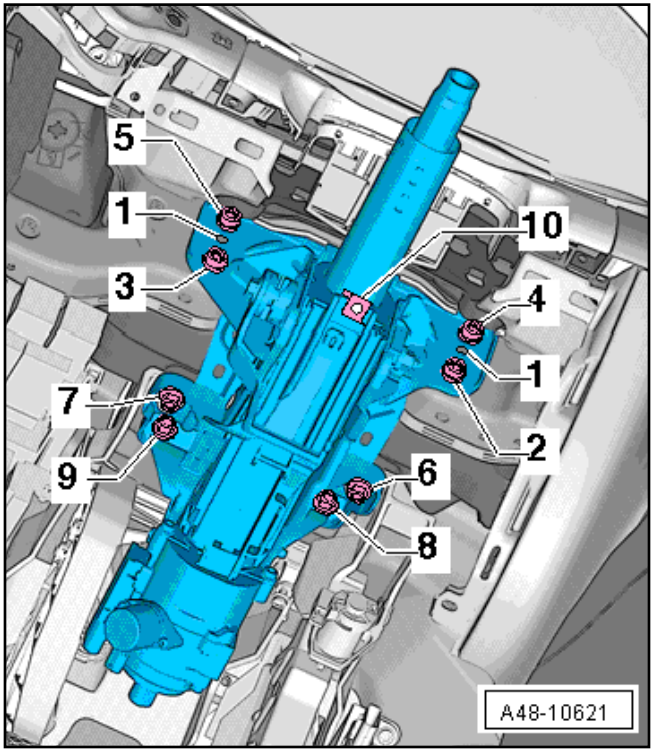
Fastener Tightening Specifications

Component	Nm
Electronic steering column lock control module-to-steering column bolt	5
Power steering pump belt pulley bolt (6-cylinder)	22
Power steering pressure line-to-steering gear bolt	20
Power steering pressure line-to-rubber bushing nut	6
Power steering pressure line union nut	40
Power steering pressure line-to-power steering pump union nut	38
Power steering pressure line-to-power steering pump bolt	9
Power steering return line-to-steering gear bolt (without dynamic steering)	9
Steering column handle bolt	3
Power steering pump mounting bolt	
- 4-cylinder TFSI and 8-cylinder FSI	25
- 6-cylinder	20
Reservoir tension strap bolt	9
Reservoir tension strap-to-body bolt	9
Return line-to-body bolt	9
Right knee bar-to-steering column bolt [2]	
- Coupe	20
- Cabriolet	22
Power steering gear rubber bushing	6
Servotronic solenoid valve-to-steering gear bolt [3]	3
Steering column mounting bolt	20
Steering gear-to-subframe bolt [1]	80 plus an additional 180° (½ turn)
Steering intermediate shaft-to-steering column bolt [1]	30 plus an additional 90° (¼ turn)
Steering intermediate shaft-to-steering gear bolt [1]	30 plus an additional 90° (¼ turn)
Steering wheel-to-steering column bolt [1]	
- Coupe	50
- Cabriolet	30 plus an additional 90° (¼ turn)
Tie rod-to-steering gear	90
Tie rod end-to-tie rod nut	60

Component	Nm
Tie rod end-to-wheel bearing housing nut [1]	
- Hex collar nut	20 plus an additional 90° (¼ turn)
- 12-point combi-nut	100
- Hex combi-nut	110

[1] Replace fastener(s).
[2] For bolt tightening clarification, refer to ElsaWeb, *Steering Column Assembly Overview*.
[3] For bolt tightening clarification, refer to ElsaWeb, *Servotronic Solenoid Valve*.

Steering Column Tightening Specifications

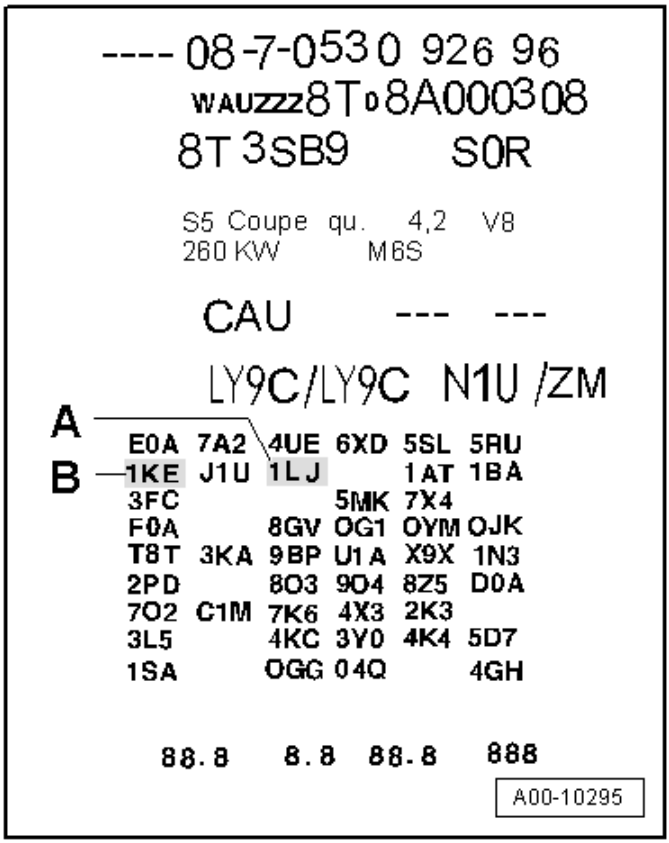


Step	Component	Nm
1	Position the steering column with the positioning pins (1) in the central tube positioning holes	-
2	Loosely install all bolts	-
3	Tighten bolts 2 through 9 in sequence	20
4	Replace the spring nut (10) if the steering column was replaced	-

BRAKE SYSTEM

General, Technical Data

Technical Data



The brake system installed in a vehicle is indicated on the vehicle data label by the Production Relevant No. (PR No.) (A and B).

Front Wheel Brakes – Technical Data

Front brakes				
Production Relevant No. (PR. No.)		1LT	1LA	1LJ
Brake caliper		FN3-57 16”	FBC-57 16”	FBC-57 17”
Brake disc ventilated	dia. in mm	314	320	345
Brake disc thickness	mm	25	30	30
Brake disc wear limit	mm	23	28	28
Brake caliper, piston	dia. in mm	57	57	57
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

Front brakes 1LM		
Ventilated brake rotor	dia. in mm	365
Brake disc thickness	mm	34
Brake disc wear limit	mm	32.4
8-piston brake caliper, Brembo	dia. in mm	32 / 28
Pad thickness with backing plate and dampening sheet	mm	17
Brake pad wear limit with backing plate and dampening sheet	mm	9.6
Backing plate	mm	5.0
Dampening sheet	mm	1.6

Ceramic Front Brakes 1LW		
Brake caliper		Brembo
Ventilated brake rotor	diameter in mm	380
Brake rotor, thickness	mm	38
Brake rotor, wear limit		
Brake caliper, 6 piston monoblock	diameter in mm	The wear value is the minimum brake rotor thickness is stamped into the brake rotor cup when it is manufactured.
Minimum pad thickness with backing plate and dampening sheet	mm	9.5

Ceramic brakes are installed only in the front on this model.
Hairline cracks on the friction surface on ceramic brakes occur during the manufacturing process and can be found on new brakes in different stampings. Hairline cracks on the friction surfaces are not a reason to exchange the ceramic brake rotors.
Every brake rotor has a singed groove to recognize the wear limit. If the brake rotor friction surface the groove are worn down to an even level, the brake rotor wear limit has been reached.

Rear Wheel Brakes – Technical Data

Rear brakes			
Production Relevant No. (PR. No.)		1KW	1KE
Brake caliper		CII-43 (16”)	CII-43 (17”)
Brake disc	dia. in 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. in 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

Anti-lock Brake System (ABS)

Fastener Tightening Specifications

Component	Nm
Brake line-to-hydraulic unit	
- 5 mm diameter M10 brake line	12
- 5 mm diameter M12 brake line	12
- 8 mm diameter M12 brake line	16
Electronic stabilization sensor-to-floor panel nut	9
Front wheel speed sensor bolt	9
Rear wheel speed sensor bolt	8

Mechanical Components

Fastener Tightening Specifications

Component	Nm
Accelerator pedal module-to-mounting bracket bolt	8
Electromechanical parking brake control module nut	9
Mounting bracket nut	8
Mounting pin bolt	8
Pedal support bolt	20
Steering column bolt	20
Steering column and mounting bracket bolt	20
Trailer mode control module and bracket nut	3
Universal joint bolt [1)]	30 plus an additional 90° (¼ turn)
Front brakes, with FN3-57 caliper	
Brake caliper housing guide pin	30
Brake carrier-to-wheel bearing housing bolt	190
Brake disc-to-wheel hub bolt	5
Brake hose-to-brake caliper housing	12
Brake shield-to-wheel bearing housing bolt	10
Front brakes, with 1LA/1LJ caliper	
Brake carrier-to-bracket caliper bolt	30
Brake carrier-to-wheel bearing housing bolt	196
Brake disc-to-wheel hub bolt	5
Brake line-to-brake caliper	20
Front brakes, with 1LT caliper	
Brake caliper housing guide pin	30
Brake carrier-to-wheel bearing housing bolt	190
Brake disc-to-wheel bearing housing bolt	5
Brake line-to-brake caliper	16

Component	Nm
Brake shield-to-wheel bearing housing bolt	18
Front brakes, with 1LM caliper	
Brake shield-to-wheel bearing housing bolt	10
Brake disc-to-wheel bearing housing bolt	5
Wheel speed sensor-to-wheel bearing housing	9
Brake hose-to-brake caliper	16
Brake pressure line-to-brake hose	16
Brake carrier-to-wheel bearing housing bolt [1)]	196
Front brakes, with 1LW caliper	
Brake bracket-to-caliper bolt	25
Brake caliper housing guide pin	30
Brake carrier-to-wheel bearing housing bolt 1	190
Brake disc-to-wheel bearing housing bolt	5
Brake line-to-brake caliper	16
Brake line connection-to-brake line	14
Brake shield-to-wheel bearing housing bolt	9
Rear brakes	
Brake caliper housing-to-brake carrier bolt [1)]	35
Brake carrier-to-wheel bearing housing bolt [1)]	100 plus an additional 90° (¼ turn)
Brake disc-to-wheel hub bolt	5
Brake hose-to-brake caliper housing	12
Brake shield-to-wheel bearing housing bolt	10
Electromechanical parking brake actuator-to-brake caliper housing	12

[1)] Replace fastener(s).

Hydraulic Components

Hydraulic Tightening Specifications

Component	Nm
Brake booster mounting bracket bolt	25
Brake fluid reservoir cover bolt	5
Brake hose-to-rear brake caliper	12
Brake line-to-brake hose bracket	12
Brake line-to-brake master cylinder	16
Brake line-to-front brake hose	17
Brake line-to-hydraulic unit	
- 5 mm diameter M10 brake line	12
- 5 mm diameter M12 brake line	12
- 8 mm diameter M12 brake line	16
Brake line-to-intermediate piece	12
Brake master cylinder-to-brake booster nut	49
Pedal support bolt	20
Vacuum hose-to-vacuum pump bolt (with 2.0L and 3.2L engines)	5
Vacuum pump bolt (with 2.0L and 3.2L engines)	9
Vacuum pump bracket nut (with 3.0L and 4.2L engines)	200
Front brake caliper, FN3-57	
Bleeder screw-to-brake caliper housing [2)]	10
Guide pin	30
Front brake caliper, FBC-57	
Bleeder screw-to-brake caliper housing [2)]	15
Brake caliper-to-brake carrier bolt	30
Brake carrier-to-wheel bearing housing bolt	196
Rear brake caliper	
Bleeder screw-to-brake caliper housing [2)]	10
Brake caliper housing-to-brake carrier bolt [1)]	35

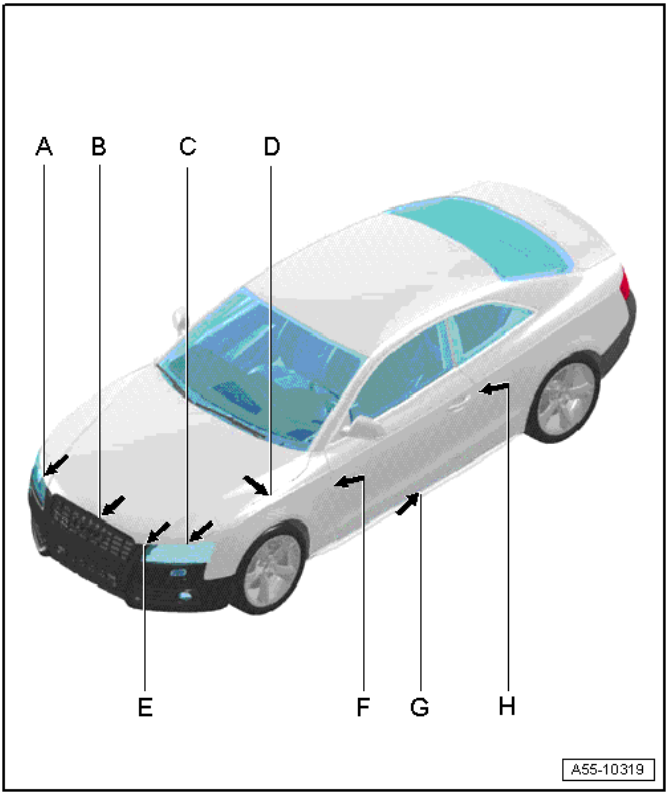
[1)] Replace fastener(s).

[2)] Apply a thin coat of assembly paste -G 052 150 A2- to the threads before installing.

BODY

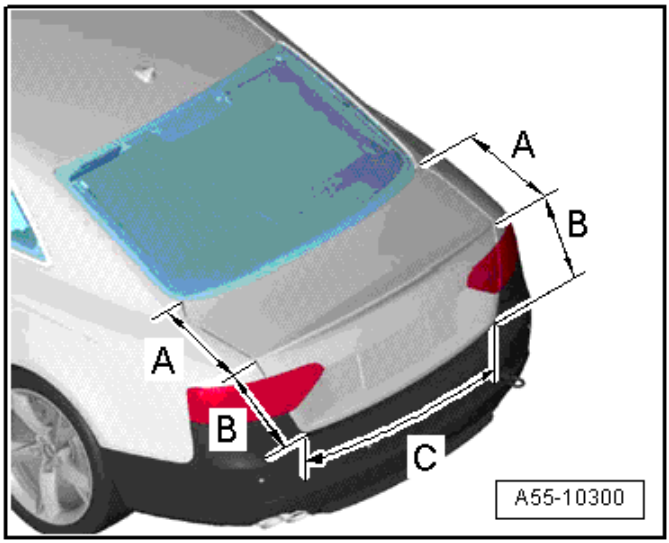
Air Gap Body Dimensions – Coupe

Front Gap Dimensions



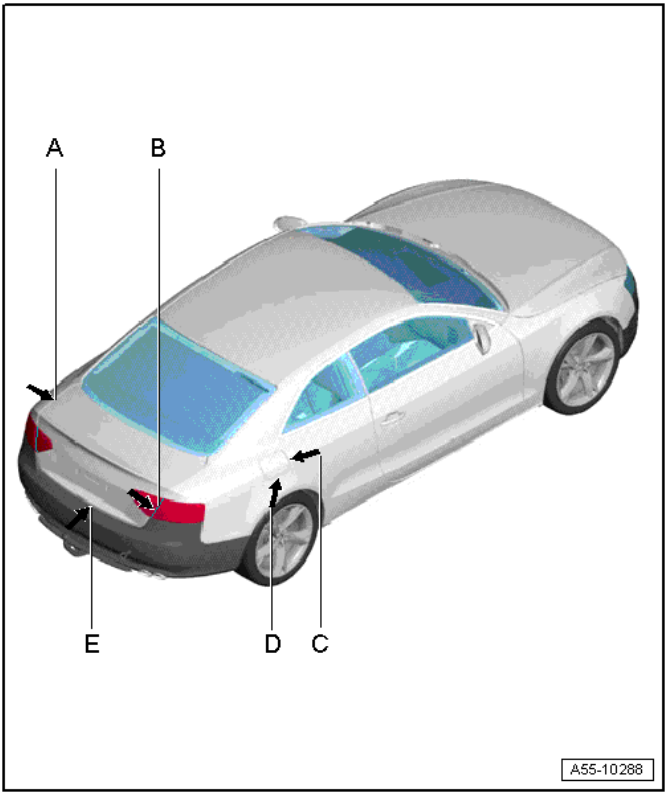
Component	mm
A	5
B	4.5
C	5.0
D	3.0
E	4.5
F	-
G	-
H	-

Rear Gap Dimensions



Component	mm
A	3.5 ± 0.5
B	3.7 ± 0.5
C	5.0 ± 0.5

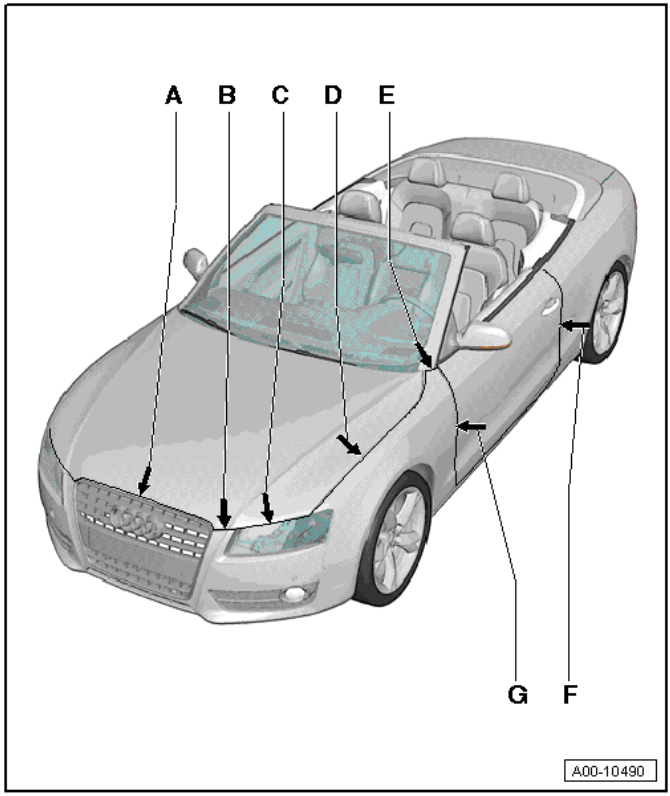
Rear Gap Dimensions



Component	mm
A	4.0 ± 0.5
B	4.5 ± 0.5
C	2.2 front and rear
D	2.0 top and bottom
E	5.0 ± 0.5

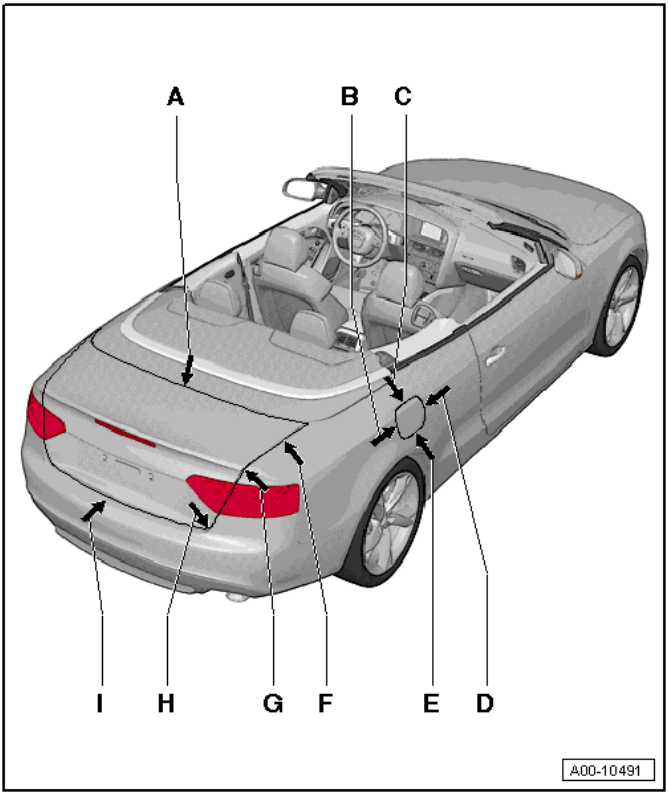
Air Gap Body Dimensions – Cabriolet

Front Gap Dimensions



Component	mm
A	4.5 ± 1.0
B	4.5 ± 1.0
C	5.0 ± 1.0
D	3.0 ± 0.5
E	4.0 ± 0.5
F	3.5 ± 0.5
G	3.5 ± 0.5

Rear Gap Dimensions



Component	mm
A	4.5 ± 1.0
B	2.5 ± 0.5
C	2.0 ± 0.5
D	2.5 ±0.5
E	2.5 ±0.5
F	3.5 ± 0.5
G	4.0 ± 0.5
H	4.0 ± 0.5
I	5.0 ± 0.5

Body Exterior

Body Front Tightening Specifications

Component	Nm
Fender bolts (front, upper and lower)	10
Fender brace nuts to bumper cover mount	4
Fender brace nuts to longitudinal member	8
Fender end plate screws	1.5
Fender nuts	4
Impact bar lower bolt	30
Impact bar upper bolt (secures the impact bar to the lock carrier)	4
Lock carrier brace bolt	1.5
Lock carrier brace nut	23
Lower lock carrier bolt	1.5
Plenum chamber bolt	7
Plenum chamber nut	7
Rear fender bolts	8
Upper lock carrier bolt	10

Hood, Lids Tightening Specifications

Component	Nm
Fuel filler door bolts	1.7
Gas-filled strut ball pin	21
Hood catch nuts	8
Hood hinge nuts	21
Hood latch bolts	11
Operating lever screw	2
Rear lid ball stud	21
Rear lid hinge nuts	21
Rear lid lock nuts	21
Rear lid striker nuts	21

Front Doors, Central Locking System Tightening Specifications

Component	Nm
Door arrester bolts to body	25
Door arrester bolts to door	8
Door striker bolt	25
Lower door hinge bolt to body	32
Lower door hinge bolt to door	45
Threaded pin to lower door hinge	25
Threaded pin to upper door hinge	30
Upper door hinge bolt to body	35
Upper door hinge bolt to door	45
Vehicle Positioning System Interface Control Module J843 bolt	2
Window regulator motor bolt	3.5
Window regulator nuts	9

Sunroof Tightening Specifications

Component	Nm
Angle bracket bolts	8
Sunshade bolt	2
Sunroof frame bolts (front and rear)	8
Sunroof glass panel bolts	2.5
Sunshade slider bolt	2
Wind deflector bolts (end)	1.5
Wind deflector bolts (middle)	1

Bumpers Tightening Specifications

Component	Nm
Bumper cover end plate bolts (rear, Qty 4)	3
Bumper cover end plate bolts (front, Qty 3)	1.5
Front bumper cover mount nut	4
Front bumper cover mount nut Audi RS 5	4
Front noise insulation bracket bolts, Audi S5	1.5
Impact member bar to Impact member mount bolt	55
Impact member bar to Impact member mount nut	20
Impact member mount nut (upper corner)	4
Lower bumper cover trim molding bolts, Audi S5	1.5
Lock carrier cover bolt Audi RS 5	3
Lower part of spoiler bolts Audi RS 5	2
Radiator grille bolts	1.5
Rear bumper cover nuts	4
Reinforcement brace bolt, Audi S5	1.5
Rear bumper cover lower decorative trim strip bolts	1.5
Rear bumper cover lower section bolts	1.5
Rear bumper cover side mount bolts	1.5
Rear bumper impact bar to mount bolts and nuts	17
Rear bumper impact bar mount bolts	57
Side bumper cover nut	4
Upper part of spoiler bolts Audi RS 5	2
RS 5	
Center guide nut	1.5
Impact member mount bolt	40
Impact member nut and bolt	17
Rear bumper cover locking mechanism bolt	3
Rear bumper diffuser bolt	2
Side mount bolt	2
Tail pipe trim bolt	2

Glass, Window Regulators Tightening Specifications

Component	Nm
Glass, Window Regulators	9

Exterior Equipment Tightening Specifications

Component	Nm
Exterior rearview mirror adjusting unit mount to door bolt	10
Front and tunnel crossmember bolts	55
Front wheel housing liner bolt, RS5 (upper)	1.5
Front wheel housing liner bolt, RS5 (lower, qty 5)	1.5
Front wheel housing liner bolt, RS5 (middle outer)	2.5
Front wheel housing liner bolt	1.5
Front wheel housing liner drive axle cover	2
Front noise insulation bolt RS5	5
Front wheel spoiler bolt	1.5
Front noise insulation bolts	5
Front aerodynamic trim panel nuts	2
Left inner wheel spoiler bolt RS5	1.5
Lower mirror adjusting unit mount cover to unit mount	1
Mirror adjusting unit bolt	1
Rear wheel housing liner bolt	1.5
Rear spoiler nuts, RS5	2
Rear spoiler adjusting mechanism intermediate piece bolt	9
Rear aerodynamic trim panel bolt	3.5
Rear aerodynamic trim panel nut	2
Right inner wheel spoiler bolt RS5	1.5
Rear floor panel heat shield nut, RS5 (center of the exhaust system)	2.1
Rear floor panel heat shield nut, RS5 (right interior heat shield for the rear muffler)	2.1
Rear floor panel heat shield bolt, RS5 (right exterior heat shield for the rear muffler)	2
Rear floor panel heat shield nut, RS5 (left interor heat shield for the rear muffler)	2.1
Rear floor panel heat shield bolt, RS5 (left exterior heat shield for the rear muffler)	2
Side member trim panel bolts, RS5	1.3

Storage Compartment, Center Console, Instrument Panel and Central Tube Tightening Specifications

Component	Nm
Console for vehicles with a front center armrest	
Ashtray-to-console	2.5
Bracket to center console [1]	
- Bolt	3
- Nut	8
Center cross support-to-console	1.4
Cupholder-to-console	1.4
Rear trim-to-console	2.5
Storage compartment-to-console	1.4
Console for vehicles without a front center armrest	
Ashtray-to-console	2.5
Bracket-to-center console [2]	
- Bolt	3
- Nut	8
Cupholder-to-console	1.4
Console-to-floor securing	4
Steering column switch module trim	
Bottom trim-to-column	2
Handle-to-column	3
Driver side instrument panel cover	
Side of cover-to-vehicle	3
Right front of cover-to-vehicle	3
Left front of cover-to-vehicle	3
Front center armrest	
Armrest hinge-to-pad	2.2
Support base cross member	3
Support base-to-clip	3
Support base-to-vehicle	20
Glove compartment	
Compartment-to-vehicle right side	3
Compartment-to-vehicle upper	3
Compartment-to-vehicle front	3
Hinge-to-glove compartment	3

[1] For bolt tightening clarification, refer to ElsaWeb, *Center Console Overview* items 4 and 5.

[2] For bolt tightening clarification, refer to ElsaWeb, *Center Console Overview* items 2 and 3.

Passenger Protection, Airbags, Seat Belts Tightening Specifications

Component	Nm
Airbag system components	
Airbag control module-to-vehicle	9
Airbag crash sensors	
Driver front airbag crash sensor-to-headlamp housing bracket	9
Driver side airbag crash sensor-to-door	5
Driver side rear side airbag crash sensor-to-nner wheel house lining	9
Front passenger side airbag crash sensor-to-door	5
Passenger front airbag crash sensor-to-headlamp housing bracket	9
Passenger side rear side airbag crash sensor-to-inner wheel house lining	9
Battery interrupt igniter	
Battery interrupt igniter-to-fuse panel a	15
Driver airbag	
Steering wheel-to-column side	7
Front seat child seat anchors	
Fracket-to-seat pan	8
Bracket-to-seat pan	
F**ront side airbag**	
Side airbag-to-seat frame	8
Head curtain airbag	
Nut for ground bolt	9
Head curtain airbag-to-vehicle	
- Bolt (end of airbag)	3.5
- Bolt (middle of airbag)	3.5
- Nut	9
Knee airbags	
- Driver knee airbag	
Mount bolt	3
Mount nuts	9
Mount-to-Support Brackets	4.5
- Passenger knee airbag	
Mount-to-airbag [1)]	3
	4.5
Passenger airbag	
Airbag-to-dashboard	8
Seat belts	
Front three-point seat belt-to-vehicle	45
Front seat belt-to-seat frame	33

Component	Nm
Rear three-point seat belt-to-vehicle	45
Rear belt latch-to-vehicle	45
Seat position sensor	
Seat position sensor-to-seat pan frame	0.3

1) For bolt tightening clarification, refer to ElsaWeb, *Passenger Knee Airbag Overview*

Interior Trim Tightening Specifications

Component	Nm
Door Trim	
Armrest to Door Trim 1)	1.2
Armrest to Door Trim 2)	2.5
Impact Absorber, Knee Airbag and Glove Compartment	
Left retainer for the driver knee airbag to central tube	9
Left retainer for the glove compartment to central tube	9
Left retainer for the passenger knee airbag to central tube	9
Left shock absorber to central tube	9
Right retainer for the driver knee airbag to central tube	9
Right retainer for the glove compartment to central tube	9
Right retainer for the passenger knee airbag to central tube	9
Right shock absorber to central tube	9
Headliner	
Front deformation element to roof	3
Front of headliner to roof	1.6
Inside door release mechanism to door trim	1.2
Instrument Panel and Dashboard	
Access/start authorization switch trim to dashboard	3
Instrument panel trim to dashboard	3
Light switch trim to dashboard	1.5
Passenger airbag mount to dashboard	3
Radio trim inside mounting to dashboard 3)	3
Right side dashboard to vehicle	3
Speaker mount trim to dashboard	0.5
Underside trim below light switch to dashboard	3
Upper center defroster vent to dashboard	0.5
Instrument Panel Central Tube	
Bolt for center support 7)	3.6
Bolts for bottom of center support 8)	20
Bracket for the air intake chamber to central tube	9
Bracket for the glove compartment to central tube	9
Bracket for the instrument panel cover	9

Front center horizontal bolt [4]	3.6
Front center vertical bolt [5]	20
Nuts for threaded pins	20
Mounting bracket to tube	20
Front facing securing bolts [9]	20
Threaded pins to tube [6]	20
Interior Trim	
A-Pillar lower trim to A-Pillar	2.5
A-Pillar upper trim to A-Pillar	3.5
B-Pillar trim to B-Pillar	4.5
B-Pillar trim side panel to B-Pillar trim	1
Rear Shelf	
Rear shelf to the rear shelf spacer	2
Rear shelf spacer to the body	2
Luggage Compartment	
Retaining hooks to body	1.5
Tie down eye through luggage compartment side trim to body	6
Rear Lid Trim	
Read trunk lid trim to rear trunk lid	1.8
Sun Shade	
Bracket to guide strip	2.3
Sun shade to rear shelf rear section	3
Sun shade to rear shelf spacer	2.3
Sun shade to body under rear shelf	2

1) For bolt tightening clarification, refer to ElsaWeb, *Door Trim Overview, see* items 2 and 25.
2) For bolt tightening clarification, refer to ElsaWeb, *Door Trim Overview, see* items 16, 22 and 26.
3) For bolt tightening clarification, refer to ElsaWeb, *Door Trim Overview, see* item 7.
4) For bolt tightening clarification, refer to ElsaWeb, *Instrument Panel Central Tube Overview* see item 3.
5) For bolt tightening clarification, refer to ElsaWeb, *Instrument Panel Central Tube Overview* see item 4.
6) For bolt tightening clarification, refer to ElsaWeb, *Instrument Panel Central Tube Overview* see items 6 and 18.
7) For bolt tightening clarification, refer to ElsaWeb, *Instrument Panel Central Tube Overview"*see item 10.
8) For bolt tightening clarification, refer to ElsaWeb, *Instrument Panel Central Tube Overview* see items 13 and 14.
9) For bolt tightening clarification, refer to ElsaWeb, *Instrument Panel Central Tube Overview* see items 19 and 20.

Seat Frames Tightening Specifications

Component	Nm
All seats	
Lumbar support adjustment switch-to-sill side trim	0.5
Front bucket seats	
Backrest frame mount-to-backrest frame	22
Button for seat bolster inflation adjustment-to-sill side trim	0.4
Button for backrest bolster inflation adjustment-to-sill side trim	0.4
Cover and mount for left release-to-backrest frame	2.5
Cover and mount for right release-to-backrest frame	2.5
Front backrest to seat frame [2)]	20
Handle-to-seat frame	4
Lumbar support adjustment switch-to-sill side trim	0.4
Retaining plate bolts	8
Seat frame bolts [1)]	24
Seat height adjuster-to-seat frame	8
Seat height adjustment lever-to-seat frame	22
Seat pan-to-seat frame	24
Seat rails-to-vehicle floor	50
Sill side trim-to-seat frame	1.2
Manual front seats	
DVD socket	0.4
Front backrest-to-seat frame	33
Handle-to-backrest frame	3.5
Seat angle adjustment bolt	6.5
Seat angle adjustment shoulder pin	6
Seat height adjuste-to-seat frame [3)]	6.5
Seat height adjuster-to-seat frame [4)]	10
Seat height adjustment handle lever-to-seat frame	8
Seat rails-to-vehicle floor	50
Sill side trim retaining bracket-to-seat frame	3.5
Manual sport front seats with seat depth adjustment	
Seat depth adjuster-to-sport seat frame	4
Seat rails-to-vehicle floor	50
Power comfort front seats with or without memory function	
Seat cushion fan assembly: grille cover-to-fan	1.5

Component	Nm
Power front seats	
Backrest adjustment motor-to-backrest frame	7.5
Backrest shaft nut	6
Front backrest-to-seat frame	33
Handle with backrest release bracket-to-eat backrest frame	3.5
Retaining bracket for sill side trim-to-seat	8
Seat adjustment control head-to-sill side trim	0.4
Seat angle adjustment motor-to-seat frame [5)]	10
Seat angle adjustment motor-to-seat frame [6)]	20
Seat height adjustment motor-to-bracket	10
Seat height adjustment motor-to-seat frame [7)]	18
Seat height adjustment motor-to-seat frame [8)]	28
Storage compartment-to-pper seat pan frame	8
Switch unit (micro-switch with bracket)-to-backrest frame	1.5
Upper seat pan frame-to-lower seat pan frame	22
Power super sport front seat with or without memory function	
Front backrest-to-seat frame	33
Handle with bracket-to-backrest frame	3.5
Seat rails-to-vehicle floor	50
Center armrest and lockable storage compartment overview	
Bracket screws [9)]	11
Center armrest bracket nuts-to-seat backrest	8
Storage compartment-to-bracket	4
Center armrest with cover and trim	
Bracket screws [9)]	11
Center armrest bracket nuts-to-seat backrest	8
Storage compartment-to-bracket	4
Trim to center armrest	1.8
Center armrest with pass-through cover	
Center armrest bracket-to-seat backrest	8
Hood-to-center armrest	11

Seat Frames Tightening Specifications *(cont'd)*

Component	Nm
All rear seats	
Center bracket-to-vehicle floor	16.5
Inner bracket bolt-to-backrest shell	15
Locking tab-to-backrest shell	25
Securing bracket-to-vehicle floor	9
Remote release handle-to-expanding nut	1.5

1) For bolt tightening clarification, refer to ElsaWeb, *Lower Seat Frame and Front Backrest Overview* items 4 and 11.
2) For bolt tightening clarification, refer to ElsaWeb, *Lower Seat Frame and Front Backrest Overview* items 6 and 8.
3) For bolt tightening clarification, refer to ElsaWeb, *Seat Height Adjuster and Seat Height Adjustment Handle Overview"* item 2.
4) For bolt tightening clarification, refer to ElsaWeb, *Seat Height Adjuster and Seat Height Adjustment Handle Overview"* item 4.
5) For bolt tightening clarification, refer to ElsaWeb, *Seat Angle Adjustment Motor Overview"* item 2
6) For bolt tightening clarification, refer to ElsaWeb, *Seat Angle Adjustment Motor Overview"* item 3
7) For bolt tightening clarification, refer to ElsaWeb, *Seat Height Adjustment Motor Overview"* item 5.
8) For bolt tightening clarification, refer to ElsaWeb, *Seat Height Adjustment Motor Overview* item 7.
9) For bolt tightening clarification, refer to ElsaWeb, *Center Armrest and Lockable Storage Compartment Overview"* item 4.

HEATING, VENTILATION & AIR CONDITIONING

General, Technical Data

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

Air Conditioning

Fastener Tightening Specifications

Component	Fastener size	Nm
A/C pressure temperature sensor	-	5
Compressor drain plug, Denso	-	30
Compressor driveshaft	-	60
Compressor mounting	-	25
Electric compressor mounting bolt	-	25
Expansion valve, front	-	10
Expansion valve, rear (Hybrid)	-	10
Hybrid Battery Refrigerant Shut-Off Valve 1 Union	-	16.5
Pressure relief valve, Denso	-	10
Refrigerant line-to-compressor	M6	9
	M8	25
Refrigerant line with inner heat exchanger	-	10

ELECTRICAL SYSTEM

Communication Equipment

Communication Tightening Specifications

Component	Fastener Size	Nm
Antenna amplifier screw	-	2
Digital sound system control module screw		
- CAN	-	3.5
- MMI	-	3.5
Front information display control head screw	-	2
Front information display control head control module screw	-	2
Front information display control head control module bracket screw	-	2
Infotainment rack nut	-	3.5
Multifunction button to steering wheel screw	-	3
Navigation system with CD drive control module nut	-	5
Radio screw		
- Radio system	-	3
- MMI system	-	3.5
Radio, telephone, navigation system antenna/roof antenna nut	-	6
Rear view camera nut	-	8
Rear view camera system control module screw	-	2
Speaker screw		
- Front treble/midrange speaker	-	1
- Rear midrange speaker	-	2
- Rear treble/mid-bass/bass/effects speaker	-	3
- Subwoofer in the rear shelf	-	4.5
- Center mid/high range loudspeaker		1
Telephone base plate screw		1
Tiptronic switch screw		1.2

Electrical Equipment

Battery, Starter, Generator, Cruise Control Tightening Specifications

Component	Nm
B+ terminal-to-starter nut	15
Battery retaining bracket-to-body bolt	18
Coolant pipes retaining plate bolt	9
Fuse panel A-to-positive battery terminal nut	6
Generator bolt	23
Ground cable with battery monitoring control module-to-negative battery terminal nut	6
Ground cable with battery monitoring control module-to-stud nut	20
Terminal 30/B+-to-generator nut	16
Tool kit cover retainer-to-body bolt	18

Instruments Tightening Specifications

Component	Nm
12v and 23v converter with power outlet-to-cup holder screw	1.4
12v power outlet 3-to-right luggage compartment side trim cover nut	2
Data bus on board diagnostic interface screw	3
Horn-to-impact member nut	9
Instrument cluster-to-instrument panel screw	2.5

Windshield Wiper/Washer Tightening Specifications

Component	Nm
Windshielf washer fluid reservoir screws	7
Windshield wiper motor bolts	8
Windshield wiper arm nut	17

Exterior Lights, Switches Tightening Specifications

Component	Nm
Clamping bracket nut	3.5
Exterior rearview mirror turn signal bulb screws to housing	0.9
Fog lamp screws	4.5
Headlamp housing screws	4.5
Headlamp housing mount bracket screws	4.5
Headlamp housing mount bracket screws	8
HID headlamp control module screw	1.4
High-mount brake lamp fasteners	2.5
Inner taillamp mounting nuts	4
Outer tail lamp threaded studs	3.5
Outer tail lamp cover screws	1.7
Parking aid control module retaining frame fasteners	3
Power output stage retaining plate screw	1.4
Steering column clamping ring screw	4
Steering column electronic systems control module screw	0.5

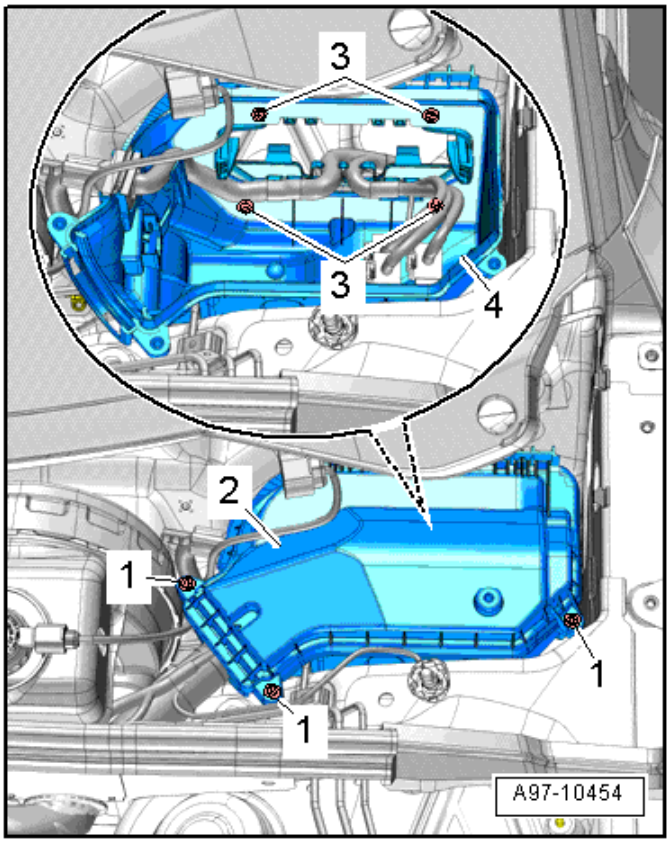
Interior Lights, Switches Tightening Specifications

Component	Nm
Alarm horn bracket nut	7
Alarm horn-to-bracket nut	5
Headlamp assistant-to-interior rearview mirror screw	2.4
Interior access/start authorization antenna 1 screw	2
Lane change assistance control module screw	3.5
Left access/start authorization antenna screw	2
Luggage compartment access/start authorization antenna nut	2
Sunroof regulator	1

Wiring Tightening Specifications

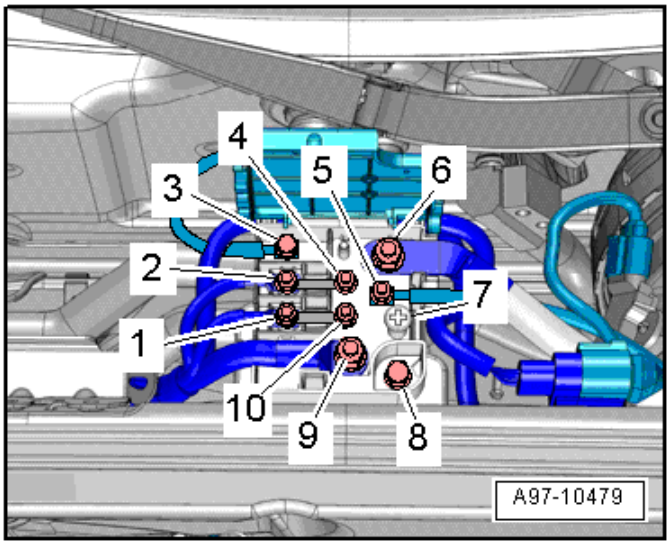
Component	Nm
Engine compartment E-box	4.5
Engine compartment E-box cover	3.5
Comfort system central control module retaining frame	3
Towing recognition control module and vehicle positioning system interface control module frame	3

Engine Compartment E-box Tightening Specifications



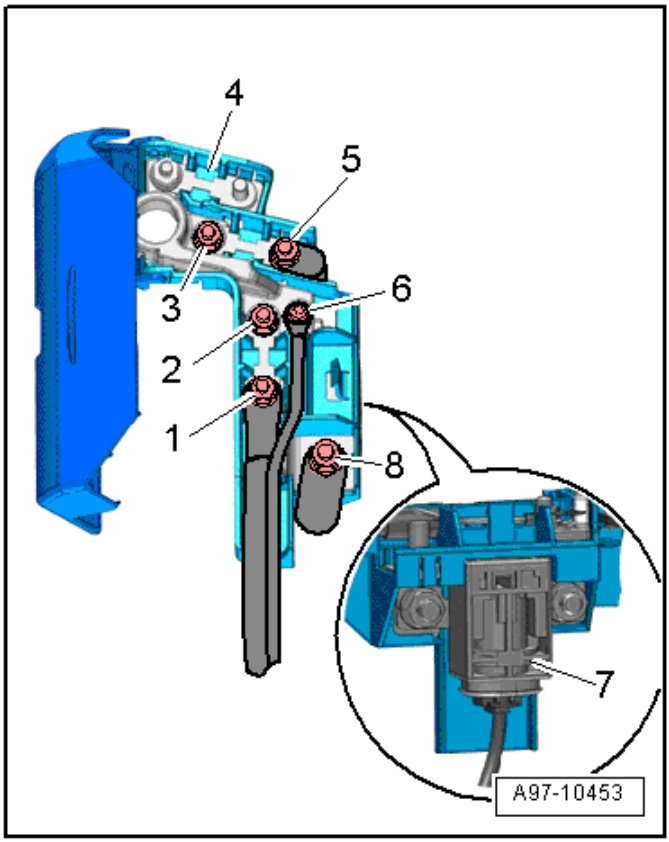
Item	Component	Nm
1	Electrical wire	3.5
2	Engine compartment E-box cover	-
3	Bolt	4.5
4	Engine compartment E-box	-

Terminal 30 Wire Junction 2 Tightening Specifications



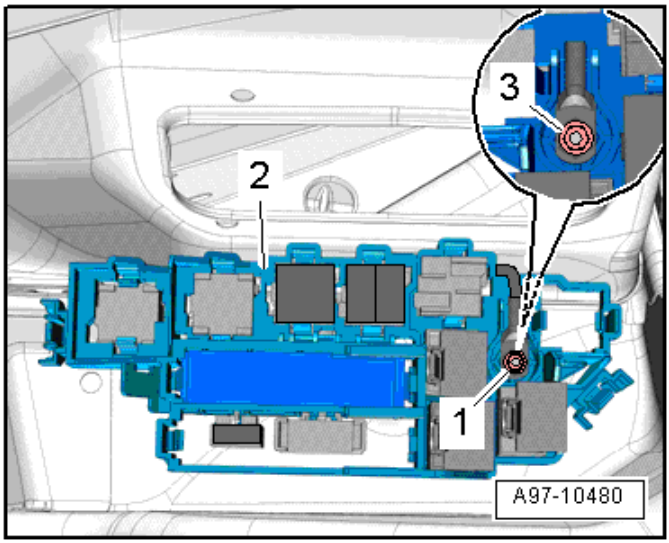
Item	Component	Nm
1	Fan wire	7.5
2	Fan wire	7.5
3	PTC line	18
4	Nut	7.5
5	E-box positive wire	7.5
6	Battery wire	18
7	Battery jump start terminal	20
8	Bolt	7.5
9	Starter wire	18
10	Nut	7.5

Fuse Panel A Tightening Specifications



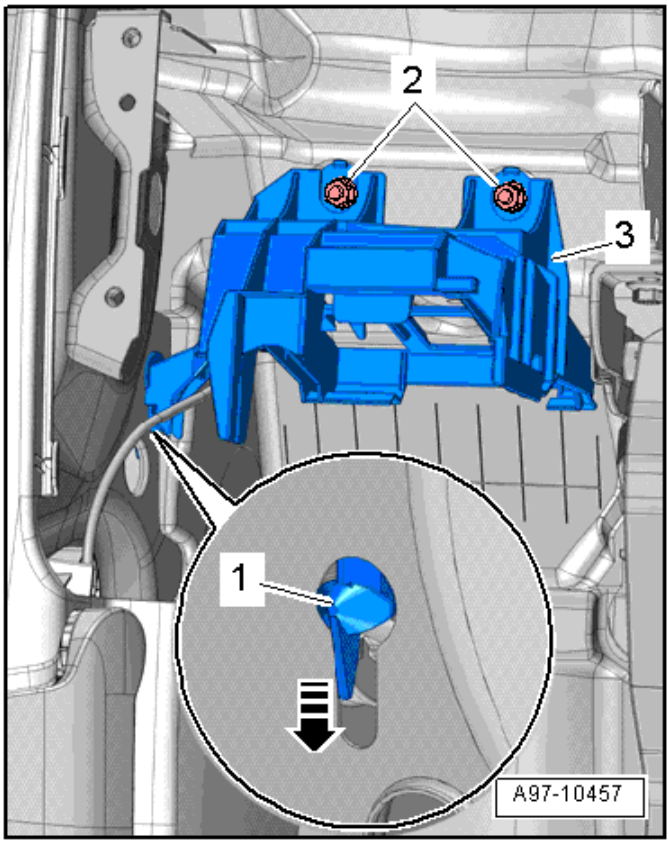
Item	Component	Nm
1	Electrical wire	7.5
2	Nut	9
3	Nut	9
4	Fuse panel A inside the luggage compartment	-
5	Positive wire-to-engine	7.5
6	Bolt	3.5
7	Battery interrupt igniter (N253)	15
8	Electrical wire	18

Fuse Panel B Tightening Specifications



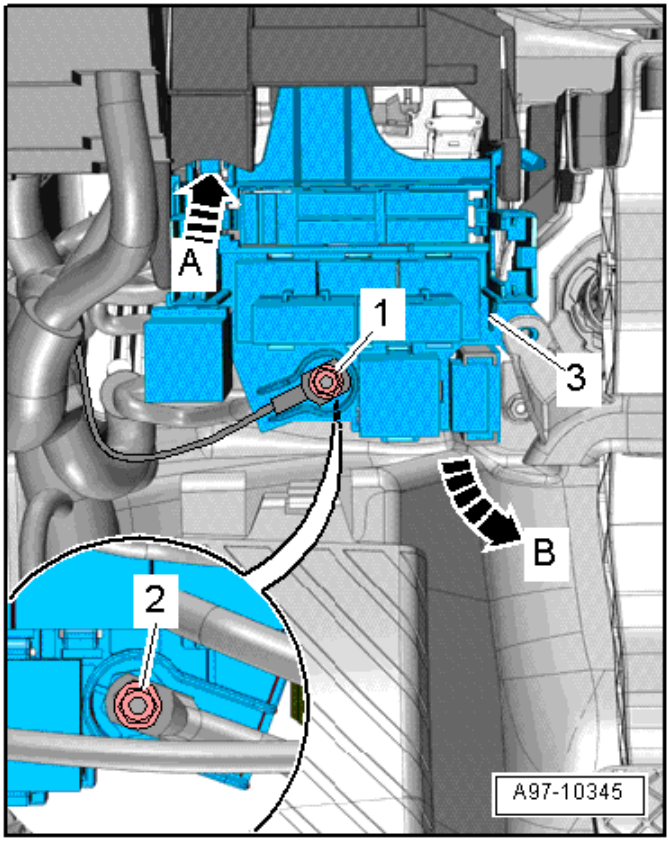
Item	Component	Nm
1	Positive wire	9
2	Fuse panel B	-
3	Rear electrical wire	9

Relay/Fuse Panel Mount Nut Tightening Specifications



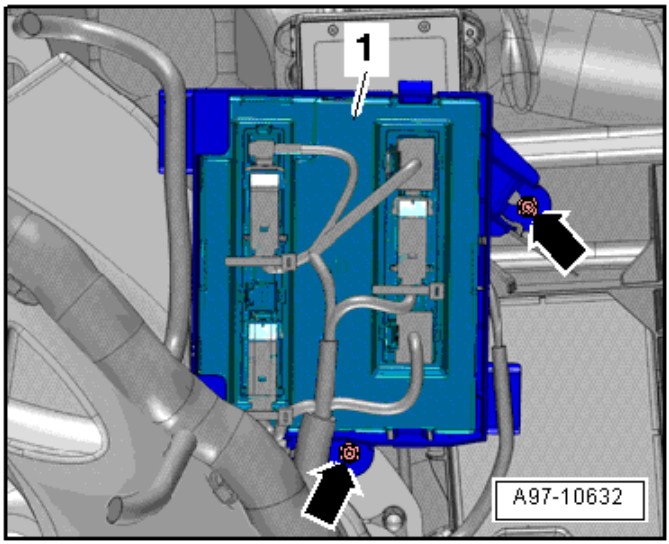
Item	Component	Nm
1	Retaining pins	-
2	Nuts	3
3	Relay/fuse panel mount with vehicle electrical system control module	-

4 Pin Relay/Fuse Panel with Threaded Connection Tightening Specifications



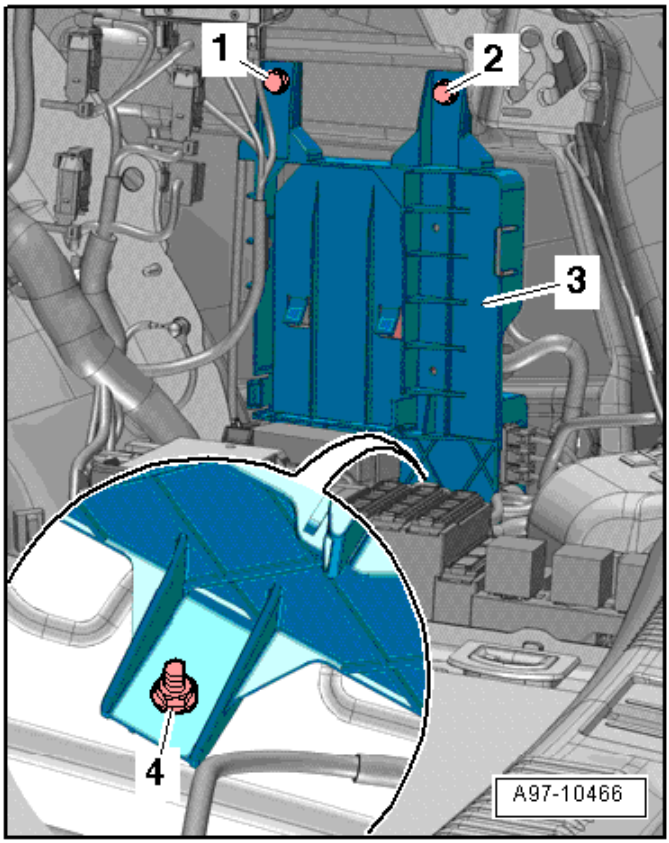
Item	Component	Nm
1	Electrical wire	9
2	Electrical wire	9
3	4 pin relay/fuse panel	-

Comfort System Central Control Module Retaining Frame Tightening Specifications



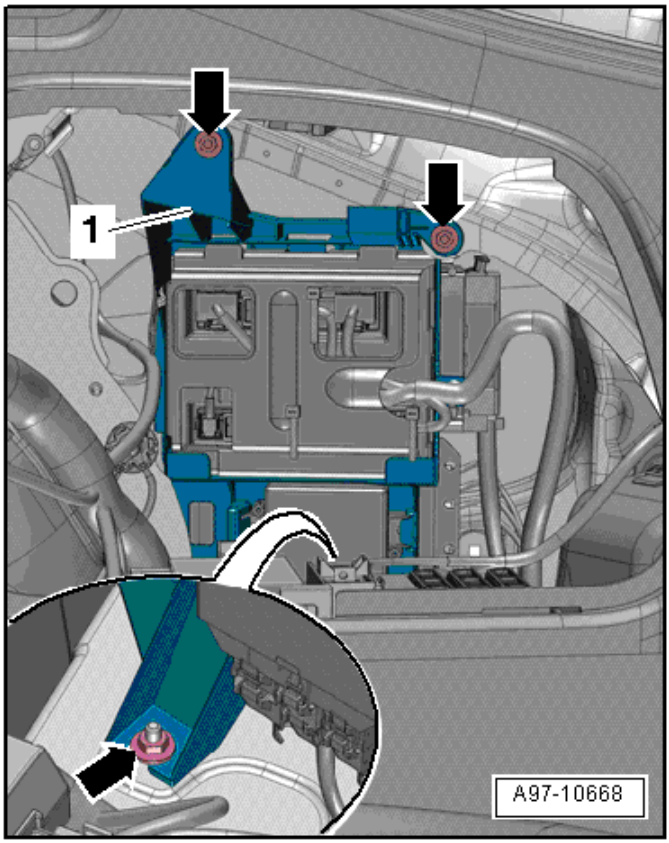
Item	Component	Nm
1	Nuts	3

Special Purpose Vehicle Control Module Retaining Frame Tightening Specifications



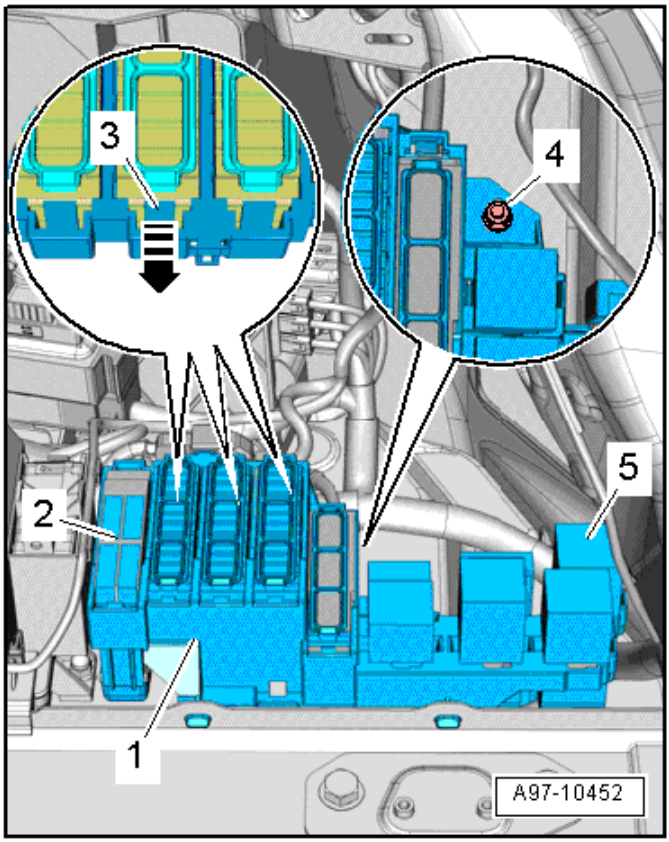
Item	Component	Nm
1	Screws 1 and 2	3
2	Nut 4	3
3	Retaining frame	

Control Module Frame Tightening Specifications



Item	Component	Nm
1	Nuts	3

Fuse Panel F Tightening Specifications



Item	Component	Nm
1	Fuse panel F	9
2	Fuse panel	9
4	Nut	3
5	Relay/control module	-

DTC CHART

Engines - CAED, CPMB

Fuel and Air Mixture, Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	“A” Camshaft Position Slow Response Bank 1	• Difference between target position vs. actual position > 8.00° CRK • For time > 1.3 to 2.9 s and • Signal change < 1.9 - 4.2 °CRK/s
P0010	"A" Camshaft Position Actuator Control Circuit/Open Bank 1	Signal voltage > 4.70 - 5.40 V
P0011	Intake (A) Camshaft Position Timing - Over-Advanced (Bank 1)	• Difference between target position vs. actual position > 8.00 °CRK • For time > 1.3 to 2.9 s and • Adjustment angle < 2.50 °CRK
P0016	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A	• Permissible deviation, < - 11.01 °CRK or • Permissible deviation > 11.01 Rev
P0030	HO2S Heater Control Circuit Bank 1 Sensor 1	Heater voltage 4.70 to 5.40 V
P0031	HO2S Heater Control Circuit Low Bank 1 Sensor 1	Heater voltage 0.0 to 2.26 V
P0032	HO2S Heater Control Circuit High (Bank 1, Sensor 1) Short to B+	Heater voltage > 5.50 V
P0036	HO2S Heater Control Circuit (Bank 1, Sensor 2) Open Circuit	Heater voltage, 2.34 - 3.59 V
P0037	HO2S Heater Control Circuit Low Bank 1 Sensor 2	Heater voltage < 2.34 V
P0038	HO2S Heater Control Circuit High Bank 1 Sensor 2	Heater voltage > 3.59 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0068	MAP/MAF – Throttle Position Correlation	• Plausibility with fuel system load calculation < -50% or • Plausibility with fuel system load calculation > 50%
P0070	Ambient Air Temperature Sensor Circuit “A”	AAT signal: short to battery / open circuit = failure
P0071	Ambient Air Temperature Sensor Circuit “A” Range/ Performance	• Difference ECT vs. IAT at engine start < 24.8 K (depending on engine off time) • Difference IAT vs. AAT at engine start > |24.8| K (depending on engine off time) • Difference AAT vs. ECT at engine start > |24.8| K (depending on engine off time)
P0072	Ambient Air Temperature Sensor Circuit “A” Low	AAT signal: short to ground = failure
P0087	Fuel Rail/System Pressure - Too Low Bank 1	• Pressure control activity > 10.00 MPa and • Fuel trim activity 0.90 - 120 and • Difference between target pressure vs. actual pressure > -16.38 MPa
P0088	Fuel Rail/System Pressure - Too High	Fuel rail pressure > 13.9 MPa
P0089	Fuel Pressure Regulator 1 Performance	• Difference between actual pressure vs. target pressure > 250.00 kPa • Difference between target pressure vs. actual pressure > 200.00 kPa
P008A	Low Pressure Fuel System Pressure - Too Low	Actual pressure < 40.00 kPa
P008B	Low Pressure Fuel System Pressure - Too High	Actual pressure > 950.00 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 Sensor “A” Circuit Range/ Performance	• Mass air flow vs lower threshold model < 0.0 to 417.0 kg/h • Mass air flow vs upper threshold > 39.0 to 873.0 kg/h • Load calculation > 23.0% • Fuel system (mult.) < -23.0% • Load calculation < -23.0% • Fuel system (mult.) > 23.0%
P0102	Mass or Volume Air Flow Sensor “A” Circuit Low	MAF sensor signal < 66 µs
P0103	Mass or Volume Air Flow Sensor “A” Circuit High	MAF sensor signal > 4500 µs
P0106	Manifold Absolute Pressure/ Barometric Pressure Sensor Circuit Range/Performance	Boost pressure signal • Altitude sensor < -210 hPa • Altitude sensor > 230 hPa
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance Bank 1	• Difference ECT vs. IAT @ maifold at engine start > 24.8 K (depending on engine off time) • Difference IAT @ maifold vs. AAT at engine start > 24.8 K (depending on engine off time) • Difference AAT vs. ECT at engine start < 24.8 K (depending on engine off time)
P0112	Intake Air Temperature Sensor 1 Circuit Low Bank 1	Signal voltage < 0.16 V
P0113	Intake Air Temperature Sensor 1 Circuit High Bank 1	Signal voltage > 4.48 V
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	Difference max ECT vs. min ECT < 1.5 K
P0117	Engine Coolant Temperature Sensor 1 Circuit Low	Engine coolant temperature > 140°C
P0118	Engine Coolant Temperature Sensor 1 Circuit High	Engine coolant temperature < -40°C
P0121	Throttle/Pedal Position Sensor/Switch “A” Circuit Range/Performance	Signal voltage, < 0.20 V
P0122	Throttle/Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.20 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High	Signal voltage, < 0.20 V
P0130	O2 Sensor Circuit Bank 1 Sensor 1	O2S ceramic temp. < 640.0° C
P0131	O2 Sensor Circuit, Bank 1 - Sensor 1 Low Voltage	Virtual mass (VM) < 2.0 V
		Nernst voltage (UN) < 1.50 V
		Adjustment voltage (IA) < 0.30 V
		Adjustment voltage (IP) < 0.30 V
P0132	O2 Sensor Circuit High Voltage Bank 1 Sensor 1	Virtual mass (VM) > 3.25 V
		Nernst voltage (UN) > 4.40 V
		Adjustment voltage (IA) > 7.00 V
		Adjustment voltage (IP) > 7.00 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 -0.40 - 0.40 • Max value of both counters for area ratio R2L and L2R ≥ 4 times Delay Time: • Gradient ratio ≥ 0.00 • Lower value of both area ratios R2L and L2R < 0.30 Transient Time: • Gradient ratio ≥ 0.00 • Gradient ratio ≤ 0.45 • Lower value of both area ratios R2L and L2R < 0.30 - or lower value of both gradient ratios R2L and L2R < 0.00 Asymmetric fault: • Difference of R2L area ratio vs. L2R area ratio < -0.40; > 0.40 • Values of both counters for area ratio R2L and L2R ≥ 4 times Delay Time: • Gradient ratio ≥ 0.00 • Lower value of both area ratios R2L and L2R < 0.30 Transient Time: • Gradient ratio ≥ 0.00 • Gradient ratio ≤ 0.45 • Lower value of both area ratios R2L and L2R < 0.30 or • Lower value of both gradient ratios R2L and L2R < 0.00
P0135	O2 Sensor Heater Circuit Bank 1 Sensor 1	Out of Range: • O2S ceramic temp. < 715° C • Heater duty cycle 90% Rationality Check: (Sensor Hearting Up): • O2S ceramic temp. < 715° C • Time after O2S heater On 40.0 s
P0136	O2 Sensor Circuit Bank 1 Sensor 2	Delta voltage One step at heater switching > 2.00 V and number of heater coupling ≥ 6 times

DTC	Error Message	Malfunction Criteria and Threshold Value
P0137	O2 Sensor 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 Sensor Circuit High Voltage Bank 1 Sensor 2	Signal voltage > 1.26 V for > 5 Sec.
P0139	O2 Sensor 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
P013A	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2	• Arithmetric filtered max differential transient time at fuel cut off n.a. or • EWMA filtered max differential transient time at fuel cut off ≥ 0.70 s and • Number of checks ≥ 3.0
P013B	O2 Sensor Slow Response - Lean to Rich Bank 1 Sensor 2	• EWMA filtered transient time at fuel cut-off, ≥ 1.2 s • Number of checks (initial phase) and (step function), >3.00 -
P013E	O2 Sensor Delayed Response - Rich to Lean Bank 1 Sensor 2	• Arithmetic filtered max differential delay time at rich to lean transition > n.a. or • EWMA filtered max differential delay time at rich to lean transition > 1.0 s and • Number of checks ≥ 3.00

DTC	Error Message	Malfunction Criteria and Threshold Value
P013F	O2 Sensor Delayed Response - Lean to Rich Bank 1 Sensor 2	• EWMA filtered max differential delay time at lean to rich transition ≥ 2.4 to 4.4 s • Number of checks ≥ 3.00 - (initial phase and step function)
P0140	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 2	• Signal voltage .40 - .60 mV for > 3 Sec and • Difference in sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) ≥ 2.80 V • Internal resistance > 40000.00 Ω and • Exhaust temperature > 600.0° C
P0141	O2 Sensor Heater Circuit Bank 1 Sensor 2	Heater resistance 810 - 4560 Ω
P0169	Incorrect Fuel Composition	Comparison with fuel quantity incorrect
P0171	System Too Lean (Bank 1)	• Lean @ idle Adaptive value > 21% • Lean @ 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)
P0177	Fuel Composition Sensor Circuit Range/Performance	• Signal fault • Possibly in fuel change window after refueling event
P0178	Fuel Composition Sensor Circuit Low	Signal Voltage < 1.0 V
P0179	Fuel Composition Sensor Circuit High	Signal Voltage > 2.2 V
P0190	Fuel Pressure Regulator 1 Control Circuit/Open	Signal voltage > 4.90 V
P0191	Fuel Rail Pressure Sensor Circuit Range/Performance Bank 1	Actual Pressure ≥ 21.30 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0192	Fuel Rail Pressure Sensor Circuit Low Bank 1	Signal voltage < 0.20 V
P0201	Cylinder 1 Injector “A” Circuit	• Low side signal current < 2.1 A • Internal logic failure
P0202	Cylinder 2 Injector “A” Circuit	• Low side signal current < 2.1 A • Internal logic failure
P0203	Cylinder 3 Injector “A” Circuit	• Low side signal current < 2.1 A • Internal logic failure
P0204	Cylinder 4 Injector “A” Circuit	• Low side signal current < 2.1 A • Internal logic failure
P0221	Throttle/Pedal Position Sensor/Switch “B” Circuit Range/Performance	• TPS 1-TPS 2, > 5.10 to 6.30% and • Actual TPS 2-calc. value, > actual TPS 1calc. value or • TPS 2-calc value > 9.00%
P0222	hrottle/Pedal Position Sensor/ Switch “B” Circuit Low	Signal voltage < 0.20 V
P0223	Throttle/Pedal Position Sensor/Switch “B” Circuit High	Signal voltage > 4.81 V
P0234	Turbocharger/Supercharger “A” Overboost Condition	Difference set value boost pressure vs actual boost pressure value, >20.00 to 128.00 kPa
P0236	Turbocharger/Supercharger Boost Sensor “A” Circuit Range/Performance	• Difference boost pressure signal vs altitude sensor signal, > 24.20 kPa • Difference boost pressure signal vs altitude sensor signal, < 14.20 kPa
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, > 4.40 to 5.60 V
P0245	Turbocharger/Supercharger Wastegate Solenoid “A” Low	Signal voltage < 2.15 - 3.25 V
P0246	Turbocharger/Supercharger Wastegate Solenoid “A” High	Signal current > 2.20 to 4.0 A
P025A	Fuel Pump Module “A” Control Circuit/Open	Signal voltage 4.8 to 5.3 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P025C	Fuel Pump Module “A” Control Circuit Low	Signal voltage < 2.7 - 3.25 V
P025D	Fuel Pump Module “A” Control Circuit High	Signal current > 0.6 mA
P0261	Cylinder 1 Injector “A” Circuit Low	Signal current < 2.10 A
P0262	Cylinder 1 Injector "A" Circuit High	Signal current > 14.70 A
P0264	Cylinder 2 Injector “A” Circuit Low	Signal current < 2.10 A
P0265	Cylinder 2 Injector "A" Circuit High	Signal current > 14.70 A
P0267	Cylinder 3 Injector “A” Circuit Low	Signal current < 2.10 A
P0268	Cylinder 3 Injector "A" Circuit High	Signal current > 14.70 A
P0270	Cylinder 4 Injector “A” Circuit Low	Low side signal current < 2.10 A
P0271	Cylinder 4 Injector "A" Circuit High	Signal current > 14.70 A
P0299	Turbocharger/Supercharger “A” Underboost Condition	Difference set value boost pressure vs actual boost pressure value (filtered) > 15.00 kPa
P2004	Intake Manifold Runner Control Stuck Open Bank 1	• Normal closed position, unable to reach signal voltage < 2.62 or > 4.65 V or • Normal open position, unable to reach signal voltage < 0.35 or > 2.38 V
P2008	Intake Manifold Runner Control Circuit/Open Bank 1	Signal voltage 4.40 - 5.40 V
P2009	Intake Manifold Runner Control Circuit Shorted Bank 1	Signal voltage 0.00 to 3.26 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

DTC	Error Message	Malfunction Criteria and Threshold Value
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance Bank 1	• Difference between target position vs. actual position > 25% • Actual position < 0.0 to > 100.0% and • Difference between target position vs. actual position > 25% and • Actual position 0.0 to 100.0% • Difference between target position vs. actual position > 25% and • Actual position 0.0 to 100.0%
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low Bank 1	Signal voltage < 0.25 V
P2024	EVAP Fuel Vapor Temperature Sensor Circuit	Signal voltage 4.70 to 5.40 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2025	EVAP Fuel Vapor Temperature Sensor Performance	Functional Check: • Reset counter > 3.0 Out of Range Low: • Smart module temperature < -39° C Cross Check: • Difference between smart temperature and ECT ≥ 25.5 K and • Difference between smart temperature and IAT@ manifold ≥ 25.5 Functional Check: • Time difference between ECU and smart module > 3.0 s Communication with Smart Temperature Sensor: • Response time > 1000 ms and • Number of checks 3.0 or • Security bit incorrect and • Number of checks 3.0 Signal Dynamic Check: • Gradient smart temperature > 20 K/10 mi Out of Range High: Case 1: • Smart module temperature > 119° C Case 2: • Smart module temperature > 119° C
P2026	EVAP Fuel Vapor Temperature Sensor Circuit Low Voltage	Signal voltage, < 0.00 - 3.25 V
P2027	EVAP Fuel Vapor Temperature Sensor Circuit High Voltage	Signal current > 2.20 A
P2067	Fuel Level Sensor “B” Circuit Low	• Instrument cluster module signal: short to ground, failure or • Instrument cluster module signal: signal range check, failure

DTC	Error Message	Malfunction Criteria and Threshold Value
P2068	Fuel Level Sensor “B” Circuit High	Instrument cluster module signal: short to battery / open circuit, failure
P2088	“A” Camshaft Position Actuator Control Circuit Low Bank 1d	Signal voltage, < 0.00 to 3.25 V
P2089	“A” Camshaft Position Actuator Control Circuit High Bank 1	Signal current > 2.2 A
P2096	Post Catalyst Fuel Trim System Too Lean Bank 1	I-portion of 2nd lambda control loop < -0.045
P2097	Post Catalyst Fuel Trim System Too Rich Bank 1	I-portion of 2nd lambda control loop < -0.045
P303F	Cold Start Injector Circuit Short to Ground	Signal voltage < 3.0 V
P3081	Engine Temperature Too Low	Difference reference model temperature vs. ECT > 9.8 K

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	• Emission threshold misfire rate (MR) > 2.1% • Catalyst damage misfire rate (MR) > 2.9 - 20.0%
P0301	Cylinder 1 Misfire Detected	• Emission threshold misfire rate (MR) > 2.1% • Catalyst damage misfire rate (MR) > 2.9 - 20.0%
P0302	Cylinder 2 Misfire Detected	• Emission threshold misfire rate (MR) > 2.1% • Catalyst damage misfire rate (MR) > 2.9 - 20.0%
P0303	Cylinder 3 Misfire Detected	• Emission threshold misfire rate (MR) > 2.1% • Catalyst damage misfire rate (MR) > 2.9 - 20.0%
P0304	Cylinder 4 Misfire Detected	• Emission threshold misfire rate (MR) > 2.1% • Catalyst damage misfire rate (MR) > 2.9 - 20.0%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0321	Ignition/Distributor Engine Speed Input Circuit Range/ Performance	• Counted teeth versus 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) > 24.0 or • Signal fault counter (measuring window) > 2.00
P0327	Knock/Combustion Vibration Sensor 1 Circuit Low Bank 1 or Single Sensor	• Lower threshold, < -0.70 V or • Lower threshold < 0.58 - 1.60 V
P0328	Knock Sensor 1 Circuit Signal Range Check (Bank 1)	Upper threshold > 18.0 to 150.0 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 • Defect counter 12.00
P0342	Camshaft Position Sensor “A” Circuit Low Bank 1 or Single Sensor	• ignal voltage permanently low and • Crankshaft signals 8.0
P0343	Camshaft Position Sensor “A” Circuit High Bank 1 or Single Sensor	• Signal voltage permanently high • Crankshaft signals 8.0
P0351	Ignition Coil “A” Primary Control Circuit/Open	• Signal current, 0.25 to 2.00 mA or • Internal check failed
P0352	Ignition Coil “B” Primary Control Circuit/Open	• Signal current, 0.25 to 2.00 mA or • Internal check failed
P0353	Ignition Coil “C” Primary Control Circuit/Open	• Signal current, 0.25 to 2.00 mA or • Internal check failed

DTC	Error Message	Malfunction Criteria and Threshold Value
P0354	Ignition Coil “D” Primary Control Circuit/Open	• Signal current, 0.25 to 2.00 mA or • Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	AIR System	Deviation SAI pressure > 20.0 hPa
P0413	AIR System Switching Valve “A” Circuit Open	Signal voltage, 9.25 to 11.25 V
P0414	AIR System Switching Valve “A” Circuit Shorted	Signal voltage < 6.00 V
P0415	AIR System Switching Valve “B” Circuit	Signal current 2.20 to 4.20 A
P0418	AIR System Control “A” Circuit	Signal voltage 4.50 - 5.50 V
P0420	Catalyst System Efficiency Below Threshold Bank 1	Measured OSC / OSC of borderline catalyst value for front catalyst , < 1.00
P0441	EVAP System Incorrect Purge Flow	• Deviation lambda control < 7.00% and • Deviation idle control < 30.00%
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.55 to 1.75 s.
P0444	EVAP System Purge Control Valve “A” Circuit Open	Signal voltage> 4.40 to 5.40 V
P0450	EVAP System Pressure Sensor/Switch Circuit	Signal voltage> 0.39 to 0.55 V
P0451	EVAP System Pressure Sensor/Switch Circuit Range/ Performance	Natural vacuum leak detection (NVLD) switch position closed
P0452	EVAP System Pressure Sensor/Switch Circuit Low	Signal voltage < 0.24 V
P0453	EVAP System Pressure Sensor/Switch Circuit High	Signal voltage > 3.0 V
P0455	Evaporative Emission System Leak Detected (gross leak/no flow)	Time for pressure drop < 0.95 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P0456	EVAP System Purge Control Valve “A” Circuit Low	< 5.0 - 6.5 Sec.
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage, 0.0 to 3.26 V
P0459	EVAP System Purge Control Valve “A” Circuit High	Signal current > 2.20 A
P0461	Fuel Level Sensor “A” Circuit Range/Performance	Difference between fuel consumption and fuel level changes <-12.00 to 12.00 l
P0462	Fuel Level Sensor “A” Circuit Low	• Instrument cluster module signal: short to ground, failure or • Instrument cluster module signal: signal range check, failure
P0463	Fuel Level Sensor “A” Circuit High	Instrument cluster module signal: short to battery / open circuit, failure
P0491	AIR System Insufficient Flow Bank 1	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” Circuit Range/Performance	Vehicle speed < 2 MPH
P0503	Vehicle Speed Sensor “A” Circuit Intermittent/Erratic/ High	Vehicle speed > 200 km/h

DTC	Error Message	Malfunction Criteria and Threshold Value
P0506	Idle Control System RPM - Lower Than Expected	Out of Range: • Engine speed deviation > 80.0 RPM and • RPM controller torque value ≥ calculated max. value • Integrated deviation of engine speed low and integrated • Engine speed deviation < -80.0 RPM • RPM controller torque value ≥ calculated max. value • Integrated deviation of engine speed low and integrated deviation of engine speed high > 2000.0 RPM
P0507	Idle Air Control System - RPM Higher Than Expected	• Engine speed deviation <-80.0 RPM and • RPM controller torque value ≤ calculated min. value or • Integrated number of fuel cut off transitions = n.a.
P050A	Idle Air Control System RPM Lower Or Higher Than Expected	• Integrated deviation of engine speed low and integrated deviation of engine speed high > 2000 RPM • Engine speed deviation > 80.0 RPM and • RPM controller torque value ≥ calculated max. value • Engine speed deviation < -80.0 RPM and • RPM controller torque value ≤ calculated min. value or • Integrated number of fuel cut off transitions = n.a.
P050B	Cold Start Ignition Timing Performance	Difference between commanded spark timing vs. actual value > 20.00 - 35.00%

DTC	Error Message	Malfunction Criteria and Threshold Value
P052A	Cold Start “A” Camshaft Position Timing Over-Advanced Bank 1	Difference between target position vs. actual position > 12.0 °CRK
P053F	Cold Start Fuel Pressure Performance	• Difference between target pressure vs. actual pressure, > 2.00 MPa or • Difference between target pressure vs. actual pressure, < -2.00 MPa

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0601	Internal Control Module Memory Check Sum Error	Internal check sum, incorrect
P0604	Internal Control Module Random Access Memory (RAM) Error	Write ability check, failed
P0605	Internal Control Module Read Only Memory (ROM) Error	Checksum incorrect
P0606	Control Module Processor	Internal control module processor failure
P0627	Fuel Pump “A” Control Circuit /Open	• Internal error fuel pump control unit • Feedback from fuel pump control unit Pump blocked short circuit to battery voltage, ground or open circuit
P062B	Internal Control Module Fuel Injector Control Performance	SPI communications check Identifier failure
P0634	Control Module Internal Temperature “A” Too High	Power stage temperature > 150° C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0638	Throttle Actuator Control Range/Performance Bank 1	• Time to open over reference point > 0.6 s and • Reference point -1.5% • Time to close below reference point > 0.30 s and • Reference point 1.0% • Time to close to reference point > 0.6 s and reference point 2.88% • TPS 1 signal voltage < 0.40 also > 0.80 V OR TPS 2 signal voltage < 4.20 also > 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	5 V 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 > 4.40 - 5.60 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 > 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

DTC	Error Message	Malfunction Criteria and Threshold Value
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
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus	Global time out, receiving no message
U0100	Lost Communication with ECM/PCM A	• Failure of all CAN engine messages, time out > 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	Lost Communication with Anti-Lock Brake System (ABS) Control Module	Received CAN message, no message
U0140	Lost Communication with Body Control Module	Time out, no message
U0146	Lost Communication With Gateway “A”	Received CAN message, no message
U0155	Lost Communication with Instrument Panel Cluster (IPC) Control Module	Received CAN message - no message
U0302	Software Incompatibility with Transmission Control Module	Received AT vehicle data TCM signal
U0323	Software Incompatibility With Instrument Panel Control Module	AAT value (module not encoded for ambient temp sensor) FDh
U0402	Invalid Data Received From TCM	Received CAN message implausible message

DTC	Error Message	Malfunction Criteria and Threshold Value
U0404	Invalid Data Received From Gear Shift Control Module	• If the value of message counter is permanent, constant, or change exceeds a threshold, increment an event counter • Maximum change of message counter > 5
U0415	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module	Out of Range High: • Vehicle speed > 202 MPH CAN Communication with BSCM: • Received data, implausible message CAN Communication with Vehicle Speed Sensor: • Speed sensor signal: initialization error, 407.296 MPH • Speed sensor signal: low voltage error 407.290 MPH • Speed sensor signal: sensor error 407.303 MPH
U0422	Invalid Data Received From Body Control Module	AAT value (initialization), Audi, FEh
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	Received CAN message implausible message
U0447	Invalid Data Received From Gateway “A”	Received data, implausible message
U1103	ECM: Production Mode	Production mode = Active

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P1114	O2 Sensor Heater Circuit 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	• Pressure control activity > 0.25 MPa and • Fuel trim activity < 0.80 and • Difference between target pressure vs. actual pressure -16.38 - 16.38 MPa
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Pressure control activity > 0.25 MPa and • Fuel trim activity < 1.64 and • Difference between target pressure vs. actual pressure -16.38 - 16.38 MPa
P12A4	Fuel Volume Metering Valve Functional Check Valve Stuck Closed	• Pressure control activity, < -10.00 MPa and • Fuel trim activity, 0.85 to 1.15 and • Difference between target pressure vs. actual pressure < 16.38 MPa
P13EA	Cold Start Ignition Timing Performance Off Idle	Difference between commanded spark timing and actual value > 0.60%
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.
P169A	ECM: Transport Mode	Transport mode = active
P2101	Throttle Actuator “A” Control Motor Circuit Range/ Performance	• Duty cycle > 80% and • ECM power stage = no failure • Deviation throttle valve angles vs throttle value setpoint > 4.00 to 50.00%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2106	Throttle Actuator Control System - Short to B+ or Ground	Short to Battery Voltage or Short to Ground: • Internal check failed Open Circuit: • Internal check failed Current Monitoring: • Internal check failed Functional Check: • Internal check failed
P2110	Throttle Drive Actuator Forced Limited RPM	Engine load out of range
P2122	Throttle/Pedal Position Sensor/Switch “D” Circuit Low	Signal voltage < 0.65 V
P2123	Throttle/Pedal Position Sensor/Switch “D” Circuit High	Signal voltage > 4.79 V
P2127	Throttle/Pedal Position Sensor/Switch “E” Circuit Low	Signal voltage < 0.28 V
P2128	Throttle/Pedal Position Sensor/Switch “E” Circuit High	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/Open	Short to ground (high side) • Signal current > 14.90 A Short to battery voltage (high side) or Core Connection (High Side-Low Side): • Signal current < 2.60 A
P2149	Fuel Injector Group “B” Supply Voltage Circuit/Open	Short to ground (high side) • Signal current > 14.90 A Short to battery voltage (high side) or Core Connection (High Side-Low Side): • Signal current < 2.60 A
P2177	System Too Lean Off Idle Bank 1	• Adaptive value > 26.00%
P2178	System Too Rich Off Idle Bank 1	• Adaptive value < 26.00%
P2181	Cooling System Performance	Cooling system temp too low after a sufficient air mass flow integral, 55 to 80° C
P2187	Fuel System	• Adaptive value > 5.02%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2188	Fuel System	• Adaptive value < -6.0%
P2195	O2 Sensor Signal Biased/ Stuck Lean Bank 1, Sensor 1	Delta lambda of 2nd lambda control loop > 0.070
P2196	O2 Sensor Signal Biased/ Stuck Rich Bank 1, Sensor 1	Delta lambda of 2nd lambda control loop < -0.070
P2231	OO2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 1	Delta O2S signal front > 190 uA
P2237	O2 Sensor Positive Current Control Circuit/Open Bank 1 Sensor 1	• O2S signal front 1.49 to 1.51 and • Difference between maximum and minimum value of O2S voltage signal front < 32.00 V and • Delta lambda controller > 0.10 or • Lambda control at min or max limit • O2S signal front 1.49 to 1.51 V and • Difference between maximum and minimum value of O2S voltage signal front < 32.00 V and • No reaction on commanded stepwise change of lambda-setpoint <> 1
P2243	O2 Sensor Reference Voltage Circuit / Open - Bank 1, Sensor 1	• O2S signal front < 0.3 to > 3.25 V and • Internal resistance > 1000 O
P2251	O2 Sensor Negative Current Control Circuit/Open Bank 1 Sensor 1	• O2S voltage signal front 1.45 to 1.53 V and • Internal resistance > 1000 O
P2257	AIR System Control “A” Circuit Low	Signal voltage < 3.00 V
P2258	AIR System Control “A” Circuit High	Signal current 0.60 - 1.20 A
P2270	O2 Sensor Signal Biased/ Stuck Lean Bank 1 Sensor 2	Sensor voltage < 0.76 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2271	O2 Sensor Signal Biased/ Stuck Rich Bank 1 Sensor 2	Sensor voltage > 0.15 V
P2279	MAP/MAF - Throttle Position Correlation	• 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, > 2.00 MPa • Difference between target pressure vs. actual pressure, < -2.00 MPa
P2294	Fuel Pressure Regulator 2 Control Circuit Open Circuit	• Signal voltage 1.40 - 3.20 V
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

DTC	Error Message	Malfunction Criteria and Threshold Value
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
P2414	O2 Sensor Exhaust Sample Error Bank 1, Sensor 1	Threshold 1: • Signal voltage 3.1 - 4.81 V Threshold 2: • Signal Voltage (Depending on gain factor, that actual is used for sensor characteristic, the threshold is switched) 2.5 - 3.10 V
P2431	Rationality check	Difference between SAI pressure and ambient pressure, NOT -25.0 to 25.00 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%
P2539	Low Pressure Fuel System Sensor Circuit	Signal voltage > 4.79 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	PWM hardware detection, 0 or 100%

DTC	Error Message	Malfunction Criteria and Threshold Value
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%
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 - CGXC, CTUB

Fuel and Air Mixture, Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	A Camshaft Position Slow Response Bank 1	• Adjustment angle difference < 5° CA • Number of checks 10 times
P000C	A Camshaft Position Slow Response Bank 2	• Adjustment angle difference < 5° CRK • Number of checks 10 times
P000D	Exhaust (B) Camshaft Position - Slow Response Bank 2	• Difference between target and actual position > 10° - 22° CRK for 2 - 3 s • Adjustment angle >= 3° CRK
P0010	A Camshaft Position Actuator Circuit / Open Bank 1	Signal current > 0.8 mA
P0011	A Camshaft Position - Timing Over-Advanced or System Performance Bank 1	• Adjustment difference > 10° CA • Number of checks 3 times
P0016	Crankshaft Position – Camshaft Position Correlation Bank 1 Sensor A	Adaptive value > 146° CRK
P0018	Crankshaft Position – Camshaft Position Correlation Bank 2 Sensor A	Adaptive value < 84° CA
P0020	A Camshaft Position Actuator Circuit / Open Bank 2	Signal current < 0.8 mA
P0021	A Camshaft Position - Timing Over-Advanced or System Performance Bank 2	• Adjustment angle difference > 10° CA • Number of checks 3 times
P0030	HO2S Heater Control Circuit Bank 1 Sensor 1	Heater current (hardware values) < 8 to 40 mA
P0031	HO2S Heater Control Circuit Low Bank 1 Sensor 1	Heater voltage (hardware values) < 1.9 to 2.22 V
P0032	HO2S Heater Control Circuit HighBank 1, Sensor 1	Heater current (hardware values) > 8 to 11 A
P0036	HO2S Heater Control Circuit Bank 1 Sensor 2	Heater current (hardware values) < 8 to 40 mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P0037	HO2S Heater Control Circuit Low Bank 1 Sensor 2	Heater voltage < 1.9 to 2.22 V
P0038	HO2S Heater Control Circuit High Bank 1 Sensor 2	Heater current (hardware values) > 3 to 5 A
P0042	HO2S Heater Circuit (Bank 1, Sensor 3) open circuit SULEV	Heater voltage 4.50 - 5.50 V
P0043	HO2S Heater Control Circuit Low Bank 1, Sensor 2 Short to Ground	• SULEV Heater voltage < 3 V • ULEV Heater voltage < 3 V
P0044	HO2S Heater Control Circuit High Bank 1, Sensor 2 Short to Battery Voltage	Heater current, > 2.70 - 5.50 A
P0050	HO2S Heater Control Circuit Bank 2, Sensor 1	Heater current (hardware values) < 8 to 40 mA
P0051	HO2S Heater Control Circuit Low Bank 2 Sensor 1	Heater voltage (hardware values) < 1.9 to 2.22 V
P0052	HO2S Heater Control Circuit High Bank 2, Sensor 1	Heater current (hardware values) > 8 to 11A
P0056	HO2S Heater Control Circuit Bank 2, Sensor 2	Heater current (hardware values) < 8 to 40 mA
P0057	HO2S Heater Control Circuit LowBank 2 Sensor 2	Heater voltage < 1.9 to 2.22 V
P0058	HO2S Heater Control Circuit High Bank 2 Sensor 2	Heater current (hardware values) > 3 to 5 A
P0068	MAP/MAF – Throttle Position Correlation	• Deviation throttle controller < 43 or > 43% • Difference actual pressure downstream throttle to set-point value >30 kPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0071	Ambient Air Temperature Sensor Range/Performance	• Difference ECT vs. CHDT vs. IAT at engine start < 26.5° C (depending on engine off time) map (1) • Difference AAT vs. IAT at engine start > 26.5° C (depending on engine off time) map (1) • Difference AAT vs. ECT at engine start > 26.5° C (depending on engine off time) map (1) • Difference AAT vs. CHDT at engine start > 26.5° C (depending on engine off time) map (1)
P0072	Ambient Air Temperature Sensor Circuit Low	Failure
P0073	Ambient Air Temperature Sensor Circuit High	Failure
P007C	Charge Air Cooler Temperature Sensor Circuit Low Bank 1	IAT > 129° C
P007D	Charge Air Cooler Temperature Sensor Circuit High Bank 1	IAT < -40° C
P0087	Fuel Rail/System Pressure Too Low	• Deviation fuel rail pressure control > 0.105 g/Rev and • Deviation HO2S control -15 - 15% • Actual pressure 3.5 MPa • Target pressure-actual pressure > 2 MP and • Deviation HO2S control -15 - 15%
P0088	Fuel Rail/System Pressure - Too High	Fuel rail pressure > 13.9 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0089	Fuel Pressure Regulator 1 Performance	• Deviation fuel press. control (LP) < -28% or > 35% • Target press minus actual press > 0.17 MPa • Target press minus actual press < 0.17 MPa
P008A	Low Pressure Fuel System Pressure - Too Low	Actual pressure < 0.08 MPa
P008B	Low Pressure Fuel System Pressure - Too High	Actual pressure >1.1 MPa
P0090	Fuel Pressure Regulator 1 Control Circuit/Open	Signal voltage < 2.9 .. 3.2 [V]
P0091	Fuel Pressure Regulator 1 Control Circuit Low	Signal voltage 1.95 - 2.2 [V]
P0092	Fuel Rail Pressure Control Valve	Short to battery plus signal current > 11 A
P0096	Intake Air Temperature Sensor 2 Circuit Range/Performance Bank 1	• Difference AAT vs. ECT vs. CHDT at engine start < 26.5° C (depending on engine off time) map (1) • Difference IAT vs. CHDT at engine start > 26.5° C (depending on engine off time) map (1) • Difference IAT vs. AAT at engine start > 26.5° C (depending on engine off time) map (1) • Difference IAT vs. ECT at engine start > 26.5° C (depending on engine off time) map (1)
P00A2	Charge Air Cooler Temperature Sensor Circuit Low Bank 2	IAT > 129 [°C]
P00A3	Charge Air Cooler Temperature Sensor Circuit High Bank 2	IAT < -40 [°C]

DTC	Error Message	Malfunction Criteria and Threshold Value
P00A6	Intake Air Temperature Sensor 2 Circuit Range/Performance Bank 2	• Difference AAT vs. ECT vs. CHDT at engine start < 26.5° C (depending on engine off time) map (1) • Difference IAT vs. CHDT at engine start > 26.5° C (depending on engine off time) map (1) • Difference IAT vs. AAT at engine start > 26.5° C (depending on engine off time) map (1) • Difference IAT vs. ECT at engine start > 26.5° C (depending on engine off time) map (1)
P0111	IIntake Air Temperature Sensor 1 Circuit Range/ Performance Bank 1	• Difference AAT vs. ECT vs. CHDT at engine start < 26.5° C (depending on engine off time) map (1) • Difference IAT vs. CHDT at engine start > 26.5° C (depending on engine off time) map (1) • Difference IAT vs. AAT at engine start > 26.5° C (depending on engine off time) map (1) • Difference IAT vs. ECT at engine start > 26.5° C (depending on engine off time) map (1)
P0112	Intake Air Temperature Sensor 1 Circuit Low Bank 1	Intake air temperature > 129° C
P0113	Intake Air Temperature Sensor 1 Circuit High Bank 1	Intake air temperature < - 40° C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	• Difference AAT vs. ECT vs. IAT at engine start < 26.5° C (depending on engine off time) map (1) • Difference IAT vs. CHDT at engine start > 26.5° C (depending on engine off time) map (1) • Difference IAT vs. AAT at engine start > 26.5° C (depending on engine off time) map (1) • Difference IAT vs. ECT at engine start > 26.5° C (depending on engine off time) map (1)
P0117	Engine Coolant Temperature Sensor 1 Circuit Low	Engine coolant temperature - 45.8° C
P0118	Engine Coolant Temperature Sensor 1 Circuit High	Engine coolant temperature > 141° C
P0121	Throttle/Pedal Position Sensor/Switch “A” Circuit Range/Performance	• TPS 1 - TPS 2 > 5.79° and • Relative mass air integral > 100... at 0.45 s
P0122	Throttle/Pedal Position Sensor/Switch “A” Circuit Low	Signal voltage, < 0.117 V
P0123	Throttle/Pedal Position Sensor/Switch “A” Circuit High	Signal voltage > 4.6 [V]
P012B	Turbocharger/Supercharger Inlet Pressure Sensor Circuit Range/Performance Downstream of Throttle Valve	• Pressure difference in cross check between boost pressure sensor 1/2; IM press., ambient pressure sensor > 7 kPa • Pressure difference in cross check between boost pressure sensor 1/2; IM pressure > 12.27 kPa • Depending on engine speed
P012C	Turbocharger/Supercharger Inlet Pressure Sensor Circuit Low Downstream of Throttle Valve	Signal voltage < 0.2 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P012D	Turbocharger/Supercharger Inlet Pressure Sensor Circuit High Downstream of Throttle Valve	Signal voltage > 4.8 V
P0130	HO2 Sensor Circuit Bank 1, Sensor 1	O2S ceramic temp. < 640.0° C
P0131	HO2 Sensor Circuit Low Voltage Bank 1 Sensor 1	Signal voltage < 0.13 V
P0132	HO2 Sensor Circuit High Voltage Bank 1 Sensor 1	Signal voltage > 5.5 V
P0133	HO2 Sensor Circuit Slow Response Bank 1 Sensor 1	Response check- HO2S value vs modeled HO2S value > 0.9004
P0135	HO2 Sensor Heater Circuit Bank 1, Sensor 1	UEGO ceramic temperature < 680° C and/or > 965° C
P0136	HO2 Sensor Circuit Bank 1 Sensor 2	Oscillation check • O2S signal rear not oscillating at reference +/- 10 mV Signal range check • Signal voltage > 0.2 V
P0137	HO2 Sensor Circuit Low Voltage Bank 1 Sensor 2	• Signal voltage < 20 mV and • Internal resistance < 10 Ω
P0138	HO2 Sensor Circuit High Voltage Bank 1 Sensor 2	Signal voltage > 1.2 V.
P0139	HO2 Sensor Circuit Slow Response Bank 1 Sensor 2	O2S signal rear- signal too slow- 1
P013A	HO2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2	• Arithmetic filtered max differential transient time at rich to lean transition ≤ 800 mV/s • Number of checks ≥ 2
P013B	HO2 Sensor Slow Response - Lean to Rich Bank 1, Sensor 2	• Arithmetic filtered max differential transient time at lean to rich transition ≤ 800 mV/s • Number of checks ≥ 2
P013C	HO2 Sensor Slow Response - Rich to Lean Bank 2 Sensor 2	• Arithmetic filtered max differential transient time at rich to lean transition ≤ 800 mV/s • Number of checks ≥ 2

DTC	Error Message	Malfunction Criteria and Threshold Value
P013D	Oxygen Sensors Slow Response - Lean to Rich Bank 2, Sensor 2	• Arithmetic filtered max differential transient time at lean to rich transition ≤ 800 mV/s • Number of checks ≥ 2
P013E	Oxygen Sensors Delayed Response - Rich to Lean Bank 1, Sensor 2	• Arithmetic filtered max differential transient time at rich to lean transition ≥ 0.800 mV/s • Number of checks ≥ 3
P013F	HO2 Sensor Delayed Response - Lean to Rich Bank 1, Sensor 2	• Arithmetic filtered max differential transient time at lean to rich transition ≥ 0.800 mV/s • Number of checks ≥ 3
P0140	HO2 Sensor Circuit No Activity Detected Bank 1 Sensor 2	• Signal voltage, 0.376 - 0.474 V • O2S rear internal resistance > 60 KΩ
P0141	HO2 Sensor Heater Circuit Bank 1 Sensor 2	Heater resistance > 10K Ω
P014A	HO2 Sensor Circuit Delayed Response - Lean to Rich Bank 2, Sensor 2	• Arithmetic filtered max differential transient time at rich to lean transition ≥ 0.800 mV/s • Number of checks ≥ 3
P014B	HO2 Sensor Circuit Delayed Response - Lean to Rich Bank 2 Sensor 2	• Arithmetic filtered max differential transient time at lean to rich transition ≥ 0.800 mV/s • Number of checks ≥ 3
P0151	HO2 Sensor Circuit Low Voltage Bank 2 Sensor 1	Signal voltage < 0.13 V
P0152	HO2 Sensor Circuit High Voltage Bank 2 Sensor 1	Signal voltage > 5.5 V
P0153	HO2 Sensor Circuit Slow Response Bank 2 Sensor 1	Response check- HO2S value vs modeled HO2S value > 0.7998
P0155	HO2 Sensor Heater Circuit Bank 2, Sensor 1	UEGO ceramic temperature < 680 or > 965° C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0156	HO2 Sensor Circuit Bank 2 Sensor 2	Oscillation check • O2S signal rear not oscillating at reference +/- 10 mV Signal range check • Signal voltage > 0.15 V
P0157	HO2 Sensor Circuit Low Voltage Bank 2 Sensor 2	• Signal voltage, < 20mV and • Internal resistance < 10 Ω
P0158	HO2 Sensor Circuit High Voltage Bank 2 Sensor 2	Signal voltage > 1.2 V
P0159	O2 Circuit Slow Response Bank 1, Sensor 2	• O2S signal rear- signal too slow- 1[-] • Maximum allowed rich to lean switching time
P0160	HO2 Sensor Circuit No Activity Detected Bank 2 Sensor 2	• Signal voltage, 0.376 - 0.474 V • O2S rear internal resistance > 60 KΩ
P0161	HO2 Sensor Heater Circuit Bank 1, Sensor 2	Heater resistance, > 10K Ω
P0169	Incorrect Fuel Composition	Plausabity check - failed
P0171	System Too Lean Bank 1	System too lean adaptive value > 0.0075 [g/rev]
P0172	System Too Rich Bank 1	System too rich adaptive value < -0.0075 [g/rev]
P0174	System Too Lean Bank 2	System too lean adaptive value > 0.0075 [g/rev]
P0175	System Too Rich Bank 2	System too rich adaptive value < -0.0075 [g/rev]

DTC	Error Message	Malfunction Criteria and Threshold Value
P017B	Cylinder Head Temperature Sensor Circuit Range/ Performance	• Measured cylinder head temperature below modeled • Difference ETC vs AAT vs IAT at engine start < 26.5° C (depending on engine off time) map (1) • Difference CHDT vs ECT at engine start > 26.5° C (depending on engine off time) map (1) • Difference CHDT vs IAT at engine start > 26.5° C (depending on engine off time) map (1) • Difference CHDT vs AAT at engine start > 26.5° C (depending on engine off time) map (1)
P017C	Cylinder Head Temperature Sensor Circuit Low	Cylinder head temperature > 215° C
P017D	Cylinder Head Temperature Sensor Circuit High	Cylinder head temperature < - 60° C
P0190	Fuel Rail Pressure Sensor “A” Circuit	Signal voltage > 4.6 V
P0191	Fuel Rail Pressure Sensor “A” Circuit Range/Performance	Actual pressure > 16.85 MPa
P0192	Fuel Rail Pressure Sensor “A” Circuit Low	Signal voltage < 0.2 V
P0201	Injector Circuit/Open - Cylinder 1	• Signal current < 10 A and • Signal voltage > 3.5 V
P0202	Injector Circuit/Open - Cylinder 2	• Signal current < 10 A and • Signal voltage > 3.5 V
P0203	Injector Circuit/Open - Cylinder 3	• Signal current < 10 A and • Signal voltage > 3.5 V
P0204	Injector Circuit/Open - Cylinder 4	• Signal current < 10 A and • Signal voltage > 3.5 V
P0205	Injector Circuit/Open - Cylinder 5	• Signal current < 10 A and • Signal voltage > 3.5 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0206	Injector Circuit/Open - Cylinder 6	• Signal current < 10 A and • Signal voltage > 3.5 V
P0221	Throttle/Pedal Position Sensor/Switch “B” Circuit Range/Performance	• TPS 1 - TPS 2 > 5.79° and • Relative mass air integral > 100... at 0.45 s
P0222	Throttle/Pedal Position Sensor/Switch “B” Circuit Low	Signal voltage < 0.117 V
P0223	Throttle/Pedal Position Sensor/Switch “B” Circuit High	Signal voltage > 4.6 V
P0234	Turbocharger/Supercharger Overboost Condition Rationality Check High	Difference of set value boost pressure vs. actual boost pressure value > 200 - 1275 hPa
P0235	Turbocharger/Supercharger Boost Sensor “A” Circuit	Difference between actual measured charge pressure quotient and target charge pressure quotient (1) > 0.25 - 35 [-] depending on altitude
P0236	Turbocharger/Supercharger Boost Sensor “A” Circuit Range/Performance	• Pressure difference in cross check between boost pressure sensor 1/2; IM pressure > 7 kPa • Pressure difference in cross check between . boost pressure sensor 1/2 and IM > 12...27 kPa • Pressure difference in cross check between pressure sensor 1 and 2 > 12.5 kPa • Fuel trim activity (bank with deviation is considered to be defective) > 15%
P0237	Turbocharger/Supercharger Boost Sensor “A” Circuit Low	Signal voltage < 0.2 V
P0238	Turbocharger/Supercharger Boost Sensor “A” Circuit High	Signal voltage > 4.8 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0240	Turbocharger/Supercharger Boost Sensor “B” Circuit Range/Performance	• 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 • Fuel trim activity (bank with deviation is considered to be defective > 151%
P0241	Turbocharger/Supercharger Boost Sensor “B” Circuit Low	Signal voltage < 0.2 V
P0242	Turbocharger/Supercharger Boost Sensor “B” Circuit High	Signal voltage > 4.8 V
P025A	Fuel Pump Module Control Circuit/Open	Signal voltage < 2.9 to 3.2 [V]
P025C	Fuel Pump Module Control Circuit Low	Signal voltage < 1.95 to 2.2 V
P025D	Fuel Pump Module Control Circuit High	Signal current > 1 to 2 A
P0261	Cylinder 1 Injector Circuit Low	• Signal current < 10 A and • Signal voltage < 3.5 V
P0262	Cylinder 1 Injector Circuit High	Signal current > 16 A
P0264	Cylinder 2 Injector Circuit Low	• Signal current < 10 A and • Signal voltage < 3.5 V
P0265	Cylinder 2 Injector Circuit High	Signal current > 16 A
P0267	Cylinder 3 Injector Circuit Low	• Signal current < 10 A and • Signal voltage < 3.5 V
P0268	Cylinder 3 Injector Circuit High	Signal current > 16 A
P0270	Cylinder 4 Injector Circuit Low	• Signal current < 10 A and • Signal voltage < 3.5 V
P0271	Cylinder 4 Injector Circuit High	Signal current > 16 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0273	Cylinder 5 Injector Circuit Low	• Signal current < 10 A and • Signal voltage < 3.5 V
P0274	Cylinder 5 Injector Circuit High	Signal current > 16 A
P0276	Cylinder 6 Injector Circuit Low	• Signal current < 10 A and • Signal voltage < 3.5 V
P0277	Cylinder 6 Injector Circuit High	Signal current > 16 A
P0299	Turbocharger / Supercharger Under-boost Rationality check	Difference set value boost pressure vs actual boost pressure value, > 150 hPa
P2004	Intake Manifold Runner Control Stuck Open Bank 1	Signal voltage, > 2.5 V
P2005	Intake Manifold Runner Control Stuck Open Bank 2	Signal voltage, > 2.5 V
P2006	Intake Manifold Runner Control Stuck Closed Bank 1	Signal voltage, < 2.9 V
P2007	Intake Manifold Runner Control Stuck Closed Bank 2	Signal voltage > 2.9 V
P2008	Intake Manifold Runner Control Circuit/Open	Signal voltage 2.9 to 3.2 V
P2009	Intake Manifold Runner Control Circuit Shorted (Bank 1)	Signal voltage > 2.0 V
P2010	Intake Manifold Runner Control Circuit High	Signal voltage < 1.95 to 2.2 V
P2014	Intake Manifold Runner Position Sensor/Switch Circuit Bank 1	Signal voltage, < 0.2 V
P2017	Intake Manifold Runner Position Sensor/Switch Circuit High Bank 1	Signal voltage, > 4.8 V
P2019	Intake Manifold Runner Position Sensor/Switch Circuit Bank 2	Signal voltage, < 0.2 V
P2022	Intake Manifold Runner Position Sensor/Switch Circuit High Bank 2	Signal voltage, > 4.8 V
P2024	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Circuit	Signal Current < 0.8 mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P2025	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Performance	• Response time > 1000 ms and number of checks > 3.00 - • Security bit incorrect and number of checks > 3.00 - • Resetcounter > 3.00 - • Time difference between ECU and EVAP Fuel Tank Temp Sensor > 3.0 • EVAP Fuel Tank Temp Sensor > 119° C • EVAP Fuel Tank Temp Sensor < -39° C • Difference between EVAP fuel tank temp sensor and ECT ≥ 20.3 K and difference between EVAP fuel tank temp sensor and IAT ≥ 20.3 K gradient EVAP fuel tank temp sensor > 20 [K/10min]
P2026	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Circuit Low Voltage	Signal Voltage < 2.0 V
P2027	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Circuit High Voltage	Signal Current > 1.0 A
P2088	A Camshaft Position Actuator Control Circuit Low Bank 1	Signal voltage, < 1.95 to 2.20 V
P2089	A Camshaft Position Actuator Control Circuit High Bank 1	Signal current, > 3 to 5 A
P2092	A Camshaft Position Actuator Control Circuit Low Bank 2	Signal voltage, < 1.95 to 2.20 V
P2093	A Camshaft Position Actuator Control Circuit High Bank 2	Signal current, > 3 to 5 A
P2096	Post Catalyst Fuel Trim System Too Lean Bank 1	Integral part of trim control, post cat > 10%
P2097	Post Catalyst Fuel Trim System Too Rich Bank 1	Integral part of trim control, post cat < 10%
P2098	Post Catalyst Fuel Trim System Too Lean Bank 2	Integral part of trim control, post cat > 10%
P2099	Post Catalyst Fuel Trim System Too Rich Bank 2	Integral part of trim control, post cat < 10%

DTC	Error Message	Malfunction Criteria and Threshold Value
P3081	Engine Temperature Too Low	Step 1 • Modeled ECT > 30° C and • Engine Coolant Temperature < 30° C

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	• Emission threshold misifre rate (MR) 1st interval > 1.5% • Emission threshold misfire rate (MR) > 1.5% • Catalyst damage misfire rate (MR) > 1.5 - 15%
P0301	Cylinder 1 Misfire Detected	• Emission threshold misifre rate (MR) 1st interval > 1.5% • Emission threshold misfire rate (MR) > 1.5% • Catalyst damage misfire rate (MR) > 1.5 - 15%
P0302	Cylinder 2 Misfire Detected	• Emission threshold misifre rate (MR) 1st interval > 1.5% • Emission threshold misfire rate (MR) > 1.5% • Catalyst damage misfire rate (MR) > 1.5 - 15%
P0303	Cylinder 3 Misfire Detected	• Emission threshold misifre rate (MR) 1st interval > 1.5% • Emission threshold misfire rate (MR) > 1.5% • Catalyst damage misfire rate (MR) > 1.5 - 15%
P0304	Cylinder 4 Misfire Detected	• Emission threshold misifre rate (MR) 1st interval > 1.5% • Emission threshold misfire rate (MR) > 1.5% • Catalyst damage misfire rate (MR) > 1.5 - 15%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0305	Cylinder 5 Misfire Detected	• Emission threshold misifre rate (MR) 1st interval > 1.5% • Emission threshold misfire rate (MR) > 1.5% • Catalyst damage misfire rate (MR) > 1.5 - 15%
P0306	Cylinder 6 Misfire Detected	• Emission threshold misifre rate (MR) 1st interval > 1.5% • Emission threshold misfire rate (MR) > 1.5% • Catalyst damage misfire rate (MR) > 1.5 - 15%
P0326	Knock Sensor 1 Circuit Range/Performance Bank 1 or Single Sensor	• Lower threshold < 0.029 V • Upper threshold > 1.992 V
P0327	Knock Sensor 1 Circuit Low Bank 1 or Single Sensor	Lower threshold, < 0.18 V
P0328	Knock Sensor 1 Circuit High Bank 1 or Single Sensor	Upper threshold > 4.8 V
P0331	Knock Sensor 2 Circuit Range/Performance Bank 2	• Lower threshold < 0.029 V • Upper threshold > 1.992 V
P0332	Knock Sensor 2 Circuit Low Bank 2	Lower threshold, < 0.18 V
P0335	Engine Speed Sensor	• Open circuit > 1 V • Short to grnd < 1.5 V • Short to Battery voltage > 3.5 V • Signal check no signal
P0336	Crankshaft Position Sensor “A” Circuit Range/ Performance	• 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 at 4 Rev
P0341	Camshaft Position Sensor “A” Circuit Range/Performance Bank 1 or Single Sensor	• Actual time value vs min. time value < 1 • Actual value vs target value > 12.4° CA • Actual time value vs modeled time value > 3.5

DTC	Error Message	Malfunction Criteria and Threshold Value
P0345	Camshaft Position Sensor “A” Circuit Bank 2	Signal activity check • Signal voltage no altering at 4 Rev
P0346	Camshaft Position Sensor “A” Circuit Range/Performance Bank 2	• Actual time value vs min. time value < 1 • Adaptive value vs target value > 12.4° CA • Actual time value vs modeled time value > 3.5
P0351	Ignition Coil “A” Primary/ Secondary Circuit	Open circuit • Signal current < -0.05 to 2.0 mA • Hardware value from final stage > 0.04 - 0.2 mA
P0352	Ignition Coil “B” Primary/ Secondary Circuit	Short to ground • Signal current < -0.05 to 2.0 mA • Hardware value from final stage > 0.04 - 0.2 mA
P0353	Ignition Coil “C” Primary/ Secondary Circuit	Short to Battery voltage • Signal current < -0.05 to 2.0 mA • Hardware value from final stage > 0.04 - 0.2 mA
P0354	Ignition Coil “D” Primary/ Secondary Circuit	• Signal current < -0.05 to 2.0 mA • Hardware value from final stage > 0.04 - 0.2 mA
P0355	Ignition Coil “E” Primary/ Secondary Circuit	• Signal current < -0.05 to 2.0 mA • Hardware value from final stage > 0.04 - 0.2 mA
P0356	Ignition Coil “F” Primary/ Secondary Circuit	• Signal current < -0.05 to 2.0 mA • Hardware value from final stage > 0.04 - 0.2 mA

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0413	Secondary Air Injection System Switching Valve “A” Circuit Open	• Signal Current 8 to 40 mA • Signal Voltage 2.9 to 3.2 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0414	Air Valve Short to Ground	Short to Battery Voltage: • Signal Current 3 to 5 A
P0416	Secondary Air Solenoid Valve 2 Circuit Open Circuit	Signal voltage < 8 mA
P0417	Secondary Air Solenoid Valve 2 Circuit Short to Ground or Battery Voltage	Signal voltage < 2.00 V
P0418	Secondary Air Injection System Control “A” Circuit	• Signal current < 1 [mA] • Signal Voltage 2.9 to 3.2 [V]
P0420	Catalyst System Efficiency Below Threshold Bank 1	Amplitude ratio O2S > 1.5
P0430	Catalyst System Efficiency Below Threshold Bank 2	Amplitude ratio O2S > 1.5
P0441	Evaporative Emission System Incorrect Purge Flow	Deviation HO2S control < 4% • Purge valve quality < 0,05 [-]
P0442	EVAP System Leak Detected LDP (Small Leak)	Time for pressure drop < 1.06 - 1.3 Sec.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal current < 0.8mA
P0445	Evaporative Emission System Purge Control Valve Circuit Shorted	• Signal voltage < 2.0 V or • Signal current > 5.0 A
P0450	Evaporative Emission System Pressure Sensor/Switch	• Signal Voltage 2.9 to 3.2 V or • Signal Current 0.8 to 4 mA
P0451	Evaporative Emission System Pressure Sensor/Switch Range/Performance	NVLD Pressure Sensor / Switch = Closed
P0452	Fuel Tank Leak Detection System (NVLD) Short to Battery Voltage	Signal Voltage > 3.0 V
P0453	Evaporative Emission System Pressure Sensor/Switch	• Signal Current 1 to 2 A or • Signal Voltage 2 V
P0455	EVAP System Leak Detected LDP (Large Leak Detected)	Time for pressure drop < 0.65...0.7 s
P0456	EVAP System Leak Detected NVLD (very small leak)	NVLD switch position open

DTC	Error Message	Malfunction Criteria and Threshold Value
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 > 2.20 A
P0491	Secondary Air Injection System Insufficient Flow Bank 1	Diference between reference AIR mass flow and calculated AIR mass flow > 18 to 21 [kg/h]
P0492	Secondary Air System Insufficient Flow Bank 2	Diference between reference AIR mass flow and calculated AIR mass flow > 18 to 21 [kg/h]

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor “A” Range/Performance	Communication check • Sensor signal failure
P0502	Vehicle Speed Sensor “A” Circuit Low	Communication check • Sensor signal failure
P0503	Vehicle Speed Sensor Range/Performance	Vehicle speed > 200 km/h
P0506	Idle Air Control System RPM Lower Than Expected	• Engine speed deviation < -80 RPM
P0507	Idle Air Control System RPM Higher Than Expected	• Engine speed deviation > 80 RPM
P050A	Cold Start Idle Air Control System Performance	• Out of range low • Engine speed deviation < 80 - 250 RPM • Out of range high • Engine speed deviation > 80 - 250 RPM
P050B	Cold Start Ignition Timing Performance	Idle Difference between commanded spark timing vs. actual value > 20%
P052A	Cold Start “A” Camshaft Position Timing Over-Advanced Bank 1	• Adjustment angle difference > 10° CA • Number of checks 2
P052C	Cold Start “A” Camshaft Position Timing Over-Advanced Bank 2	• Adjustment angle difference > 10° CA • Number of checks 2

DTC	Error Message	Malfunction Criteria and Threshold Value
P053F	Cold Start Fuel Pressure Performance	Target pressure-actual pressure > 1.5 MPa

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0601	Internal Control Module Memory Check Sum Error	Internal check sum, incorrect
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	Checksum incorrect
P0606	Control Module Processor ECM fault	EEPROM 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	Functional check: close movement • Open to 15° > 1.275 s • Then close to ref. point > 1.28 s • Gradient < 7° per second Functional check open movement • Close to 1.99° > 1.275 s • Then open to ref. point > 1.28 s • Gradient < 7° per second Signal range check at mechanical stop low • TPS 1 signal voltage out-off range 0.208 - 0.852 V or • TPS 2 signal voltage out off range 4.158 - 4.802 V
P0641	Sensor Reference Voltage A Circuit/Open	Signal voltage deviation > ± 0.3 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage < 4.62 V
P0643	Sensor Reference Voltage A Circuit High	5V supply voltage > 5.44 V
P0651	Sensor Reference Voltage B Circuit/Open	Signal voltage deviation > ± 0.3 V
P0652	Sensor Reference Voltage B Circuit Low	Signal voltage < 4.62 V
P0653	Sensor Reference Voltage B Circuit High	5V supply voltage > 5.44 V
P0657	Actuator Supply Voltage A Circuit/Open	Signal voltage, < 2.9 to 3.2 V
P0658	Actuator Supply Voltage A Circuit Low	Signal voltage, < 1.95 to 2.2 V
P0659	Actuator Supply Voltage A Circuit High	Signal current > 1.2 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	• Sense circuit voltage > 6.0 V
P0687	ECM/PCM Power Relay Control Circuit High	• Sense circuit voltage < 5.0 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
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus	Global time out...receiving no messages

DTC	Error Message	Malfunction Criteria and Threshold Value
U0100	Lost Communication with ECM/PCM A	• Failure of all CAN engine messages, Time out more than 490 mSec. • Failure of all CAN engine messages but not all CAN messages, Time out more than 1010 mSec.
U0101	Lost Communication with TCM	No message received from TCM
U0121	CAN ABS Brake Unit	No CAN communication with TCU, time-out
U0140	CAN communication with Body Control Module 1	CAN message no message
U0146	CAN Gateway A	CAN communication with gateway, implausible message
U0155	Communication with ICL	No CAN communication with ICL, time-out
U0302	Software Incompatibility with Transmission Control Module	MT vehicle ECM coded as AT vehicle
U0322	Communication with Body Control Module	Ambient temperature value (moduel not encoded for ambient temperature sensor) FDh -
U0323	CAN: Instrument cluster Audi only	Ambient temperature value module not encoded for ambient temp sensor, 00h
U0402	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
U0415	CAN Link to Speed Sensor	• Out of range: receiving fault value 203.5 mph • Out of range: receiving fault value > 202.81 mph • Out of range: receiving fault value < 1.24 mph

DTC	Error Message	Malfunction Criteria and Threshold Value
U0415	CAN Link to Vehicle Speed Sensor Only S4	• 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
U0422	CAN: Instrument Cluster	Ambient temperature value initialization, Audi 01 h
U0423	Communication with ICL	Invalid data received from ICL implausible message
U0447	Lost Communication With Gateway “B”	Received data from Gateway implausible message
U1103	Vehicle in Production Mode	Production mode = active

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P10A0	Actuation Regulating Flap for Intake Air Electrical Error	• Duty cycle > 95 [%] and/or duty cycle < -95 [%] • Duty cycle > 0.3 s at > 98%
P10A4	Regulating flap for intake air Mechanical malfunction	• Difference adapted value vs. actual value > 6.5 [%] • Absolute value of maximum deviation between predicted and real value: > 8% • Adaptive value < 60 [%] and/or adaptive value > 88 [%]
P10A5	Potentiometer Regulating Flap for Intake Air Signal Too High	Signal voltage > 4.9 V
P10A6	Potentiometer Regulating Flap for Intake Air Signal Too Low	Signal voltage < 0.1 V
P10A7	Adaptation Regulating Flap for Intake Air Soiled	Difference actual signal voltage to learned signal voltage > 0.05 V
P10A8	Adaptation Regulating Flap for Intake Air Lower Limit Not Reached	RFP Signal Voltage in closed position ≤ 0.35 V or ≥ 0.65 V
P1114	Internal Resistance Too Large (Bank 1, Sensor 2)	Heater resistance, (128-648)*(8-40)1.02-25.9 k O (dep. on mod. exhaust temp. and heater power)

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	• Deviation fuel rail pressure control > 0.060 g/Rev • Deviation HO2S control < -22.5%
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Deviation fuel rail pressure control < 0.051 g/Rev • Deviation HO2S control > 30%
P12A4	Fuel Rail Pressure Metering Valve Function Check Valve Stuck Closed	• Deviation fuel rail pressure control < - 0.120 g/rev • Lambda controller output (no map, just bottom and top limit) -15 - 15% • Actual pressure - target pressure > 3.5 MPa • Lambda controller output (no map, just bottom and top limit) -15 - 15%
P13EA	Cold Start Ignition Timing Performance Off Idle	Part load difference between commanded spark timing vs. actual value > 15%
P150A	Engine Off Timer Performance	• Difference between engine-off-time < - 12 s. • and ECM after run-time > 12 s.
P169A	Loading Mode Active	Transport mode active
P2101	Throttle Actuator “A” Control Motor Circuit Range/ Performance	• Duty cycle > 0.4 s at > 98% and • Actual TPS reference point > 1.5° • Actual TPS calc value > 0.4 s at > 8°
P2106	Throttle Actuator Control System - Short to Battery Voltage or Ground	ECM power stage = failure
P2122	Throttle/Pedal Position Sensor/Switch “D” Circuit Low	Signal voltage < 0.4 V
P2123	Throttle/Pedal Position Sensor/Switch “D” Circuit High	Signal voltage > 4.82 V
P2127	Throttle/Pedal Position Sensor/Switch “E” Circuit Low	Signal voltage < 0.2 V
P2128	Throttle/Pedal Position Sensor/Switch “E” Circuit High	Signal voltage > 2.8 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2138	Throttle/Pedal Position Sensor/Switch “D”/”E” Voltage Correlation	Signal voltage sensor 1 vs 2, > 0.24 V
P2147	Fuel Injector Group “A” Supply Voltage Circuit Low	Signal current > 12 A
P2148	Fuel Injector Group “A” Supply Voltage Circuit High	Signal current > 33 A
P2150	Fuel Injector Group “B” Supply Voltage Circuit Low	Signal current > 12 A
P2151	Fuel Injector Group “B” Supply Voltage Circuit High	Signal current > 33 A
P2153	Fuel Injector Group “C” Supply Voltage Circuit Low	Signal current > 12 A
P2154	Fuel Injector Group “C” Supply Voltage Circuit High	Signal current > 33 A
P2181	Cooling System Performance	• ECT < 75 °C • Mass air integral 3.5 - 26.0 kg
P2195	HO2 Sensor Signal Biased/ Stuck Lean Bank 1 Sensor 1	HO2S value > 1.1 V
P2196	HO2 Sensor Signal Biased/ Stuck Rich Bank 1 Sensor 1	HO2S value < 0.9 V
P2197	HO2 Sensor Signal Biased/ Stuck Lean Bank 2 Sensor 1	HO2S value > 1.1 V
P2198	HO2 Sensor Signal Biased/ Stuck Rich Bank 2 Sensor 1	HO2S value < 0.9 V
P219C	Cylinder 1 Air-Fuel Ratio Imbalance	• Adaptive value < -10% or • > 10%
P219D	Cylinder 2 Air-Fuel Ratio Imbalance	• Adaptive value < -10% or • > 10%
P219E	Cylinder 3 Air-Fuel Ratio Imbalance	• Adaptive value < -10% or • > 10%
P219F	Cylinder 4 Air-Fuel Ratio Imbalance	• Adaptive value < -10% or • > 10%
P21A0	Cylinder 5 Air-Fuel Ratio Imbalance	• Adaptive value < -10% or • > 10%

DTC	Error Message	Malfunction Criteria and Threshold Value
P21A1	Cylinder 6 Air-Fuel Ratio Imbalance	• Adaptive value < -10% or • > 10%
P2227	Barometric Pressure Sensor “A” Circuit Range/ Performance	Pressure. difference in cross-check between boost press. sensor 1/2; Intake Manifold press., abient press. > 7 kPa
P2237	HO2 Sensor Positive Current Control Circuit Open Bank 1, Sensor 1	• Signal activity check-failed • Open Circuit pump Current (IP)
P2240	HO2 Sensor Positive Current Control Circuit Open Bank 2, Sensor 1	• Signal activity check-failed • Open Circuit pump Current (IP)
P2243	HO2 Sensor Reference Voltage Circuit/Open Bank 1 Sensor 1	• Signal activity check-failed • Open Circuit Nernst Voltage (UN)
P2247	HO2 Sensor Reference Voltage Circuit/Open Bank 2 Sensor 1	• Signal activity check-failed • Open Circuit Nernst Voltage (UN)
P2251	HO2 Sensor Negative Current Control Circuit Open Bank 1, Sensor 1	• Signal activity check-failed • Open Circuit Virtual Mass (VM)
P2254	HO2 Sensor Negative Current Control Circuit Open Bank 2, Sensor 1	• Signal activity check-failed • Open Circuit Virtual Mass (VM)
P2257	Secondary Air Injection System Control “A” Circuit Low	Signal voltage < 2.00 V
P2258	Secondary Air Injection System Control “A” Circuit High	Signal current > 3 A
P2270	HO2 Sensor Signal Biased/ Stuck Lean Bank 1 Sensor 2	• Signal voltage < 0.750 V • Number of checks ≥ 2
P2271	HO2 Sensor Signal Biased/ Stuck Rich Bank 1 Sensor 2	• Signal voltage > 0.15 V • Number of checks ≥ 2
P2272	HO2 Sensor Signal Biased/ Stuck Lean Bank 2 Sensor 2	• Signal voltage < 0.750 V • Number of checks ≥ 2
P2273	HO2 Sensor Signal Biased/ Stuck Rich Bank 2 Sensor 2	• Signal voltage > 0.15 V • Number of checks ≥ 2

DTC	Error Message	Malfunction Criteria and Threshold Value
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 Open Circuit	Signal current < 0.8 mA
P2295	Fuel Pressure Regulator 2 Control Circuit Low Short to Ground	Signal voltage < 2.0 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal current > 8 A

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
P2414	HO2 Sensor Exhaust Sample Error Bank 1, Sensor 1	O2S signal front > 3.1 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2415	HO2 Sensor Exhaust Sample Error Bank 2, Sensor 1	O2S signal front > 3.1 V
P2440	Secondary Air Injection System Switching Valve Stuck Open Bank 1	Deviation of lambda controller > 15.00%
P2442	Secondary Air Injection System Switching Valve Stuck Open Bank 2	Deviation of lambda controller > 15.00%
P2539	Low Pressure Fuel System Sensor Circuit	Signal voltage > 4.8 V
P2541	Low Pressure Fuel System Sensor Circuit Low	Signal voltage < 0.2 V
P2626	HO2 Sensor Pumping Current Trim Circuit Open Bank 1 Sensor 1	• O2S signal front > 4.7 V • Open Circuit Adjustment Voltage (IA)
P2629	HO2 Sensor Pumping Current Trim Circuit Open Bank 2 Sensor 1	• O2S signal front > 4.7 V • Open Circuit Adjustment Voltage (IA)

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	PWM hardware detection, 0 or 100%
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%

DTC	Error Message	Malfunction Criteria and Threshold Value
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%
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
2735	Pressure Control Solenoid “F” Intermittent	PWM hardware detection, 0 or 100%

DTC CHART

Engine - CFSA

Fuel and Air Mixture, Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	Intake (A) Camshaft Position Response check Bank 1 Bank 2	• Difference between target position vs. actual position > 9.00 - 63.75° CRK • For time > 1.5 - 2.0 Sec and • Adjustment angle ≥ 3.00° CRK
P000B	Exhaust (A) Camshaft Position Response check Bank 1 Bank 2	• Difference between target position vs. actual position > 9.00 - 63.75° CRK • For time > 1.5 - 2.0 Sec and • Adjustment angle ≥ 3.00°CRK
P000C	Intake (A) Camshaft Position Response checkBank 1 Bank 2	• Difference between target position vs. actual position > 9.00 - 63.75° CRK • For time > 1.5 - 2.0 Sec and • Adjustment angle ≥ 3.00°CRK
P000D	Exhaust (A) Camshaft Position Response check Bank 1 Bank 2	• Difference between target position vs. actual position > 9.00 - 63.75° CRK • For time > 1.5 - 2.0 Sec and • Adjustment angle ≥ 3.00°CRK
P007C	Intake Air Temperature Sensor after intercooler 1	Intake Air Temperature < 0.099 V
P008A	Out of Range Low	< 80.0 kPa
P008B	Out of Range High	Actual press > 950 kPa
P0010	Intake (A) Camshaft Position Actuator Circuit/Open (Bank 1)	Signal voltage, signal voltage 4.70 - 5.40 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0011	Intake (A) Camshaft Position Timing - Over-Advanced (Bank 1)	• Difference between target position vs. actual position > 9.00 - 63.75° CRK • For time > 1.5 - 2.0 Sec and • Adjustment angle < 3.00° CRK
P0012	Intake (A) Camshaft Position Timing - Over-Advanced (Bank 1)	• Difference between target position vs. actual position > 9.00 - 63.75° CRK • For time > 1.5 - 2.0 Sec and • Adjustment angle < 3.00° CRK
P0013	Exhaust (A) Camshaft Position Response Check (Bank 1 Bank 2)	Signal voltage 4.70 - 5.40 V
P0014	Exhaust (A) Camshaft Position Response Check Bank 1 Bank 2	• Difference between target position vs. actual position > 9.00 - 63.75° CRK • For time > 1.5 - 2.0 Sec and • Adjustment angle < 3.00° CRK
P0016	Crankshaft Position - Camshaft Position Correlation Intake Bank 1 Bank 2	• Permissible deviation < 11.01° 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	• Permissible deviation < 11.01° Rev 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

DTC	Error Message	Malfunction Criteria and Threshold Value
P0021	Intake (A) Camshaft Position Timing - Over-Advanced (Bank 1)	• Difference between target position vs. actual position > 9.00 - 63.75° CRK • For time > 1.5 - 2.0 Sec and • Adjustment angle < 3.00° CRK
P0022	Position Response check Bank 1 Bank 2	• Difference between target position vs. actual position > 9.00 - 63.75° CRK • For time > 1.5 - 2.0 Sec and • Adjustment angle < 3.00° CRK
P0023	Exhaust (A) Camshaft Position Response Check Bank 1 Bank 2	Signal voltage 4.70 - 5.40 V
P0024	Exhaust (A) Camshaft Position Response Check Bank 1 Bank 2	• Difference between target position vs. actual position > 9.00 - 63.75° CRK • For time > 1.5 - 2.0 Sec and • Adjustment angle < 3.00° CRK
P025A	Fuel Pump Open Circuit	Signal voltage > 4.8 - 5.3 V
P025C	Fuel Pump Short to Ground	Signal voltage < 2.7 - 3.25 V
P025D	Fuel Pump Short to B+	Signal current > 0.6 mA
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 curent > 5.50 A
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

DTC	Error Message	Malfunction Criteria and Threshold Value
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
P0050	HO2S Heater Control Circuit (Bank 1, Sensor 1) Open Circuit	Signal voltage > 4.70 - 5.40 V
P050A	Idle Air Control System RPM Lower or Higher Than Expected	Out of range - Low • Engine speed deviation < 200 RPM Out of range - High • Engine speed deviation > 200 RPM
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
P0070	Ambient air temp sensor short to B+	Failure

DTC	Error Message	Malfunction Criteria and Threshold Value
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	Failure
P0087	Fuel Rail/System Pressure - Too Low	• Pressure < 0.80 MPa
P0088	Fuel Rail/System Pressure - Too High	Pressure > 13.50 MPa
P0089	Fuel Pressure Regulator 1 Performance	• Difference between actual pressure - target pressure > 200 kPa • Pressure control activity -350 kPa - 350 kPa
P0106	Manifold Absolute Pressure/ BARO Sensor Range/ Performance	Boost pressure signal • Manifold pressure signal: variation between state 1 and 2 < 5.00 [kPa]
P0107	Manifold Pressure Sensor	• Signal voltage < 0.20 V Range check: • Manifold pressure signal < 8.00 kPa
P0108	Manifold Pressure Sensor	• Signal voltage > 4.80 Range check: • Manifold pressure signal > 170.00 kPa
P0111	Intake Air Temperature Sensor 1 Rationality Check	• Difference ECT vs. IAT 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 • (depending on engine off time) and diff. AAT vs. AAT at engine start > 24.8 - 39.8 K
P0112	Intake Air Temperature Sensor 1 Circuit Low Input	Signal voltage < 0.15 V

DTC	Error Message	Malfunction Criteria and Threshold Value
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 • AAT vs. ECT at engine start < 24.8...39.8 K (depending on engine off time)
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 calculated value > 9.00%
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
P0130	O2 Sensor Circuit (Bank 1, Sensor 1) Malfunction	Sensor element temperature < 690° C
P0131	O2 Sensor Circuit Bank 1, Sensor 1 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) voltage > 3.25 V
		Nernst voltage (UN) > 4.40 V
		Adjustment voltage (IP) > 7.00 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0133	O2 Circuit Slow Response (Bank 1, Bank 2)	Symmetric fault: • Difference of R2L area ratio vs. L2R area ratio -0.50 - 0.50 • Maximum value of both counters for area ratio R2L and L2R > 5 times Delay Time: • Gradient ratio ≥ 0.00 • Lower value of both area ratios R2L and L2R < 0.30 Transient Time: • Gradient ratio ≥ 0.00 • Gradient ratio ≤ 0.00 • Lower value of both area ratios R2L and L2R < 0.30 or • Lower value of both gradient ratios R2L and L2R < 0.00 ASYMMETRIC FAULT • Difference of R2L area ratio vs. L2R area ratio NOT (-0.50 - 0.50) • Values of both counters for area ratio R2L and L2R ≥ 5 times Delay Time: • Gradient ratio ≥ 0.00 • Lower value of both area ratios R2L and L2R < 0.30 Transient Time: • Gradient ratio ≥ 0.00 • Gradient ratio ≤ 0.00 • Lower value of both area ratios R2L and L2R < 0.30 or • Lower value of both gradient ratios R2L and L2R < 0.00

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 35.0 Sec.
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 > 5 Sec.
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)
P0140	O2 Sensor Circuit (Bank 1-Sensor 2) No Activity Detected	• Signal voltage 0.40 - 0.60 V for > 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 > 40,000 Ω and • Exhaust temperature > 600° C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0141	O2 Heater Circuit (Bank 1, Sensor 2) Out of Range	Heater resistance 1000 - 6500 Ω
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) < 0.30 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) > 7.00 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0153	O2 Circuit Slow Response (Bank 1, Bank 2)	SYMMETRIC FAULT: • Difference of R2L area ratio vs. L2R area ratio -0.50 - 0.50 • Max value of both counters for area ratio R2L and L2R 5 times Delay Time: • Gradient ratio ≥ 0.00 • Lower value of both area ratios R2L and L2R < 0.30 Transient Time: • Gradient ratio ≥ 0.00 • Gradient ratio ≤ 0.00 • Lower value of both area ratios R2L and L2R < 0.30 or • Lower value of both gradient ratios R2L and L2R < 0.00 ASYMMETRIC FAULT: • Difference of R2L area ratio vs. L2R area ratio NOT (-0.50 - 0.50) • Values of both counters for area ratio R2L and L2R ≥ 5 times • Delay Time: • Gradient ratio ≥ 0.00 • Lower value of both area ratios R2L and L2R < 0.30 Transient Time: • Gradient ratio ≥ 0.00 • Gradient ratio ≤ 0.00 • Lower value of both area ratios R2L and L2R < 0.30 or • Lower value of both gradient ratios R2L and L2R < 0.00

DTC	Error Message	Malfunction Criteria and Threshold Value
P0155	O2 Sensor Heater Circuit (Bank 2-Sensor 1) Malfunction	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 35.0 Sec
P0157	O2 Sensor Circuit (Bank 1-Sensor 2) Low Voltage	• 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 (Bank 1, Sensor 2) High Voltage	Signal voltage > 1.08 V for time > 5.0 Sec
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) ≥ 2.8 V
P0160	O2S Signal Check - Circuit Continuity (sensor ground line open circuit)	• Internal resistance > 40,000 Ω and • Exhaust temperature > 600° C
P0161	O2 Heater Circuit (Bank 1, Sensor 2) Out of Range	Heater resistance > 1000 - 6500 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 > 20%
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)	Adaptive value < - 20%
P0190	Fuel Rail Pressure Sensor A Circuit	Signal voltage > 4.80 V
P0191	Fuel Rail Control Valve, High Pressure Side	Actual pressure > 19 MPa
P0192	Fuel Rail Pressure Sensor A Circuit Low Input	Signal voltage < 0.20 V
P0201	Injector Circuit/Open - Cylinder 1	Signal current < 2.10 A
P0202	Injector Circuit/Open - Cylinder 2	Signal current < 2.10 A
P0203	Injector Circuit/Open - Cylinder 3	Signal current < 2.10 A
P0204	Injector Circuit/Open - Cylinder 4	Signal current < 2.10 A
P0205	Injector Circuit/Open - Cylinder 5	Signal current < 2.10 A
P0206	Injector Circuit/Open - Cylinder 6	Signal current < 2.10 A
P0207	Injector Circuit/Open - Cylinder 7	Signal current < 2.10 A
P0208	Injector Circuit/Open - Cylinder 8	Signal current < 2.10 A
P0221	Throttle/Pedal Position Sensor/Switch B Circuit Range/Performance	• TPS 1 - TPS 2 > 6.30% or • TPS 2 calculated value > 9.00%
P0222	Throttle/Pedal Position Sensor/Switch B Circuit Low Input	Signal voltage < 0.18 V
P0223	Throttle/Pedal Position Sensor/Switch B Circuit High Input	Signal voltage > 4.63 V

DTC	Error Message	Malfunction Criteria and Threshold Value
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 < 2.1 A
P0265	Cylinder 2 Injector Circuit Short to B+	Signal current > 14.70 A
P0267	Cylinder 3 Injector Circuit Short to Ground	Signal current < 2.1 A
P0268	Cylinder 3 Injector Circuit Short to B+	Signal current > 14.70 A
P0270	Cylinder 4 Injector Circuit Short to Ground	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
P0279	Cylinder 7 Injector Circuit Short to Ground	Signal current < 2.10 A
P0280	Cylinder 7 Injector Circuit Short to B+	Signal current > 14.70 A
P0282	Cylinder 8 Injector Circuit Short to Ground	Signal current < 2.10 A
P0283	Cylinder 8 Injector Circuit Short to B+	Signal current > 14.70 A
P025A	Fuel Pump Open Circuit	Signal voltage > 4.8 - 5.3 V
P025C	Fuel Pump Short to Ground	Signal voltage < 2.7 - 3.25 V
P025D	Fuel Pump Short to Battery Plus	Signal current > .6 mA
P2004	Intake Manifold Runner Control Stuck Closed Bank 1	Deviation runner flaps position > 30 vs. calculated position > 30%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2005	Intake Manifold Runner Control Stuck Closed Bank 1	Deviation runner flaps position > 30 vs. calculated position > 30%
P2006	Intake Manifold Runner Control Stuck Open Bank 1	Deviation runner flaps position > 30 vs. calculated position > 30%
P2007	Intake Manifold Runner Control Stuck Open Bank 1	Deviation runner flaps position > 30 vs. calculated position > 30%
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 0.0 - 3.26 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 Short to Ground	Signal voltage, < 0.20 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	Smart Temperature Sensor	Open circuit signal voltage 4.70 - 5.40 V
P2025	Smart Temperature Sensor	Communication with Smart Temperature Sensor response time > 1000 mSec and number of checks > 3.00 OR security bit incorrect and number of checks > 3.00
P2026	Smart Temperature Sensor	Short to ground signal voltage 0 - 3.25 V
P2027	Smart Temperature Sensor	Short to battery plus signal current > 2.20 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P2088	A Camshaft Position Actuator Control Circuit Low Bank 1 Short to Ground	Signal voltage 0.0 - 3.25 V
P2089	A Camshaft Position 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 - 325 V
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 - 325 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 temperature > 9.8 K or • Measured engine coolant temperature - reference model temperature > 191.3 K

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random Misfire Detected	• Emission threshold misfire rate (MR) > 2.75% • Catalyst damage misfire rate (MR) > 11%
P0301	Cylinder 1 Misfire Detected	• Emission threshold misfire rate (MR) > 2.75% • Catalyst damage misfire rate (MR) > 11%
P0302	Cylinder 2 Misfire Detected	• Emission threshold misfire rate (MR) > 2.75% • Catalyst damage misfire rate (MR) > 11%
P0303	Cylinder 3 Misfire Detected	• Emission threshold misfire rate (MR) > 2.75% • Catalyst damage misfire rate (MR) > 11%
P0304	Cylinder 4 Misfire Detected	• Emission threshold misfire rate (MR) > 2.75% • Catalyst damage misfire rate (MR) > 11%
P0305	Cylinder 5 Misfire Detected	• Emission threshold misfire rate (MR) > 2.75% • Catalyst damage misfire rate (MR) > 11%
P0306	Cylinder 6 Misfire Detected	• Emission threshold misfire rate (MR) > 2.75% • Catalyst damage misfire rate (MR) > 11%
P0307	Cylinder 7 Misfire Detected	• Emission threshold misfire rate (MR) > 2.75% • Catalyst damage misfire rate (MR) > 11%
P0308	Cylinder 8 Misfire Detected	• Emission threshold misfire rate (MR) > 2.75% • Catalyst damage misfire rate (MR) > 11%
P0321	Ignition/Distributor Engine Speed Input Circuit Range/ Performance	• Counted teeth vs. reference incorrect or • Monitoring reference gap failure

DTC	Error Message	Malfunction Criteria and Threshold Value
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) > 48.0 or • Signal fault counter (measuring window) > 2.00
P0327	Knock Sensor 1 Circuit Low Input (Bank 1) Short to Ground	Lower threshold < -70 V
P0328	Knock Sensor 1 Circuit Short to B+	Upper threshold > 1.00 V
P0332	Knock Sensor 1 Circuit Low Input (Bank 1) Short to Ground	Lower threshold, < -0.70 V
P0333	Knock Sensor 1 Circuit Short to B+	Upper threshold >1.00 V
P0341	Camshaft Position Sensor A Circuit Range/Performance (Bank 1 or Single Sensor)	• Signal pattern incorrect • Defect counter 30.00
P0342	Camshaft Position Sensor A Circuit Low Input (Bank 1 or Single Sensor)	• Signal voltage permanently low and • Crankshaft signals 6.00
P0343	Camshaft Position Sensor A Circuit High Input (Bank 1 or Single Sensor)	• Signal voltage permanently high • Crankshaft signals 6.00
P0346	Camshaft Position Sensor A Circuit Range/Performance (Bank 2 or single sensor)	• Signal pattern incorrect • Defect counter 30.00
P0347	Camshaft Position Sensor A Circuit Low (Bank 2 or single sensor)	• Signal voltage permanently low and • Crankshaft signals 6
P0348	Camshaft Position Sensor A Circuit High (Bank 2 or single sensor)	• Signal voltage permanently high and • Crankshaft signals 6
P0351	Ignition Coil A Primary/ Secondary Circuit	Open circuit • Signal current < -0.25 to 2.0 mA or • Internal check failed

DTC	Error Message	Malfunction Criteria and Threshold Value
P0352	Ignition Coil B Primary/ Secondary Circuit	Open circuit • Signal current < -0.25 to 2.0 mA or • 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
P0357	Ignition Coil G Primary/ Secondary Circuit	Open circuit • Signal current < -0.25 to 2.0 mA or • Internal check failed
P0358	Ignition Coil H 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 30
P0367	Camshaft Position Sensor A Circuit Low (Bank 1 or single sensor)	• Signal voltage permanently low and • Crankshaft signals 6

DTC	Error Message	Malfunction Criteria and Threshold Value
P0368	Camshaft Position Sensor A Circuit High (Bank 1 or single sensor)	• Signal voltage permanently high and • Crankshaft signals 6
P0391	Camshaft Position Sensor A Circuit Range/Performance (Bank 2 or single sensor)	• Signal pattern incorrect • Defect counter 30
P0392	Camshaft Position Sensor A Circuit Low (Bank 2 or single sensor)	• Signal voltage permanently low • Crankshaft signals 6
P0393	Camshaft Position Sensor A Circuit High (Bank 2 or single sensor)	• Signal voltage permanently high • Crankshaft signals 6

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	Rationality Check	Difference in ambient pressure vs. AIR pressure measured with AIR pressure sensor > 2.00 kPa
P0413	Circuit Open	Signal voltage 4.70 - 5.40 V
P0414	Short to Ground	Signal voltage 0.0 - 3.25 V
P0414	Short to Battery Plus	Signal current > 2.20 A
P0417	Secondary Air Injection System Switching Valve B Circuit Shorted	Signal current 2.20 - 4.20 A
P0418	Air Pump Relay Open Circuit	Signal voltage 4.4 - 5.6 V
P0420	Catalyst System Bank 1	Measured O2S EWMA filter value for catalyst < 1.0
P0430	Catalyst System Bank 2	Measured O2S EWMA filter value for catalyst < 1.0
P0441	Evaporative Emission System Incorrect Purge Flow	• Deviation lambda control < 3.00 - 5.00% and • Deviation idle controlt < 25%
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage > 4.70 - 5.70 V
P0450	NVLD Switch - Open Circuit	Signal voltage 0.39 - 0.55 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0451	NVLD Switch - Stuck Closed	Natural vacuum leak detection (NVLD) switch position closed
P0452	NVLD Switch - Short to Ground	Short to ground signal voltage < 0.24 V
P0453	NVLD Switch - Short to B+	Short to battery plus signal voltage > 3.0 V
P0456	Evaporative Emission System Leak Detected (very small leak)	Natural vacuum leak detection (NVLD) switch position open
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 0.0 - 3.26 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	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 ≤ 2.00 kPa or • Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.27 • Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.27 and • Relative AIR pressure measured ≤ 2.00 kPa or • Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled while valve bank 2 commanded closed < 0.70 • Average pressure difference between absolute value and filtered value while valve bank 2 commanded closed < 0.30 - 1.00 kPa and • Relative AIR pressure measured ≤ 2.00 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 ≤ 2.00 kPa or • Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.27 • Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.27 and • Relative AIR pressure measured ≤ 2.00 kPa or • Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled while valve bank 2 commanded closed < 0.70 • Average pressure difference between absolute value and filtered value while valve bank 2 commanded closed < 0.30 - 1.00 kPa and • Relative AIR pressure measured ≤ 2.00 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 < 2 MPH
P0506	Idle Air Control System - RPM Lower Than Expected	Engine speed deviation > -80 RPM and RPM controller torque value ≥ calculated max. value

DTC	Error Message	Malfunction Criteria and Threshold Value
P0507	Idle Air Control System - RPM Higher Than Expected	Engine speed deviation <-80 RPM and RPM controller torque value ≤ calculated max. value
P0597	lectrical Thermostat	Signal voltage 4.70...5.40 V
P0598	lectrical Thermostat	Signal voltage 0.0...3.25 V
P0599	lectrical Thermostat	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	Cold Start Idle Air Control System Performance	Difference between commanded spark timing vs. actual value > 26.00%
P052A	Cold Start Monitoring VVT intake Bank 1 Bank 2	Difference between target position vs. actual position > 3.50° CRK
P052C	Cold Start “A” Camshaft Position Timing Over-Advanced	Difference between target position vs. actual position > 5°CRK
P053F	Fuel Rail Pressure Control Valve	• Difference between target pressure-actual pressure >1.30 MPa or • 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 > 5°CRK
P054C	Cold Start Monitoring VVT exhaust Bank 1 Bank 2	Difference between target position vs. actual position > 5° CRK

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	Barometric Pressure Sensor Faults	• Signal gradient, out of range > 7.5 kPa/s or <-7.5 kPa/s • Signal voltage, out of range > 4.80 V or < 0.20 V • Measured ambient pressure, out of range > 115 kPa or < 45 kPa.
P0634	Electrical Thermostat	Signal range check over temperature > 150° C
P0638	Throttle Actuator Control Range/Performance Bank 1	• Time to close to reference point > 0.6 Sec. and • Reference point -1.5% • Time to close below reference point > 0.3 Sec and • Reference point 1.0%
P0641	Sensor Reference Voltage A Circuit/Open	Signal voltage deviation > ± 0.3 V
P0651	Sensor Reference Voltage B Circuit/Open	Signal voltage deviation > ± 0.3 V
P0657	Actuator Supply Voltage A Circuit/Open	Signal voltage > 4.4 - 5.6 V
P0658	Actuator Supply Voltage A Circuit Low	Signal voltage < 2.15 - 3.25 V
P0659	Actuator Supply Voltage “A” Circuit High	Signal current > 1.10 A
P0697	Sensor Reference Voltage C Circuit/Open	Signal voltage deviation > ± 0.3 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
U0101	Lost Communication with TCM	No CAN message received from TCM
U0121	CAN: ABS Brake Unit	Received CAN message no message
U0140	CAN communication with Body Control Module	Time out no message

DTC	Error Message	Malfunction Criteria and Threshold Value
U0146	CAN: Gateway A	Received CAN message no message
U0155	CAN: Communication with Instrument Cluster Module	Received CAN message - no message
U0302	Software Incompatibility with Transmission Control Module	MT vehicle ECM coded as AT vehicle
U0323	CAN: Instrument Cluster Only	Ambient temperature value module not encoded for ambient temp sensor, FDh
U0402	CAN: Communication with TCM	Invalid data received from TCM • Implausible message
U0415	CAN: Communication with Vehicle Speed Sensor	Speed sensor signal 407.296 MPH
U0422	CAN: Ambient Air Temperature Sensor	Ambient temperature value initialization, FEh
U0423	CAN: Communication with Instrument Cluster Module	Received data implausible message
U0447	CAN: Gateway	Received data from Gateway implausible message

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	• Rail pressure at bank 1 at engine start up < 1 kPa and either • Fuel system rich at part load < -15% or • Fuel system too rich at idle < 3% or • Fault fuel system too rich at part load detected or • Fault fuel system too rich at idle detected or • Misfire fault

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Rail pressure at bank 1 at engine start up < 1 kPa and either • Fuel system rich at part load < 15% or • Fuel system too lean at idle < 3% or • Fault fuel system too lean at part load detected or • Fault fuel system too lean at idle detected or • Misfire fault
P129B	Fuel Rail Pressure Control Valve	• Open circuit signal voltage 1.40 - 3.20 V • Rationality check signal pattern incorrec
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.
P2101	Throttle Actuator Control Motor Circuit Range/ Performance	Signal range check • Duty cycle >80% and • ECM power stage, no failure Rationality check • Deviation throttle valve angles vs. calculated value 4.00 - 50.00%

DTC	Error Message	Malfunction Criteria and Threshold Value
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 • Internal check failed Functional check • Internal check failed
P2108	Throttle Actuator Control Range/Performance - Bank 1	TPS 1 signal voltage NOT (0.21 - 0.87) V
P2119	Throttle Actuator Control Throttle Body Range/ Performance	TPS 1 signal voltage NOT (0.21 - 0.87) V
P2122	Throttle/Pedal Position Sensor/Switch D Circuit Low Input	Signal voltage < 0.65V
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
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
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

DTC	Error Message	Malfunction Criteria and Threshold Value
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 integral < 75° C
P2195	O2 Sensor Rationality Check High - Bank 1, Bank 2	Delta lambda of 2nd lambda control loop > 0.070
P2196	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 1)	Delta lambda of 2nd lambda control loop < 0.070
P2197	O2 Sensor rationality check high - Bank 1, Bank 2	Delta lambda of 2nd lambda control loop > 0.070
P2198	O2 Sensor Rationality Check Low- Bank 1, Bank 2	Delta lambda of 2nd lambda control loop < 0.070
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
P2237	O2 Sensor Positive Current Control Circuit / Open - Bank 1, Bank 2	• O2S signal front 1.46 - 1.54 V and • Delta lambda controller > 0.20
P2240	O2 Sensor Positive Current Control Circuit / Open - Bank 1, Bank 2	• O2S signal front 1.46 - 1.54 V and • Delta lambda controller > 0.20
P2243	O2 Sensor Reference Voltage Circuit / Open - Bank 1, Bank 2	• O2S signal front > 4.70 V and internal resistance > 950 Ohms • O2S signal front > 3.25 V and Internal resistance > 950 Ohms
P2247	O2 Sensor Nernst Voltage Open - Bank 1, Bank 2	• O2S signal front > 4.70 V and • Internal resistance > 950 Ω • O2S signal front < 0.20 V and • Internal resistance > 950 Ω
P2251	O2 Sensor Signal Open Circuit - Bank 1, Bank 2	• O2S signal front 1.42 - 1.50 V and • Internal resistance > 950 Ω
P2254	O2 Sensor Signal Open Circuit - Bank 1, Sensor 1	• O2S signal front 1.42 - 1.50 V and • Internal resistance > 950 Ω

DTC	Error Message	Malfunction Criteria and Threshold Value
P2257	Air Pump Relay Short to Ground.	Signal voltage 0.0 - 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 < 0.67 - 0.72 V and • Enrichment after stuck lean 25.00%
P2271	O2 Circuit Bank 1, Sensor 2	• O2S signal rear not oscillating at reference < 0.67 - 0.72 V and • Enrichment after stuck lean 25.00%
P2272	O2 Circuit Slow Response Bank 1, Sensor 2	• O2S signal rear not oscillating at reference < 0.67 - 0.72 V and • Enrichment after stuck lean 25.00%
P2273	O2 Circuit Slow Response Bank 1, Sensor 2	• O2S signal rear not oscillating at reference < 0.67 - 0.72 V and • Enrichment after stuck lean 25.00%
P2279	Intake Air System Leak	• Offset value throttle mass flow > 21.50 kg/h and • Correction factor > 0.97
P2294	Fuel Pressure Regulator 2 Control Circuit OPen Circuit	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 current > 5.1 - 7.0 mA
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 current > 5.1 - 7.0 mA
P2306	Ignition Coil C Primary Control Circuit Low	Short to ground signal current > 24.0 mA
P2307	Ignition Coil C Primary Control Circuit High	Short to battery plus signal current > 5.1 - 7.0 mA
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 current > 5.1 - 7.0 mA
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 current > 5.1 - 7.0 mA
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 current > 5.1 - 7.0 mA
P2318	Ignition Coil G Primary Control Circuit Low	Short to ground signal current > 24.0 mA
P2319	Ignition Coil G Primary Control Circuit High	Short to battery plus signal current > 5.1 - 7.0 mA
P2321	Ignition Coil H Primary Control Circuit Low	Short to ground signal current > 24.0 mA
P2322	Ignition Coil H Primary Control Circuit High	Short to battery plus signal current > 5.1 - 7.0 mA

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P2414	O2 Sensor Signal Range Check - Bank 1, Bank 2	• Threshold 1 - Signal voltage 2.71 - 5.00 V • Threshold 2 - Depending on gain factor, that actual is used for sensor characteristic, the threshold is signal voltage 2.05 - 3.06 V
P2415	O2 Sensor signal range check - Bank 1, Bank 2	• Threshold 1 - Signal voltage 2.71 - 5.00 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 SAIR pressure and ambient pressure -6.00; > 6.00 kPa
P2432	Signal Range Check	Signal voltage < 0.40 V
P2433	Signal Range Check	Signal voltage > 4.60 V
P2440	Air Valve Bank 1	• Relative AIR pressure measured ≤ 2.0 kPa • Blockage: relative SAIR pressure > 0.27 • Leakage: relative SAIR Bank 1 pressure > 0.27
P2442	air valve bank 2	• Relative AIR pressure measured ≤ 2.0 kPa • Blockage: relative SAIR pressure > 0.27 • Leakage: relative SAIR Bank 1 pressure > 0.27
P2539	Low Pressure Fuel System Sensor Circuit	Signal voltage > 4.80 V
P2541	Low Pressure Fuel System Sensor Circuit Low	Signal voltage < 0.20 V

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