

2014

Q7

Quick Reference
Specification Book



2014 Audi Q7

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: $\text{kg}\cdot\text{cm} \times 0.868 = \text{lb}\cdot\text{in}$ • $\text{kg}\cdot\text{cm} \times 9.81 = \text{N}\cdot\text{cm}$

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.

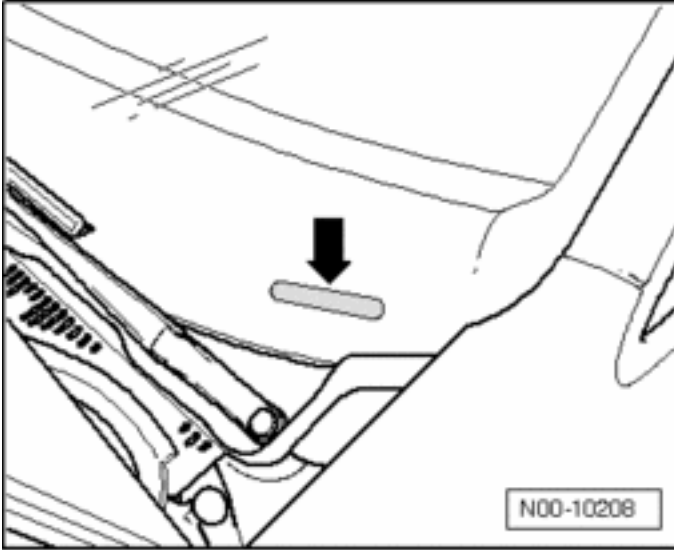
(CAUTIONS cont'd on next page)

CAUTIONS *(cont'd)*

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

VEHICLE IDENTIFICATION

Vehicle Identification Number (VIN) Location



The Vehicle Identification Number (VIN) (➡) is on the left side of the vehicle and is visible from the outside.

VIN Decoder

2014 Audi VIN Decoder

Series:	Mfg. Make (1-3)	Series	Engine	Restraint system	Model (7&8)	Check digit	Model year	Assembly plant	Sequential production number (position 12 - 17)
A = A4 Premium A5 Cab Premium A8 Sedan RB V8 4.2 Coupé*** B = A4 Premium q S4 Premium q TT/TTTS/TTTS Coupé 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** S05 Premium Q7 3.0T/TTDI Prem R55 Cpe & Cab*** M = A4 Manual Prem q S4 Manual Prem A6 2.0T Premium** S5 Sedan Q5 3.0T Premium q Q5 TDI Prem + S-Line Q7 3.0T Prest. S-Line RB V8 4.2 Coupé - Manual A4 Premium RB V10 5.2 Coupé**** A6 Premium q A6 2.0T Premium q A6 Premium q S8 RB V8 4.2 Coupé**** A5 Manual Prem q S5 Manual Prem q A6 2.0T Premium q RB V10 5.2 Coupé - Manual A4 Manual Prem q A5 Prestige q A5 Cab Premium** A6/A6 Prestige q RB V10 5.2 Coupé	L = A5 Premium** q A5 Cab Premium** q Q5 2.0T Premium** Q7 3.0T/TTDI Prem - Manual M = A4/A5 Man Prestige q A5 Premium** q A5 Cab Premium** q A5 L Sedan R = A4/A5 TT/TTTS Rtdr Prem + q A5 Manual Prem + q S-Line RB V8 4.2 Spyder**** RB V10 5.2 Spyder**** T = Allroad Premium q RB V10 5.2 Spyder - Manual U = Allroad Premium** q A5 Cab Prestige RB V8 4.2 Spyder - Manual V = Allroad Prestige q S5 Prestige q S5 Cab Prestige q Q5 TDI Prestige S05 Prestige Q7 TDI Prestige RB V10 5.2 Spyder**** W = A5 Cab Prestige q 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 RB V8 4.2 Spyder****	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 E E 1 0 2 0 1 4	Eye back FC (4G) = A6 / S6 / A7 / S7 / RS7 FD (4H) = A8 / S8 FE (4L) = Audi Q7 FG (4Z) = R8 FH (8F) = A5 / S5 / S7 FK (6J) = R5S Cab FL (8K)** = TT / TTS FL (8K)** = A4 / S4 FR (8T) = A5 / S5 / S7	Calculate per NHTSA Code A = Ingolstadt B = Bratislava N = Neckarsulm P = Győr	F = 4 cyl 2.0L 220hp (CAED) A4 CVT / A4 q / A5 Cpe q / A5 Cab / A6 CVT (C7) / A6 q / A5 Cpe q / A5 Cab q / A5 (Altois) / Q5 G = V6 3.0L 310hp (CTUA) A6 q (C7) / A7 q / A6 / A8L H = V6 3.0L 272hp (CTUC) Q5 I = V6 3.0L 354hp (CTUD) S05 J = V6 3.0L 333hp (CTVA) Q7 K = V6 4.0L 280hp (CTWB) Q7 L = V6 3.0L TDI 240hp (CPNB) Q7 M = V6 3.0L TDI 240hp (CPNB) A8 N = V6 3.0L TDI 240hp (CPNB) A6 / A7 Sportback, Q5 O = V10 5.2L 550hp (CTPA) R8 Coupe P = V10 5.2L 525hp (CTYA) R8 / R8 Spyder Q = V8 4.2L 430hp (CNDN) R8 / R8 Spyder R = V8 4.2L 420hp (CEUA) A8 / A8L S = V8 4.0L 420hp (CEUC) S5 / S7 Sportback (C7) T = V8 4.0L 520hp (CCTA) S8 U = V8 4.0L 560hp (CRDB) RS7 Sportback (C7) V = V10 5.2L 500hp (CEJA) A8L (D4) W = V8 4.2L 450hp (CFS) R55 Cpe/A6 X = 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 identified by WMI code of 'WAF'. All other A4 models are identified by WMI code of 'WAU'.
 *** R5S Cabriolet, R5S 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 Coupés with manual transmission vehicles used a 4th and 5th character combination of 'CU' instead of 'QV'.
 ♦♦♦ Some early production vehicles use the character 'C' instead of 'E'.

2014 Restraint System:

All = Active - Dri/Pass, AirBag - Dri/Pass, Advanced Front Air Bag
 A (A5 / S5 / R5S Cab, TT / TTS, R8) = Side AirBags Front, Knee AirBags Front
 A (A5 / S5 / R5S 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, Knee AirBag
 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
 B (Q5, Q7) = Side AirBags Front & Rear, Side Guard Air Curtain

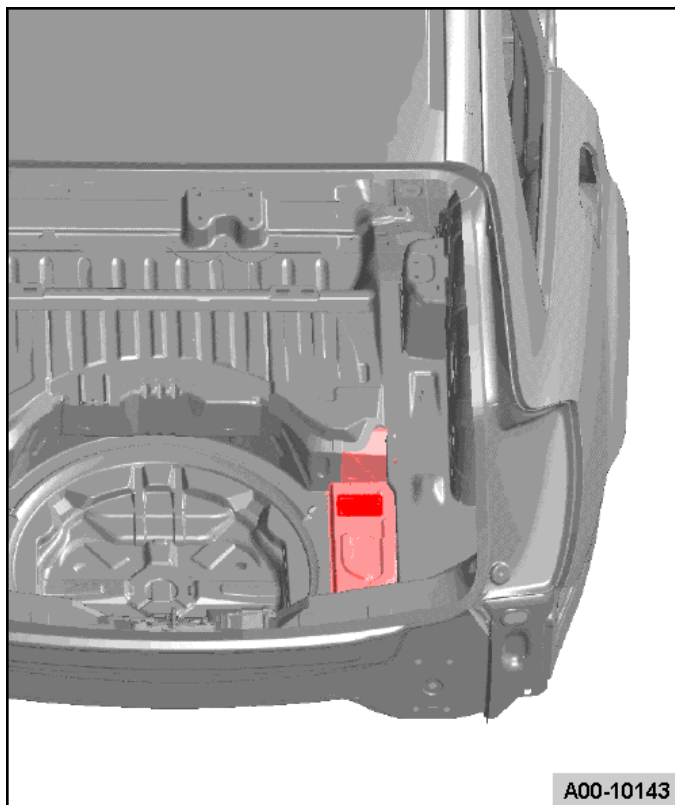
Mfg. Make (1-3)	Series	Engine	Restraint system	Model (7&8)	Check digit	Model year	Assembly plant	Sequential production number (position 12 - 17)
1	2	3	4	5	6	7	8	9
10	11	12	13	14	15	16	17	

Calculate per NHTSA Code
 Sequential Product Number

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

2014 Audi VIN Decoder

Vehicle Data Label Location



The vehicle data label is in the rear right longitudinal member on the floor panel.

Vehicle
Identification

SALES CODES

Engine Codes

CNRB	3.0L 6-cylinder TDI
CTWA, CTWB	3.0L 6-cylinder

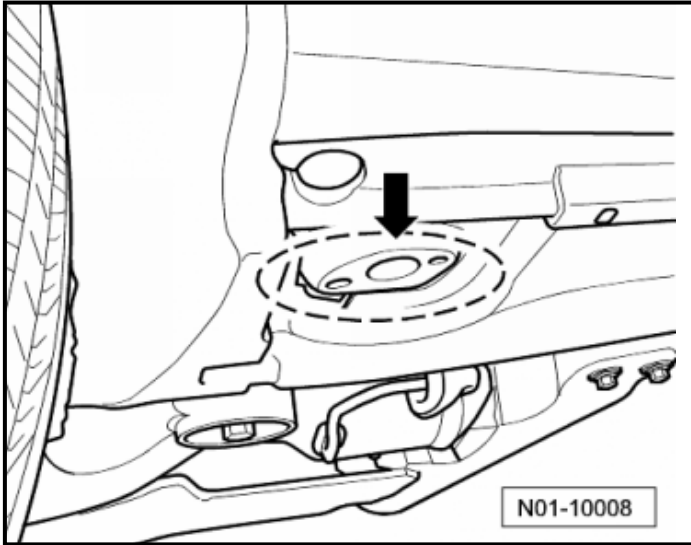
Transmission Codes

0C8	8-speed automatic transmission
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VEHICLE LIFTING

Hoist and Jack Mounting Points

Front



Front: Position the mounting plate on the floor panel reinforcement (➔).



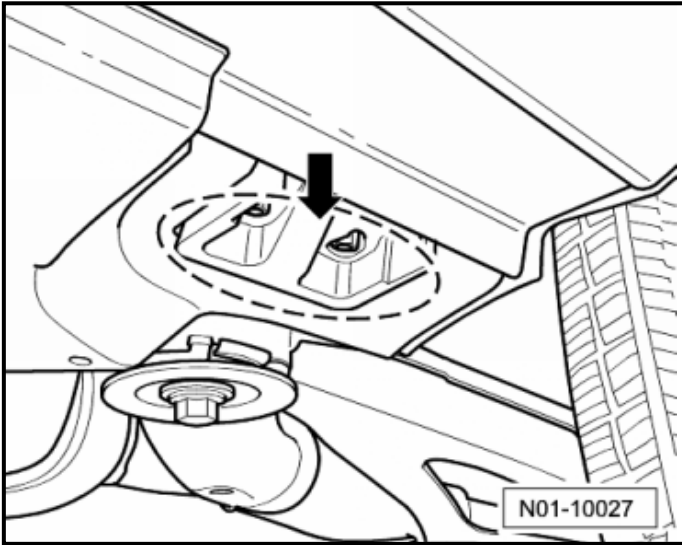
WARNING

Never raise the front of the vehicle by the side member vertical stiffener.

Sales
Codes

Vehicle
Lifting

Rear



Rear: Position the mounting plate on the floor plate reinforcement near the rear axle mount (➡).



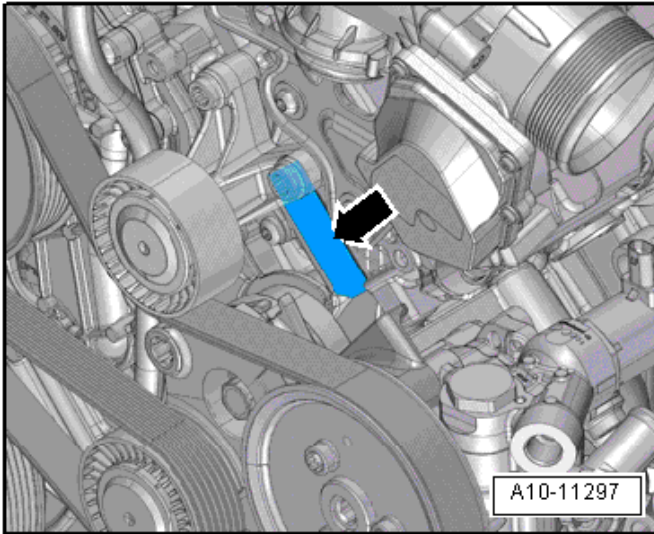
WARNING

Make sure the lifting platform support plate is centrally positioned on the reinforcement.

ENGINE MECHANICAL – 3.0L CNRB (TDI)

General, Technical Data

Engine Number Location



The engine number (engine code and serial number) is located on the left side in the front under the high pressure pump toothed belt (➡). 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.

Engine Data

Engine code		CNRB
Displacement	liter	2.967
Output	kW at RPM	176 @ 4000-4500
Torque	Nm at RPM	550 @ 1500-3000
Bore	diameter mm	83.0
Stroke	mm	91.4
Compression ratio		16.8
CZ	at least	51
Ignition sequence		1-4-3-6-2-5
Exhaust Gas Recirculation (EGR)		Yes
Turbocharger, Supercharger		Turbocharger
Catalytic converter		Yes
Particulate filter		Yes
Charge Air Cooler (CAC)		Yes
Oxygen Sensor (O2S) regulation		Yes
Valves per cylinder		4
Selective Catalytic Reduction (SCR) system		No

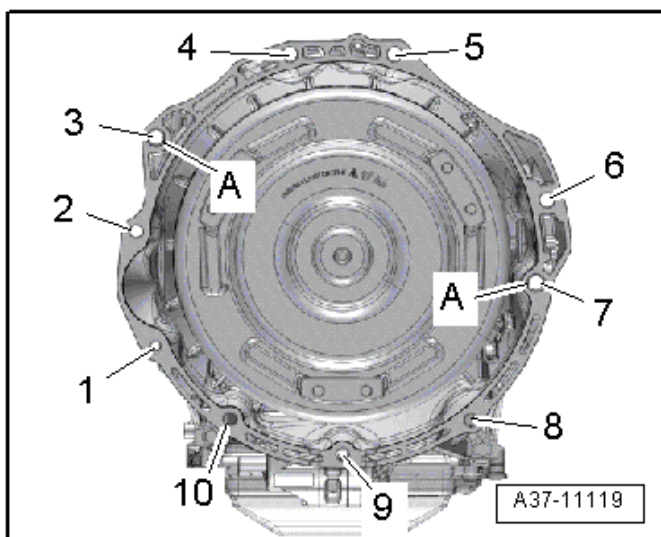
Engine Assembly – 3.0L CNRB (TDI)

Fastener Tightening Specifications

Component	Fastener size	Nm
Bolts and nuts	M6	10
	M7	15
	M8	25
	M10	40
	M12	60
Bracket for vacuum reservoir-to-engine support	-	9
Bracket-to-vacuum reservoir	-	2.5
Electrohydraulic engine mount solenoid valve-to-bracket for vacuum reservoir	-	5
Engine support-to-subframe ¹⁾	-	120 plus an additional 180° (½ turn)
Ground wire-to-right engine support	-	15
Left engine support-to-left engine mount nut	-	75
Left engine support-to-left engine mount nut	-	60
Left engine support-to-subframe	-	50 plus an additional 90° (¼ turn)
Right engine support		
- Bolt	-	50 plus an additional 90° (¼ turn)
- Nut	-	75

¹⁾ Replace

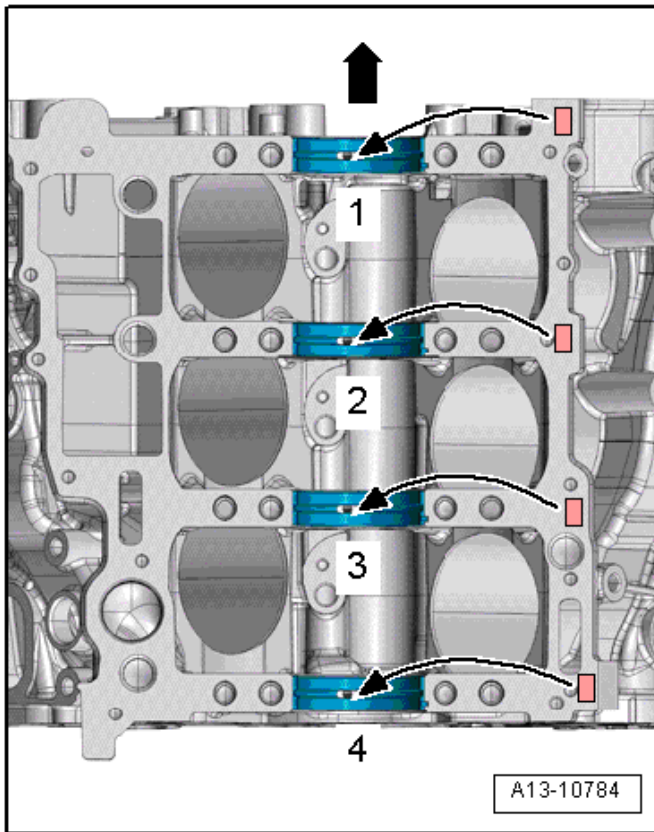
Engine to Automatic Transmission



Item	Bolts	Nm
1	M10x70 ¹⁾	65
2	M10x70 ¹⁾	65
3, 4, 5, 7	M12x80	80
6	M12x80	80
8, 9, 10	M10x70	45
A	Alignment sleeves for centering	
¹⁾ Also secures the starter		

Crankshaft, Cylinder Block – 3.0L CNRB (TDI)

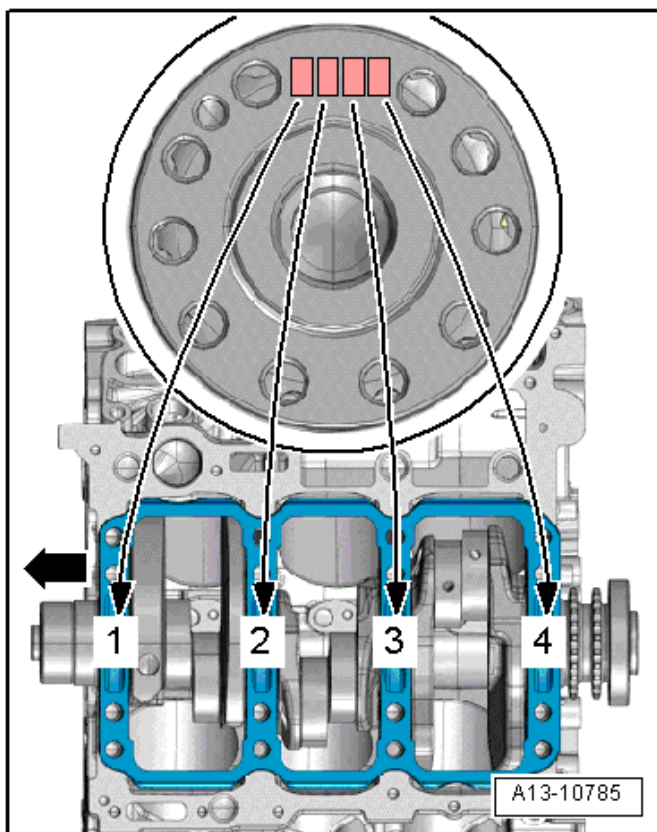
Allocation of Crankshaft Bearing Shells for Cylinder Block



Bearing shells with the correct thickness are allocated to the cylinder block in the factory. Colored dots on the bearing shells identify bearing shell thickness. The ➔ points to the belt pulley side. The allocation of the bearing shells to the cylinder block is identified with a letter by each bearing.

Letter on cylinder block	Color of bearing
R	Red
G	Yellow
B	Blue

Allocation of Crankshaft Bearing Shells for Guide Frame



Bearing shells with the correct thickness are allocated to the bearing cap at the factory. Colored dots on sides of bearing shells serve for identifying bearing shell thickness. Allocation of bearing shells to guide frame is marked on flywheel flange of crankshaft by a row of letters. The first letter of the row of letters represents bearing “1” the second letter is for bearing “2”, etc.

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

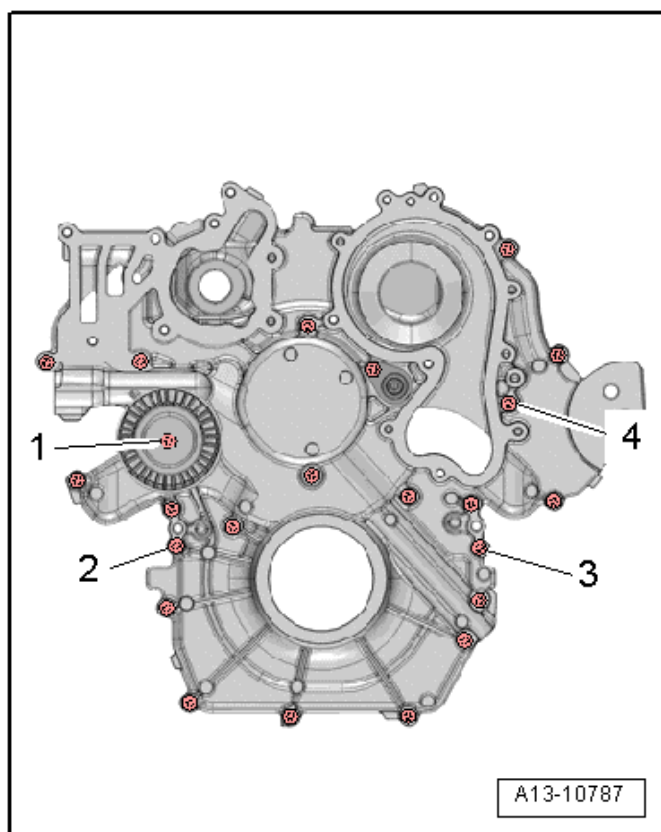
Fastener Tightening Specifications

Component	Fastener Size	Nm
Bracket for the assemblies		
Tighten in 2 stages: • 5 Nm in a diagonal sequence • 40 Nm in a diagonal sequence	-	
Connecting rod bearing cap-to-connecting rod ¹⁾ ²⁾	-	35 plus an additional 90° (¼ turn)
Cover for the belt pulley side sealing flange	-	9
Drive plate-to-crankshaft ¹⁾	-	60 plus an additional 90° (¼ turn)
Generator bracket-to-engine		
Tighten in 2 stages: • 5 Nm in a diagonal sequence • 40 Nm in a diagonal sequence	-	
Idler roller for the ribbed belt		23
Idler roller-to-engine		23
Oil spray jet for piston cooling	-	9
Oil temperature sensor 2-to-sealing flange	-	9
Ribbed belt tensioner-to-engine ¹⁾	-	50 plus an additional 90° (¼ turn)
Vibration damper-to-crankshaft ¹⁾	-	20 plus an additional 90° (¼ turn)

¹⁾ Replace fastener(s).

²⁾ Lubricate the thread and contact surface

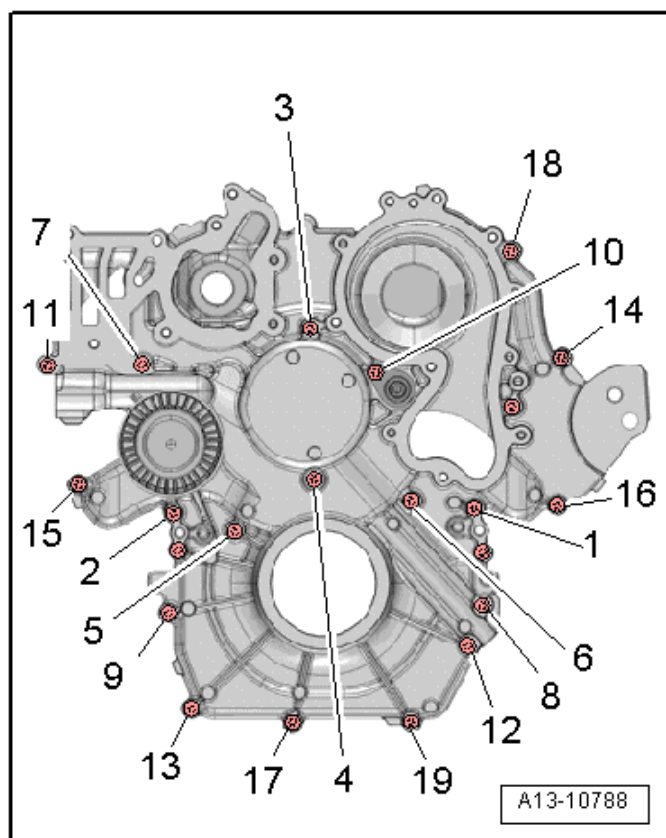
Ribbed Belt Pulley Side Sealing Flange Tightening Specification



Replace the bolts that have been tightened to additional torque. There is a risk of damaging the aluminum bolts when installing the sealing flange. Aluminum bolts must not be used to tighten the sealing flange to the cylinder block. Therefore prepare 3 M6x20 steel bolts to tighten the sealing flange as instructed as follows. Tighten the bolts in 11 steps in the sequence shown.

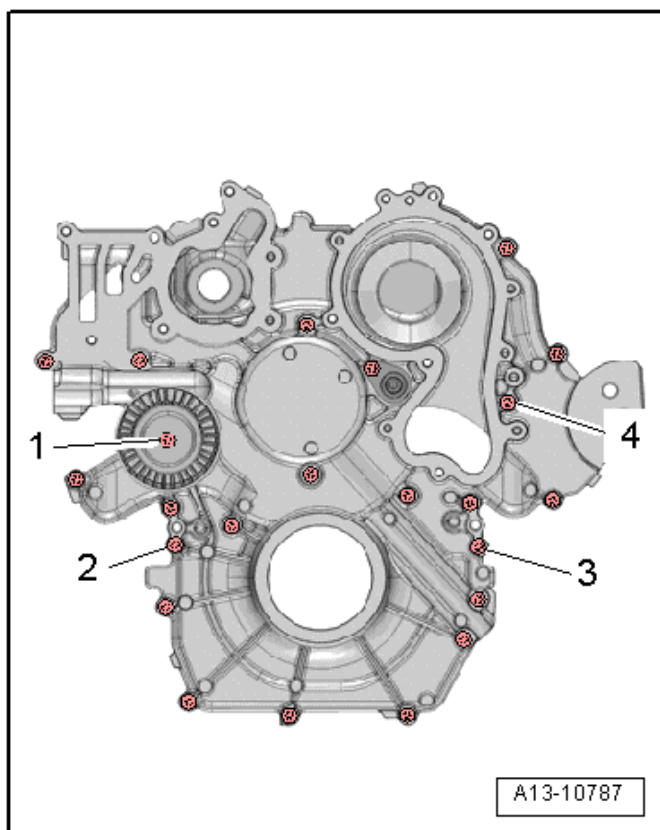
Step	Bolts	Nm
1	Tighten bolts in a diagonal sequence	Attach the sealing flange with the seal to the cylinder block
2	1	23
3	2, 3, 4	M6 x 20 to 9 Nm

Ribbed Belt Pulley Side Sealing Flange Tightening Specification (cont'd)



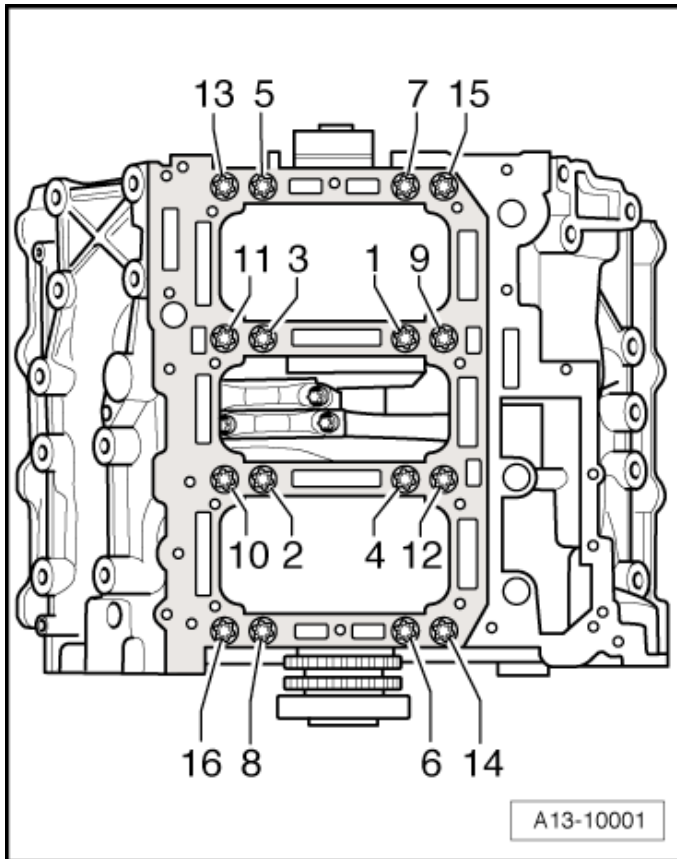
Step	Bolts	Nm
4		Insert a temperature regulator for the engine oil cooler with the cover
5	10	Install all the way in by hand.
6	1 through 19	3
7	1 through 19	3 Nm - this measurement accounts for the seal shrinkage
8	1 through 19	Tighten an additional turn 90°

Ribbed Belt Pulley Side Sealing Flange Tightening Specification (cont'd)



Step	Bolts	Nm
9	2, 3, 4	Remove the steel bolts M6 x 20
10	2, 3, 4	Insert the aluminum bolts and tighten to 3 Nm
11	2, 3, 4	Turn the aluminum bolts 90° further

Guide Frame Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 16 in sequence ¹⁾	30
2	Tighten bolts 1 through 16 in sequence	50
3	Tighten bolts 1 through 16 in sequence	an additional 180° (½ turn)

¹⁾ Replace fastener(s).

Crankshaft Dimensions

Honing dimension in mm	Crankshaft bearing pin diameter		Crankshaft connecting rod journal diameter	
Basic dimension	65.00	-0.022	60.00	-0.022
		-0.042		-0.042

Piston and Cylinder Dimensions

Honing dimensions in mm	Piston diameter	Cylinder bore diameter
Basic dimension	82.924 to 82.936 ¹⁾	83.006 to 83.014 ²⁾
Repair stage	82.964 to 82.976 ¹⁾	83.046 to 83.054 ²⁾

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

²⁾ Measure 50 mm inside the cylinder bore.

Piston Ring End Gaps

Piston ring dimensions in mm	New	Wear limit
1 st compression ring	0.25 to 0.40	0.60
2 nd compression ring	0.70 to 0.90	1.20
Oil scraping ring	0.25 to 0.50	0.70

Piston Ring Clearance

Piston ring dimensions in mm	New	Wear limit
1 st compression ring	0.09 to 0.130	0.160
2 nd compression ring	0.05 to 0.09	0.11
Oil scraping ring	0.03 to 0.09	0.10

Cylinder Head, Valvetrain – 3.0L CNRB (TDI)

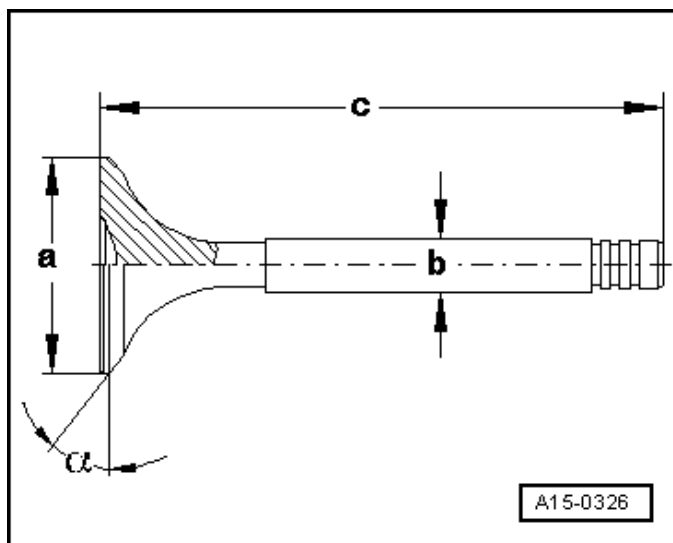
Fastener Tightening Specifications

Component	Nm
Balance weight belt pulley side bolt	60
Balance weight transmission side	30 plus an additional 90° (¼ turn)
Bracket-to-cylinder head bolt	23
Camshaft chain sprocket-to-camshaft bolt	23
Chain tensioner for camshaft timing chain ¹⁾	5 plus an additional 90° (¼ turn)
Chain tensioner with glide track-to-engine ¹⁾	5 plus an additional 90° (¼ turn)
Guide rail guide bolt ¹⁾	5 plus an additional 90° (¼ turn)
Drive sprocket for the balance shaft	23
Drive sprocket-to-oil pump ¹⁾	30 plus an additional 45° (⅛ turn)
Engine lifting eye-to-cylinder head	23
Gear carrier ²⁾	9
Heat shield-to-cylinder head cover	9
Jump protector-to-crankshaft	9

¹⁾ Replace fastener(s).

²⁾ Insert with locking compound.

Valve Dimensions



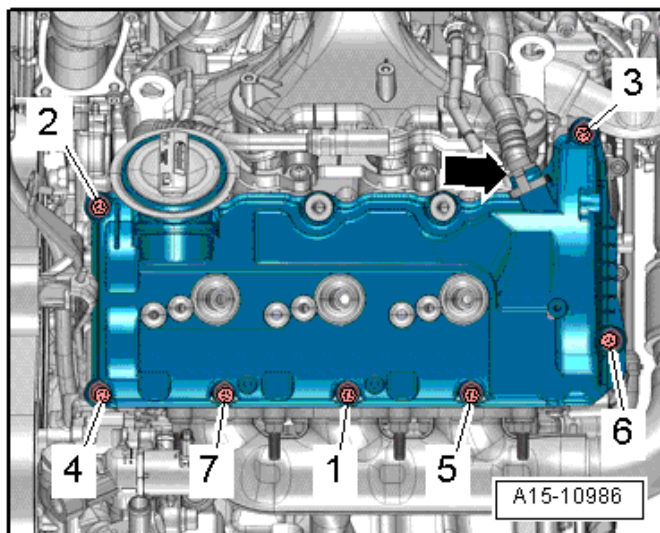
Dimension		Intake valve	Exhaust valve
Diameter a	mm	28.5 to 28.7	25.9 to 26.1
Diameter b	mm	5.968 to 5.982	5.958 to 5.972
c	mm	97.2 to 97.4	99.0 to 99.2
α	$^{\circ}$	45° 10'	45° 10'

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

Compression Pressures

Compression pressure	Bar pressure
New	28 to 33
Wear limit	21
Maximum difference between cylinders	5

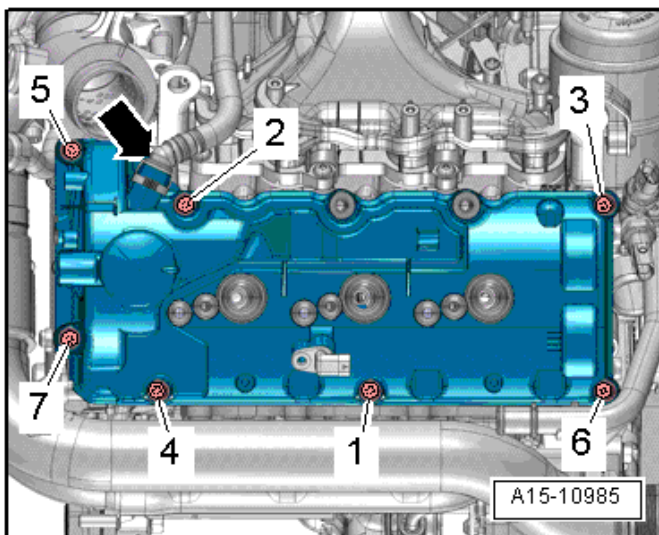
Left Cylinder Head Cover Tightening Specifications



Replace the bolts that have been tightened to additional torque.

Step	Component	Nm
1	Tighten bolts 1 through 7 in sequence	Hand-tighten
2	Tighten bolts 1 through 7 in sequence	8
3	Tighten bolts 1 through 7 in sequence	an additional 90° (¼ turn)

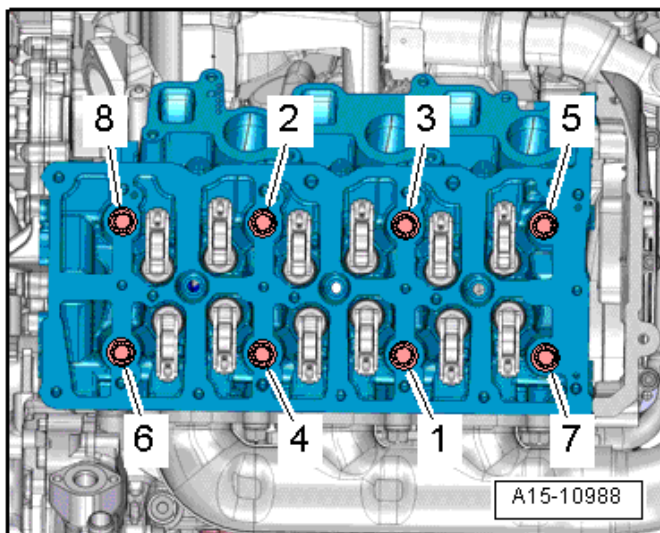
Right Cylinder Head Cover Tightening Specifications



Replace the bolts that have been tightened to additional torque.

Step	Component	Nm
1	Tighten bolts 1 through 7 in sequence	Hand-tighten
2	Tighten bolts 1 through 7 in sequence	8
3	Tighten bolts 1 through 7 in sequence	an additional 90° (¼ turn)

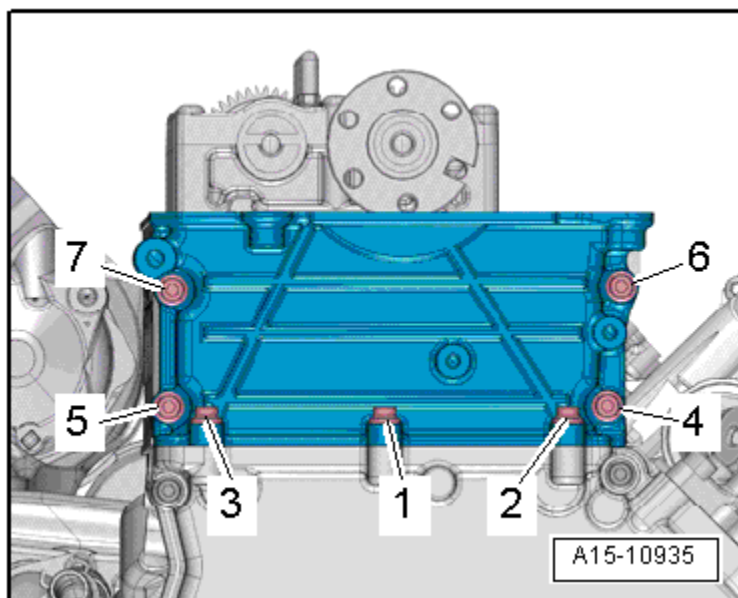
Cylinder Head Tightening Specifications



Replace the bolts that have been tightened to additional torque.

Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	Hand-tighten
2	Tighten bolts 1 through 8 in sequence	35
3	Tighten bolts 1 through 8 in sequence	70
4	Tighten bolts 1 through 8 in sequence	an additional 90° (¼ turn)
5	Tighten bolts 1 through 8 in sequence	an additional 90° (¼ turn)

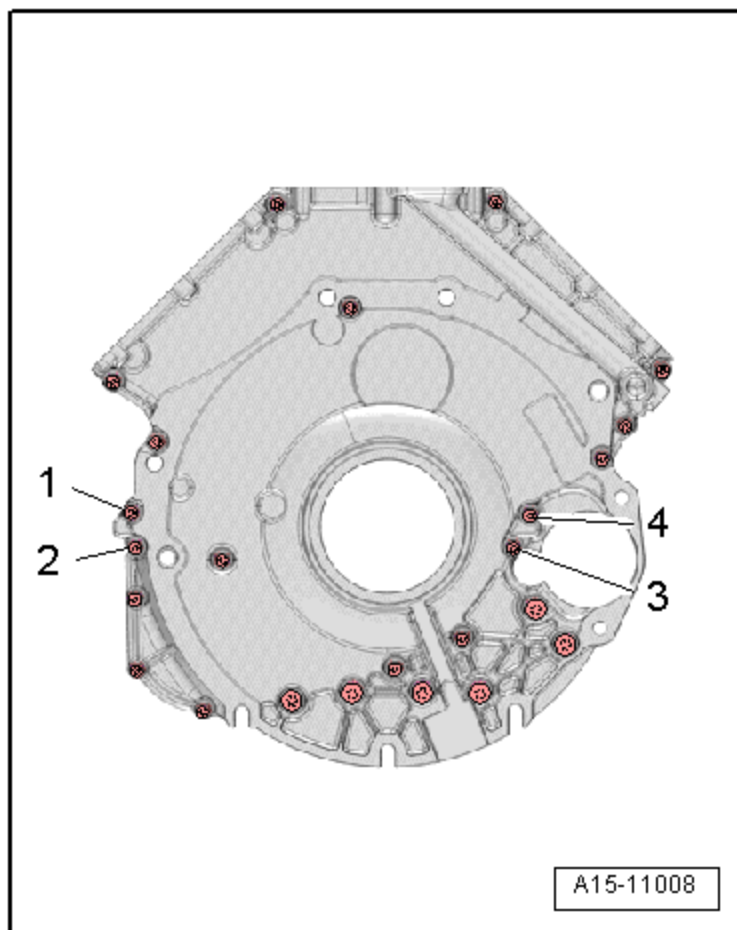
Upper Timing Chain Cover Tightening Specifications



Replace the bolts that have been tightened to additional torque

Step	Component	Nm
1	Tighten bolts 1 through 3 in sequence	Hand-tighten
2	Tighten bolts 4 through 7 in sequence	Hand-tighten
3	Tighten bolts 1 through 7 in sequence	8
4	Tighten bolts 1 through 7 in sequence	8 Nm - this measurement takes into account the timing chain guard shrinkage.
5	Tighten bolts 1 through 7 in sequence	an additional 90° (¼ turn)

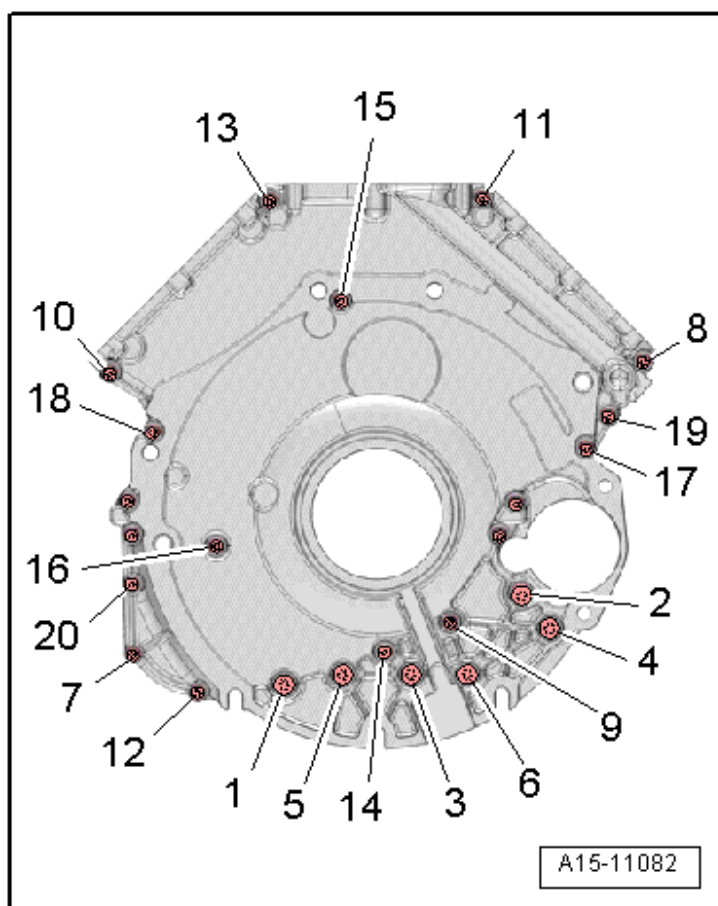
Lower Timing Chain Cover Tightening Specifications



Replace the bolts that have been tightened to additional torque.

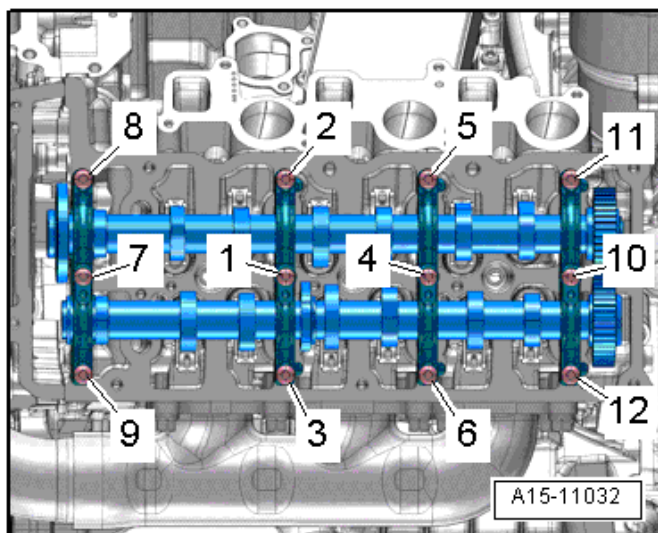
Step	Component	Fastener Size	Nm
1		-	Attaching the timing chain guard lower section with the sealant and the sealing pieces to the cylinder block
2	Tighten bolts 1 - 4 in sequence	M26x20	9

Lower Timing Chain Cover Tightening Specifications (cont'd)



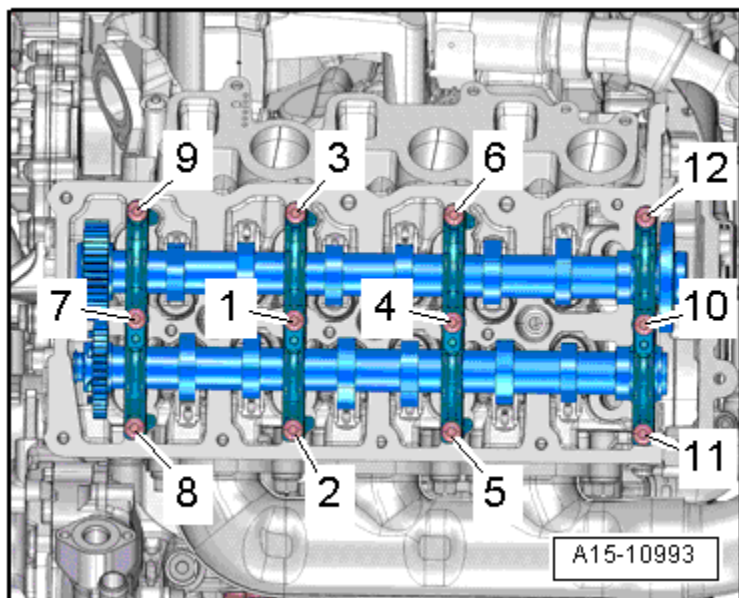
Step	Component	Nm
3	Tighten bolts 1 through 20 in sequence	3
4	Tighten bolts 1 through 20 in sequence	3 Nm - this measurement takes into account the timing chain guard lower section shrinkage
5	Tighten bolts 1 through 6 in sequence	8
6	Tighten bolts 1 through 20 in sequence	an additional 90° (¼ turn)

Cylinder Bank 1 (Right) Bearing Cap Tightening Specifications



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

Cylinder Bank 2 (Left) Bearing Cap Tightening Specifications



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

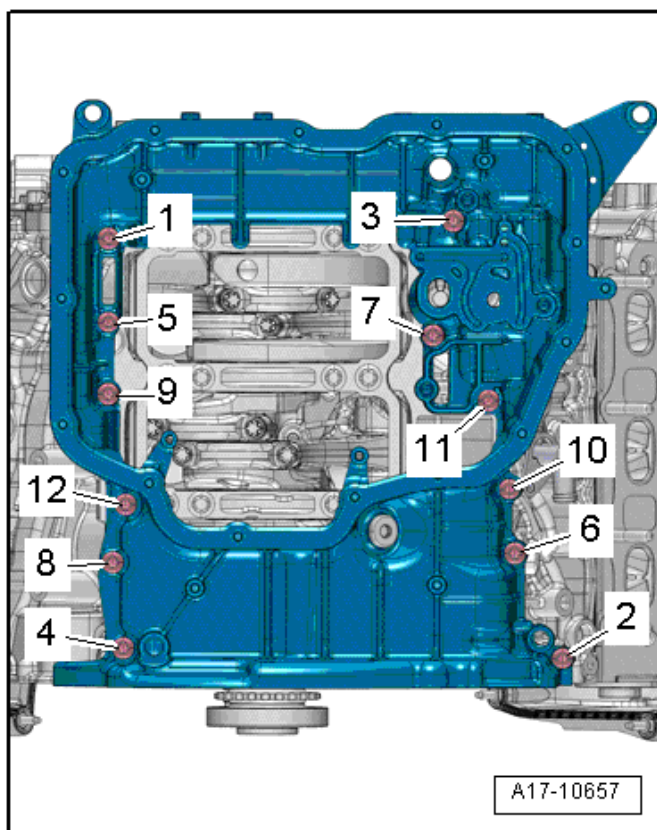
Lubrication – 3.0L CNRB (TDI)

Fastener Tightening Specifications

Component	Nm
Cap-to-oil filter housing	35
Chain sprocket-to-support ¹⁾	30 plus an additional 45° ($\frac{1}{8}$ turn)
Cover for the temperature regulator for the engine oil cooler-to-engine ¹⁾	3 plus an additional 90° ($\frac{1}{4}$ turn)
Coolant switch-off valve-to-mounting plate bolt	9
Drain plug	25
Engine oil cooler-to-mounting plate	9
Guide tube-to-engine	9
Mounting plate-to-engine oil cooler	9
Oil baffle bolt ¹⁾	3 plus an additional 90° ($\frac{1}{4}$ turn)
Oil drain plug	30
Oil level thermal sensor-to-lower oil pan nut	9
Oil pressure regulation valve-to-upper oil pan	9
Oil pressure switch-to-oil filter housing	9
Oil pressure switch-to-oil filter housing	20
Oil return pipe-to-oil pump	9
Reduced oil pressure switch-to-oil filter housing	20
Suction pipe to oil pump	9
Vacuum line bolt	9
Vacuum line-to-upper oil pan bolt ¹⁾	3 plus an additional 45° ($\frac{1}{8}$ turn)

¹⁾ Replace fastener(s).

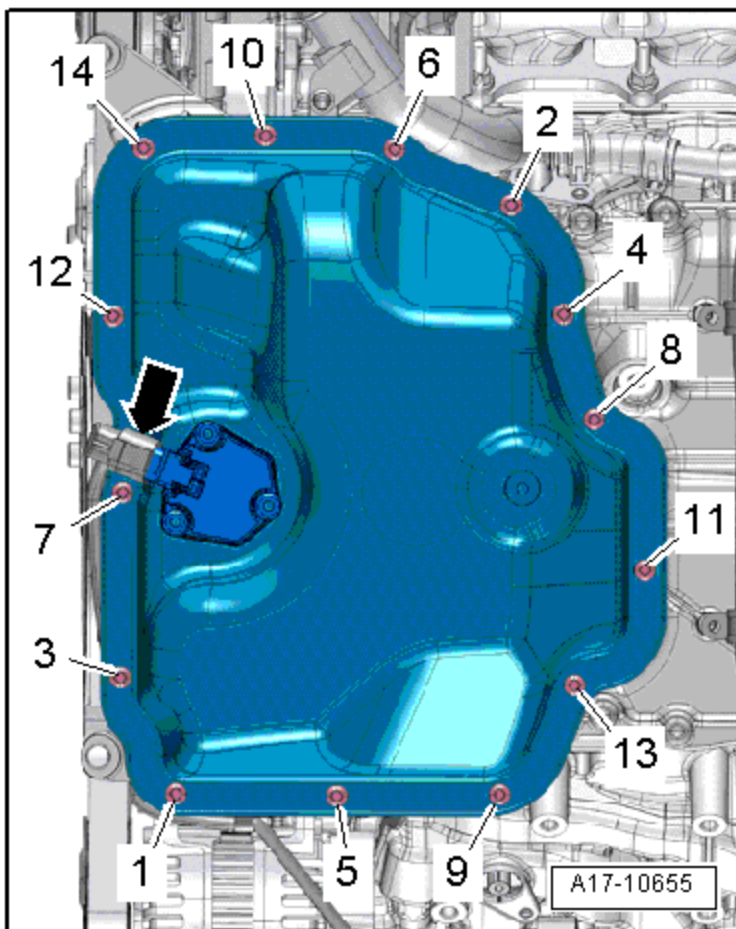
Upper Oil Pan Tightening Specifications



Replace the bolts that have been tightened to additional torque.

Step	Component	Nm
1	Tighten bolts 1 through 12 in a diagonal sequence	2
2	Tighten bolts 1 through 12 in a diagonal sequence	5
3	Tighten bolts 1 through 12 in a diagonal sequence	an additional 90° (¼ turn)

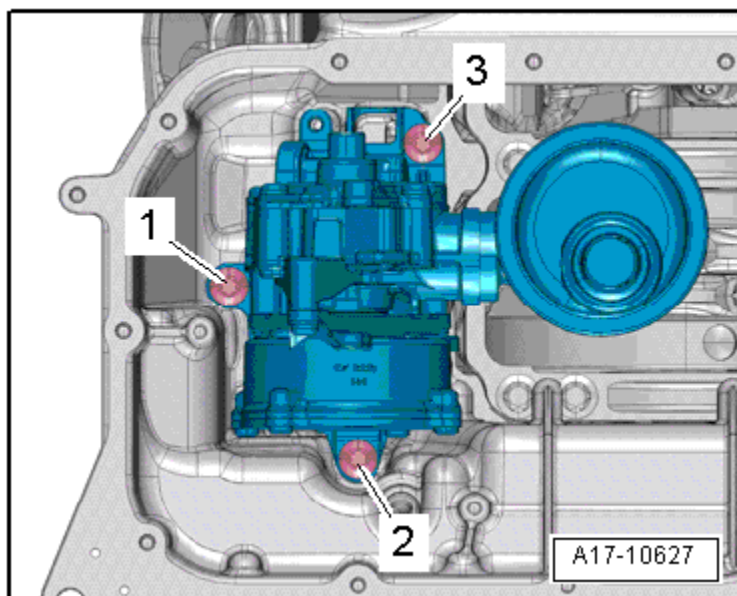
Lower Oil Pan Tightening Specifications



Replace the bolts that have been tightened to additional torque.

Step	Component	Nm
1	Tighten bolts 1 through 14 in a diagonal sequence	2
2	Tighten bolts 1 through 14 in a diagonal sequence	3
3	Tighten bolts 1 through 14 in a diagonal sequence	an additional 90° (¼ turn)

Oil Pan Tightening Specifications



Replace the bolts that have been tightened to additional torque.

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

Cooling System – 3.0L CNRB (TDI)

Fastener Tightening Specifications

Component	Nm
Bracket for transmission coolant valve-to-transmission ³⁾	
- Bolt	9
- Bolt	23
Check valve-to-cylinder	9
Coolant connection-to-engine	9
Coolant pipe on the left side of the transmission-to-transmission	9
Coolant pipes-to-cylinder head bank 2 (left)	
- Banjo bolt	12
- Bolt	9
Coolant pump ribbed belt pulley-to-coolant pump	23
Coolant pump-to-engine ^{1) 2)}	3 plus an additional 90° (¼ turn)
Coolant switch-off valve-to-mounting plate	9
Engine coolant temperature sensor-to-engine	9
Engine temperature control sensor-to-engine	9
Fan shroud-to-coolant fan	10
Fan shroud-to-coolant fan 2 ⁴⁾	
- Bolt	5
- Bolt	10
Front coolant pipe-to-engine	9
Grommet-to-radiator	5.5
Left coolant pipe-to-engine	9
Left upper coolant pipe on the transmission-to-transmission	9
Lower left coolant pipe-to-engine	9
Transmission coolant valve-to-bracket	9
Upper coolant pipe-to-engine	9

¹⁾ Replace fastener(s).

²⁾ Fasten in diagonal sequence in steps

³⁾ For bolt tightening clarification, refer to ElsaWeb, *Coolant Pipe on Transmission Overview*, items 14 and 16.

⁴⁾ For bolt tightening clarification, refer to ElsaWeb, *Fan Shroud and Coolant Fan Overview*, items 2 and 3.

Fuel Supply – 3.0L CNRB (TDI)

Fastener Tightening Specifications

Component	Nm
Accelerator Pedal Position (APP) module bolt	10
Bracket for auxiliary fuel pump, nut	9
Bracket for fuel filter, nut	9
Carrier plate bolt	33
Filter housing cover	
- Bleeder screw	5
- Bolt	8
Fuel filter housing, bolt/nut	8
Fuel cooler-to-bracket, bolt/nut	8
Fuel Pump Control Module -J538- for vehicles with a Horizontal Fuel Filter	3.5
Fuel tank ¹⁾	
- Bolt	5
- Bolt	9
Locking Flange Cover	9
Locking ring	110
Protective plate for fuel filler tube, nut	9
Securing strap bolt	33

¹⁾ For bolt tightening clarification, refer to ElsaWeb, *Fuel Tank with Attachments with Reducing Agent Metering System Overview*, items 12 and 14.

Turbocharger, G-Charger – 3.0L CNRB (TDI)

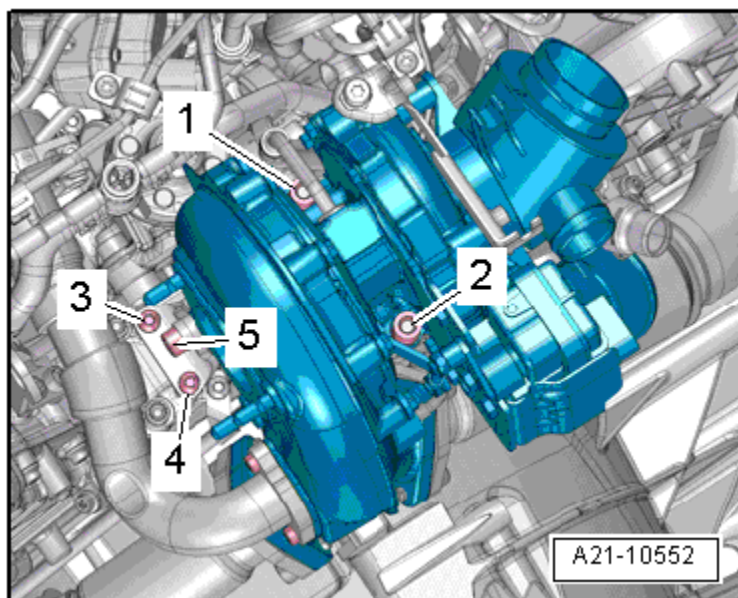
Fastener Tightening Specifications

Component	Nm
Bracket for electric connector and engine cover-to-turbocharger	9
Bracket for turbocharger	
- Stud bolt ²⁾	10
- Bolt ¹⁾	23
Charge air pressure sensor/intake air temperature sensor-to-connection	9
Clamp 9 mm wide	3
Clamp 13 mm wide	5.5
Connection for air guide hose-to-turbocharger	9
Connection-to-charge air cooler	9
Right air duct pipe	9
Sleeve-to-air duct pipe in the center	5.5
Sleeve-to-lower air duct pipe	9

¹⁾ Tighten lastly in diagonal sequence and in stages

²⁾ Replace nuts after each time they are loosened

Turbocharger Tightening Specifications



Replace stud bolts and nuts

Step	Component	Nm
1	Stud bolts for the nuts 1, 2	10
2	1, 2	Hand-tighten
3	1, 2	9
4	1, 2	an additional 90° (¼ turn)
5	3, 4, 5	Hand-tighten
6	3, 4	9
7	5	23

Exhaust System – 3.0L CNRB (TDI)

Fastener Tightening Specifications

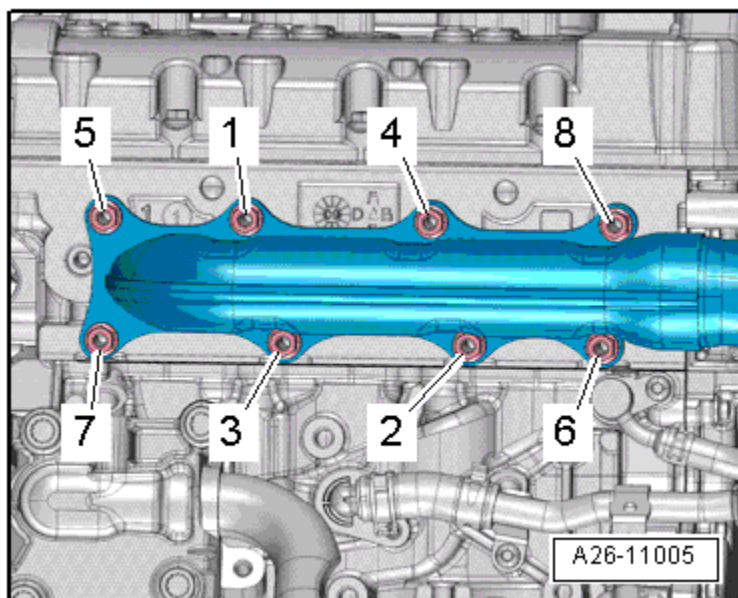
Component	Nm
Active tank to body	9
Bleeder screw	8
Bracket for the preliminary catalytic converter-to-body	23
Bracket for the preliminary catalytic converter-to-particulate filter nut ¹⁾	23
Bracket for reducing agent metering system control module nut-to-body	2
Clamp-to-SCR - catalytic converter	5
Exhaust gas recirculation cooler-to-engine	9
Exhaust gas recirculation motor-to-connection	9
Exhaust gas temperature sensor ¹⁾	45
Exhaust manifold-to-engine nut ¹⁾	25
Exhaust manifold-to-primary catalytic converter ¹⁾²⁾	30 + 90°
Exhaust pressure sensor	23
Engine temperature control sensor-to-connection	9
Mounting straps-to-body ³⁾	
	35
	60
Particle sensor ¹⁾	50
Primary catalytic converter to bracket for the preliminary catalytic converter	23
Reducing agent metering system control module nut-to-bracket	2
Reducing agent metering system pressure sensor -G686- version 1	8
Reducing agent metering system pressure sensor -G686- version 2	1.5
Reducing agent pump to active tank	1.8
Reducing agent tank cap switch	0.6
Reducing agent transfer pump-to-passive tank	1.8
Suspended mount-to-body	23
Tail pipe-to-rear muffler	60
Underbody protection lock washer-to-passive tank	1.5

¹⁾ Coat the thread with hot bolt paste

²⁾ Replace fastener(s).

³⁾ For bolt tightening clarification, refer to ElsaWeb, *Reducing Agent Tank Overview*, items 3, 5 and 14.

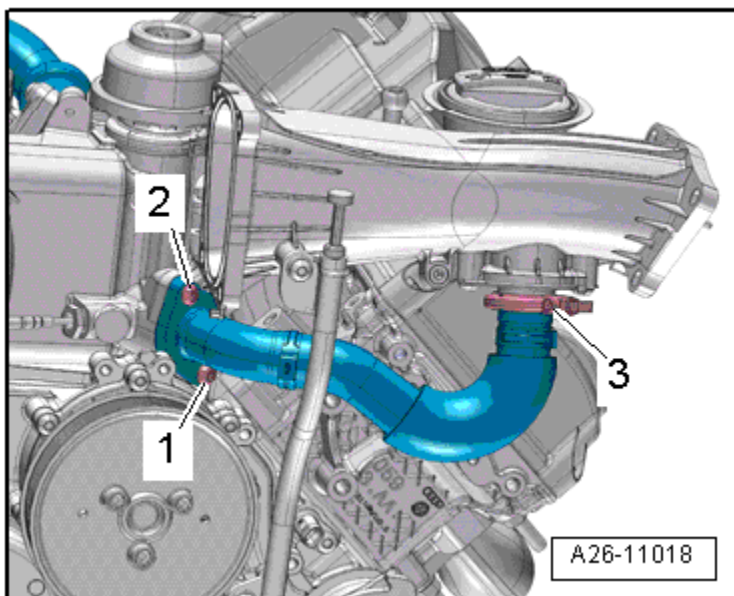
Exhaust Manifold Tightening Specifications



Replace nuts. Coat the nut thread with hot bolt paste. Refer to the Parts Catalog.

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

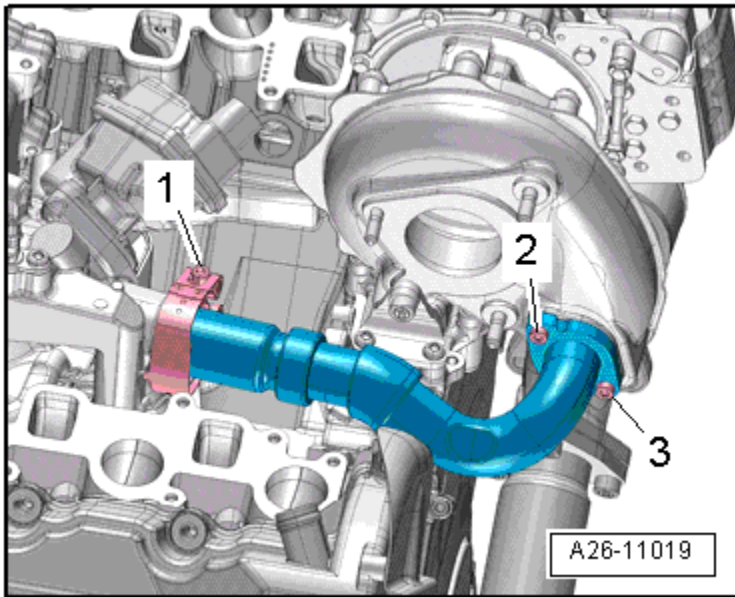
EGR Pipe at the Intake Manifold Tightening Specifications



Coat the screw thread with hot bolt past. Refer to the Parts Catalog.

Step	Bolts/screw-type clamps	Nm
1	1, 2	Hand-tighten
2	3	2.5
3	1, 2	9
4	2, 3	an additional 90° (¼ turn)

EGR Pipe at the Turbocharger Tightening Specifications



Coat the screw thread with hot bolt past. Refer to the Parts Catalog.

Step	Bolts/screw-type clamps	Nm
1	2, 3	Hand-tighten
2	1	6
3	2, 3	5
4	2, 3	an additional 90° (¼ turn)

Diesel Fuel Injection – 3.0L CNRB (TDI)

Fastener Tightening Specifications

Component	Nm
Bracket for the air guide pipe-to-air guide pipe bolt	9
Bracket for the electrical connector to Intake Manifold bolt	4
Charge air pressure sensor / intake air temperature sensor bolt	5
Clamp for high pressure line	9
Counter Pin	
- On camshaft bearing	2.5
- On cylinder head	9
Differential pressure sensor nut	3.5
Exhaust gas temperature sensor ²⁾	45
Engine support adapter to high pressure pump nut	70
Fuel rail bolt	22
Fuel temperature sensor	2
Guide pin	
- On camshaft bearing	2.5
- On cylinder head	9
High pressure line union nut ¹⁾	25
High pressure pump bolt	22
Hose connection ring-to-fuel rail banjo bolt	25
Intake flap motor-to-bracket exhaust gas recirculation cooler switch-over valve bolt	9
Lower Air Filter Housing bolt	10
Mass airflow sensor-to-upper air filter housing bolt	1.5
Mounting pins for engine cover	1.5
NOx sensor nut	2.5
Particulate sensor ²⁾	50
Particulate sensor-to-CR - catalytic converter nut	3.5
Pipe for Exhaust Gas Recirculation (EGR) system-to-air guide pipe bolt	9
Pressure line to particulate filter	45
Oxygen sensor	50
Tensioning claw bolt	
- First tightening	6
- Second tightening	90° (¼ turn)
Wiring guide-to-intake manifold bolt	4

¹⁾ Coat the union nut threads with clean engine oil

²⁾ Coat with hot bolt paste.

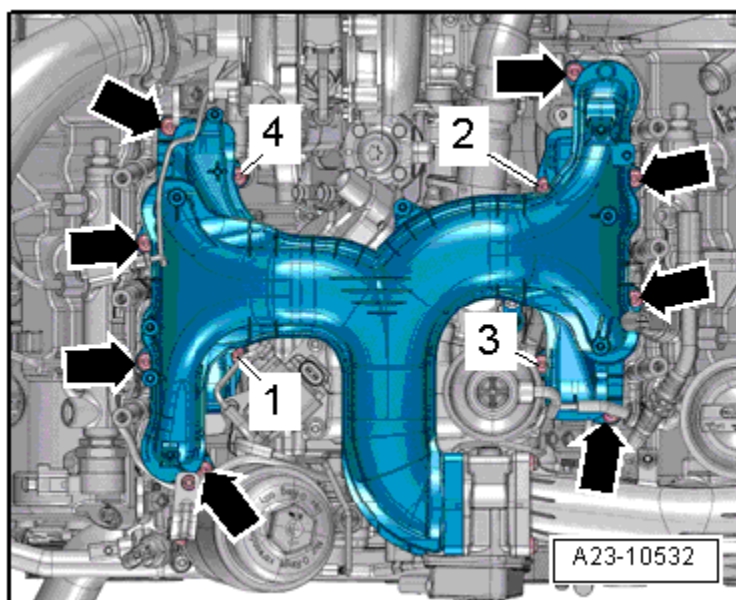
Fuel Pressure Regulator Valve Tightening Specifications

Step	Nm
1	Hand-tighten
2	60
3	Turn back 180°
4	85

Fuel Pressure Sensor Tightening Specifications

Step	Nm
1	Hand-tighten
2	60
3	Turn back 180°
4	85

Intake Manifold Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 4 in sequence and arrows	Hand-tighten
2	Tighten bolts 1 through 4 in sequence	5
3	Tighten arrows in any sequence	9

Ignition/Glow Plug System – 3.0L CNRB (TDI)

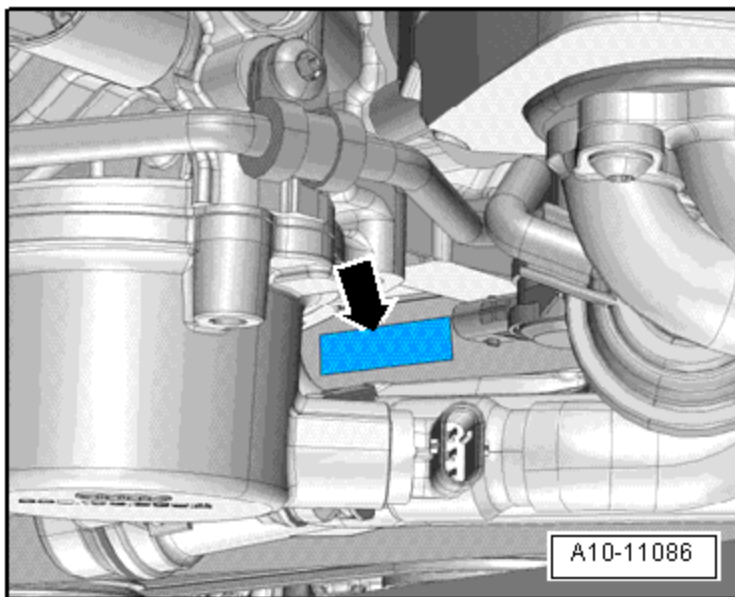
Fastener Tightening Specifications

Component	Nm
Camshaft position sensor bolt	9
Engine speed sensor bolt	9
Glow plug	12

ENGINE MECHANICAL – 3.0L CTWA, CTWB

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

**Engine – 3.0L
CTWA, CTWB**

Engine code		CTWB	CTWA
Displacement	liter	2.995	2.995
Output	kW at RPM	206 @ 4900-6500	245 @ 5500-6500
Torque	Nm at RPM	400 @ 1500-4900	440 @ 2900-5300
Bore	dia. mm	84.5	84.5
Stroke	mm	89.0	89.0
Compression ratio		10.5	10.5
Research Octane Number (RON)	minimum	98 ¹⁾	98 ¹⁾
Fuel injection system and ignition system		Simos	Simos
Ignition sequence		1-4-3-6-2-5	1-4-3-6-2-5
Exhaust Gas Recirculation (EGR)		no	no
Turbocharger, Supercharger		Supercharger	Supercharger
Knock Sensor (KS)		2 sensors	2 sensors
Charge Air Cooler (CAC)		Yes	Yes
Oxygen Sensor (O2S) regulation		2 sensors before catalytic converter 2 sensors after catalytic converter	2 sensors before catalytic converter 2 sensors after catalytic converter
Variable valve timing		Intake	Intake
Variable intake manifold		No	No
Secondary Air Injection (AIR) system		Yes	Yes
Valve per cylinder		4	4

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

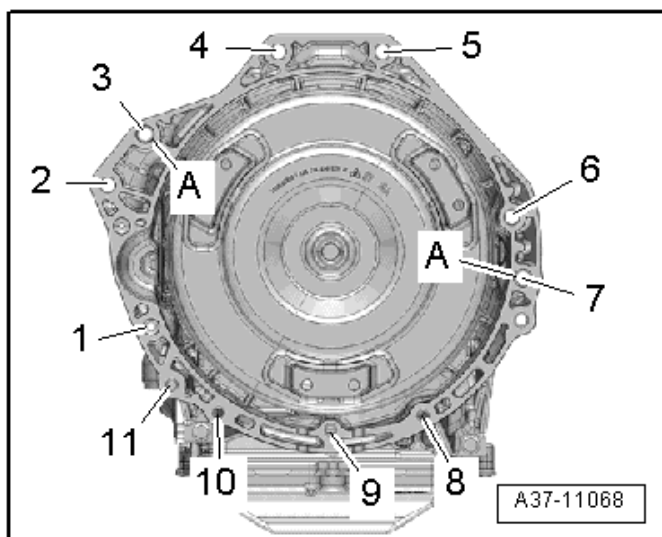
Engine Assembly – 3.0L CTWA, CTWB

Fastener Tightening Specifications

Component	Fastener size	Nm
Bolts and nuts	M6	9
	M7	15
	M8	20
	M10	40
	M12	65
Engine carrier-to-body bolt ¹⁾	-	120 plus an additional 180° (½ turn)
Engine mount, left	-	60
Engine mount, right	-	50
Ground connection on the right longitudinal member	-	15
Left engine support		
- Bolt	-	50
- Nut	-	75
Right engine support		
- Bolt	-	40
- Nut	-	75

¹⁾ Replace fastener(s).

Engine to Automatic Transmission

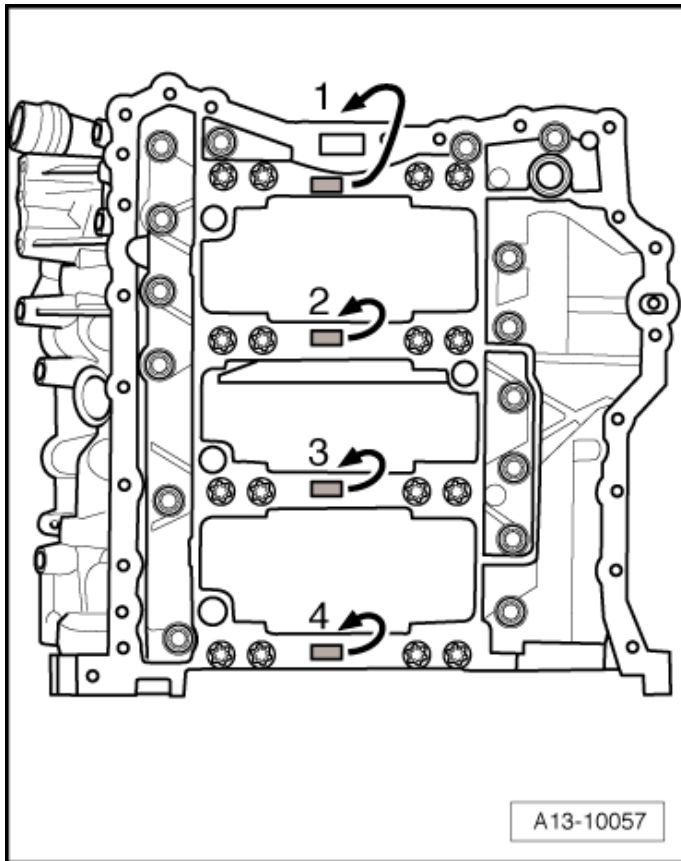


Engine – 3.0L
CTWA, CTWB

Item	Bolts ¹⁾	Nm
1	M10x95	15 plus an additional 90° (¼ turn)
2-5	M12x75	30 plus an additional 90° (¼ turn)
6, 7	M12x140	30 plus an additional 90° (¼ turn)
8, 9, 10	M10x60	15 plus an additional 90° (¼ turn)
11	M10x45	15 plus an additional 90° (¼ turn)
A	Alignment sleeves for centering	
¹⁾ Aluminum bolts may be used two times		

Crankshaft, Cylinder Block – 3.0L CTWA, CTWB

Allocation of Crankshaft Bearing Shells for Cylinder Block

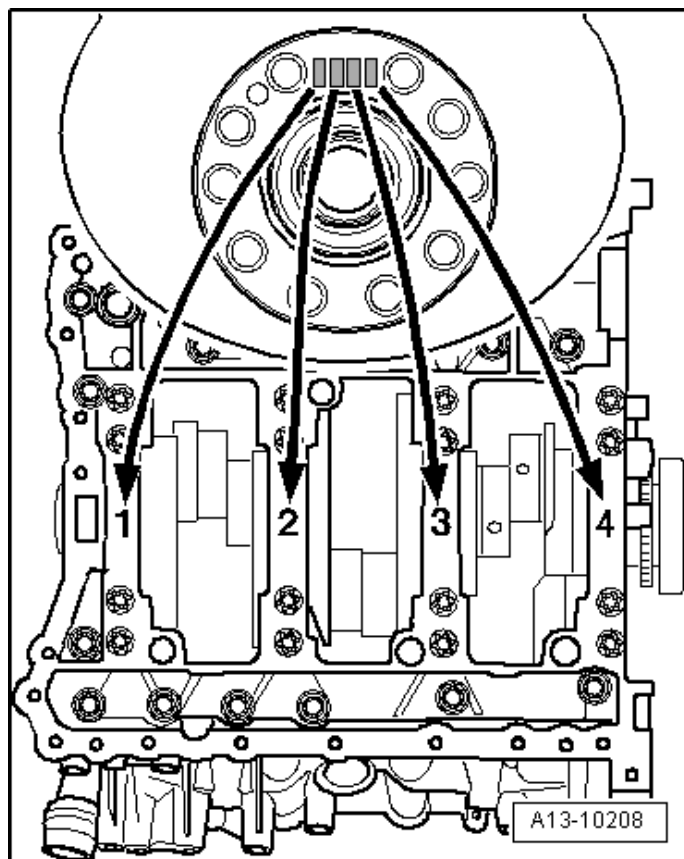


Bearing shells with the correct thickness are allocated to the cylinder block in the factory. Colored dots on the bearing shells identify bearing shell thickness. The ➔ points to the belt pulley side. The allocation of the bearing shells to the cylinder block is identified with a letter by each bearing.

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

Allocation of Crankshaft Bearing Shells for Guide Frame

Engine – 3.0L
CTWA, CTWB



Bearing shells with the correct thickness are allocated to the bearing cap at the factory. Colored dots on sides of bearing shells serve for identifying bearing shell thickness. Allocation of bearing shells to guide frame is marked on transmission flange of crankshaft by a row of letters. The first letter of the row of letters represents bearing "1", the second letter is for bearing "2", etc.

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

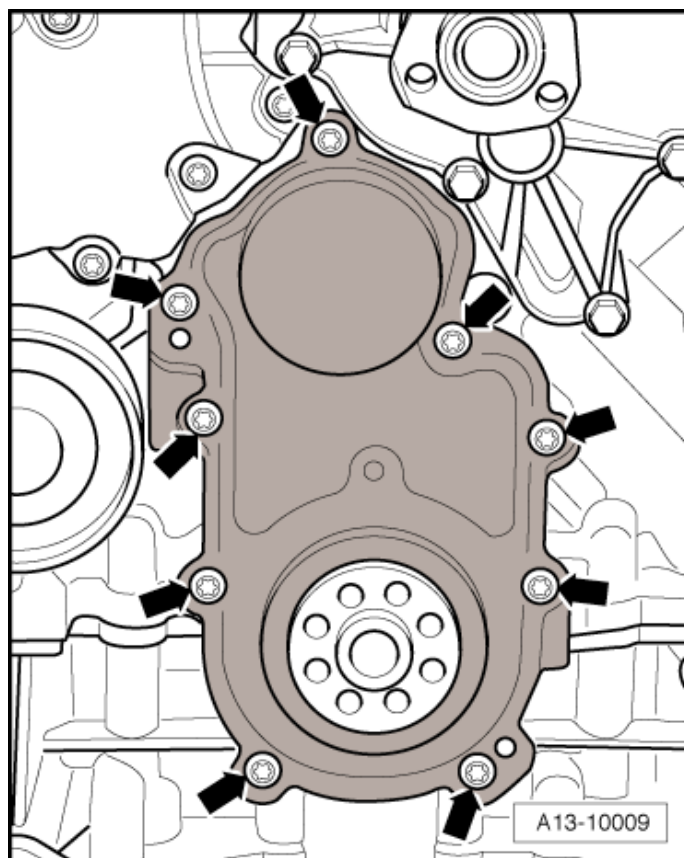
Fastener Tightening Specifications

Component	Nm
Bracket for generator	20
Connecting rod bearing cap bolt ¹⁾	50 plus an additional 90° (¼ turn)
Drive plate bolt ¹⁾	60 plus an additional 90° (¼ turn)
Idler roller for ribbed belt bolt	40
Idler roller for ribbed belt (supercharger) bolt	42
Oil spray jet for piston cooling	9
Tensioning element for ribbed belt bolt	40
Top Dead Center (TDC) marking locking bolt	14
Vibration damper-to-crankshaft bolt ¹⁾	20 plus an additional 90° (¼ turn)

¹⁾ Replace fastener(s).

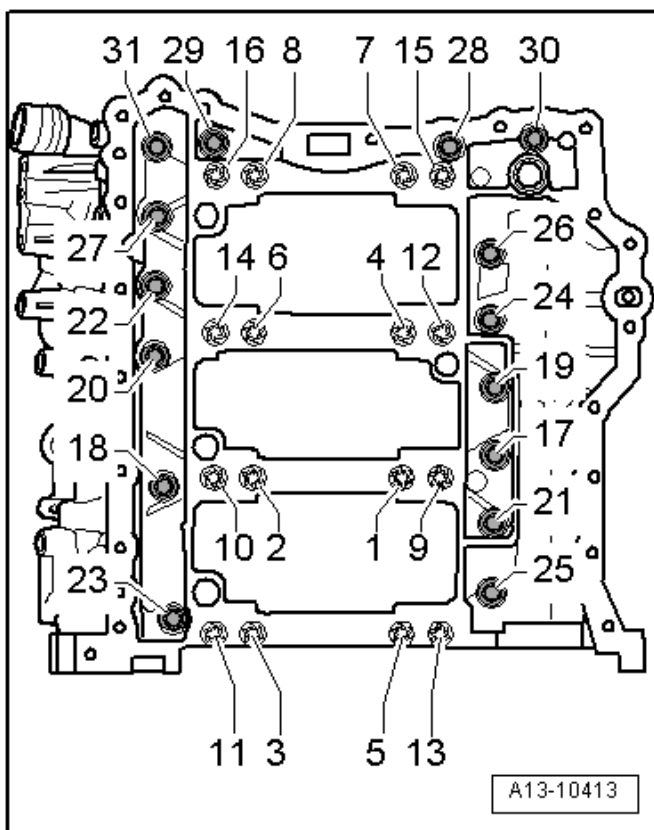
Ribbed Belt Sealing Flange Tightening Specification

Engine – 3.0L
CTWA, CTWB



Step	Component	Nm
1	Tighten the 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 (for guide frame sealing surfaces on cylinder block)	23

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
1 st compression ring	0.20 to 0.30	0.80
2 nd compression ring	0.50 to 0.70	0.80
Oil scraping ring	0.25 to 0.50	– ¹⁾

¹⁾ Not determined yet.

Piston Ring Clearance

Piston ring dimensions in mm	New	Wear limit
1 st compression ring	0.04 to 0.08	0.20
2 nd 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 CTWA, CTWB

Fastener Tightening Specifications

Component	Nm
Balance Shaft	60
Balance Shaft Chain Sprocket ¹⁾	15 plus an additional 90° (¼ turn)
Balance shaft bearing end bracket-to-cylinder block bolt	13
Bearing Plate for Drive Sprocket ¹⁾	8 plus an additional 45° (½ turn)
Bracket for Electrical Wires	9
Bearing Plate for the Right Camshaft Timing Chain Drive Sprocket ¹⁾	8 plus an additional 45° (½ turn)
Camshaft Adjuster for Intake Camshaft ¹⁾	80 plus an additional 90° (¼ turn)
Camshaft Adjustment Solenoid Valve	5
Camshaft Chain Sprocket for Exhaust Camshaft ¹⁾	80 plus an additional 90° (¼ turn)
Chain Tensioner	9
Chain Tensioner with Glide Track ¹⁾	10 plus an additional 45° (½ turn)
Drive Chain for Timing Mechanism ¹⁾	10 plus an additional 90° (¼ turn)
Drive Sprocket for Oil Pump ¹⁾	30 plus an additional 90° (¼ turn)
Guide Rail ^{1) 4)}	10 plus an additional 90° (¼ turn)
Guide Rail ^{1) 5)}	8 plus an additional 45° (½ turn)
Mounting Pin for Drive Sprocket ^{1) 2)}	5 plus an additional 60° (⅙ turn)
Mounting Pin for Drive Sprocket ^{1) 3)}	30 plus an additional 90° (¼ turn)
Oil dipstick guide tube	9

¹⁾ Replace fastener(s).

²⁾ For bolt tightening clarification, refer to ElsaWeb, *Timing Mechanism Drive Chain Overview*, items 3 and 4.

³⁾ For bolt tightening clarification, refer to ElsaWeb, *Timing Mechanism Drive Chain Overview*, items 14 and 15.

⁴⁾ For bolt tightening clarification, refer to ElsaWeb, *Timing Mechanism Drive Chain Overview*, items 1 and 2.

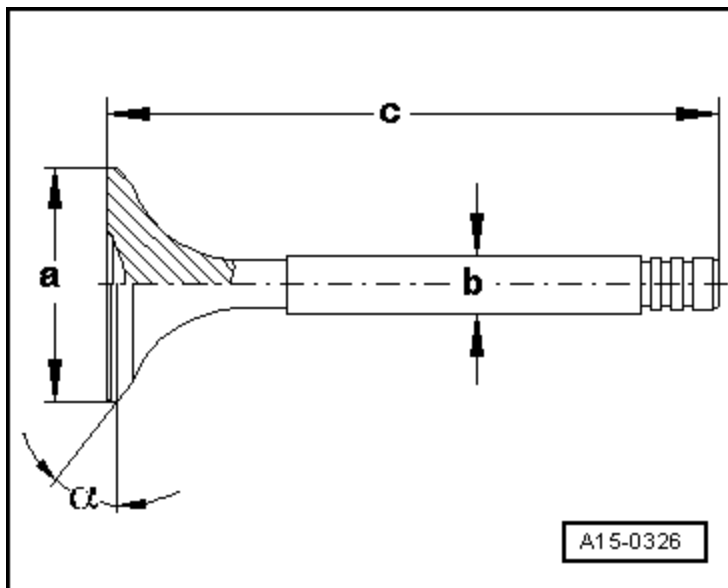
⁵⁾ For bolt tightening clarification, refer to ElsaWeb, *Timing Mechanism Drive Chain Overview*, items 9 and 10.

Compression Checking Specifications

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

Engine – 3.0L
CTWA, CTWB

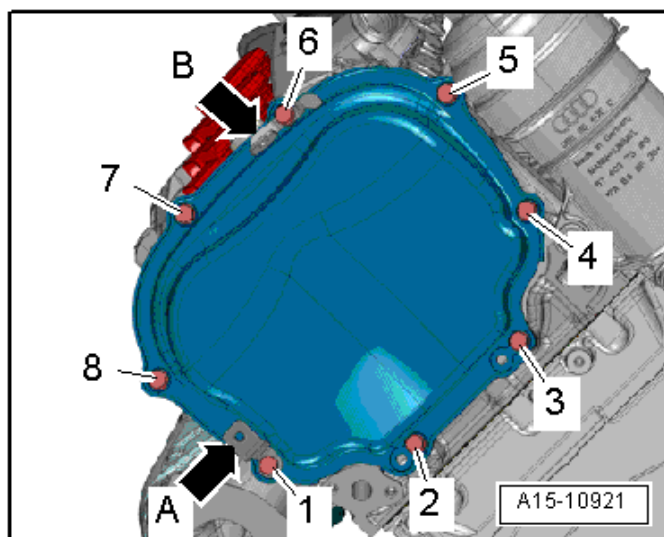
Valve Dimensions



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	\angle°	45	45

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

Left Timing Chain Cover Tightening Specifications

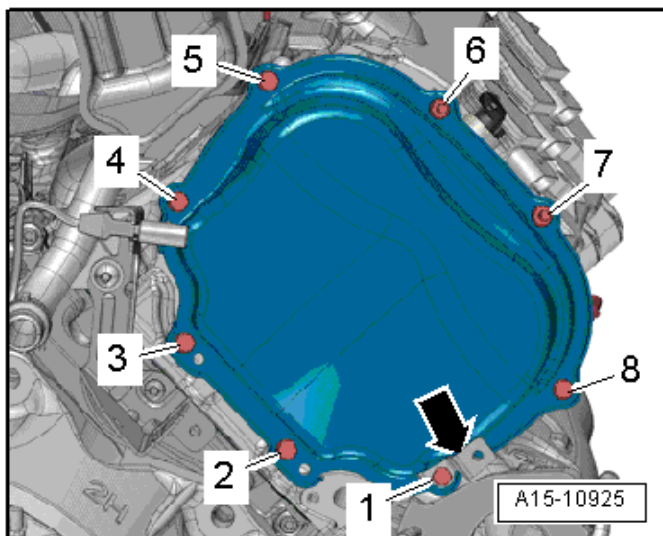


Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence (replace bolts)	5
2	Tighten bolts 1 through 8 in sequence	an additional 90° (¼ turn)

The brackets (A and B) are connected with the left timing chain cover.

Right Timing Chain Cover Tightening Specifications

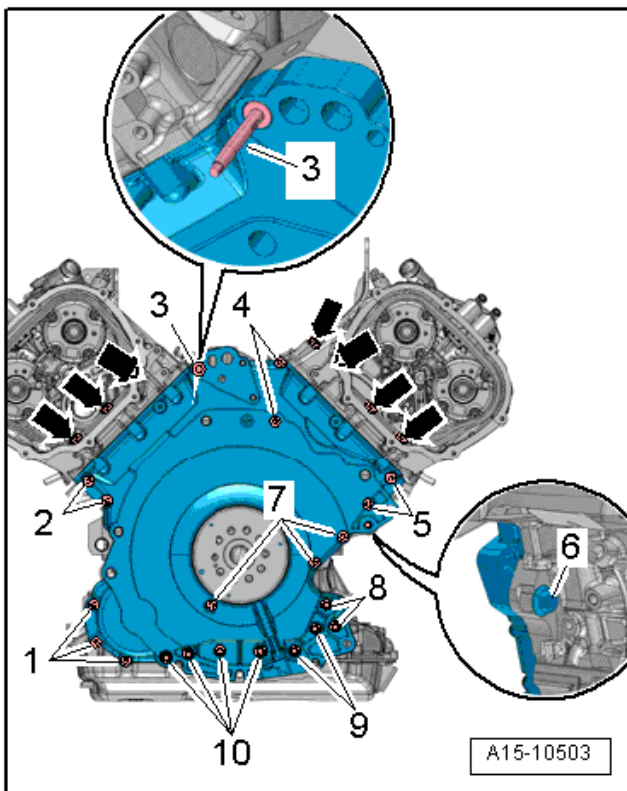
Engine – 3.0L
CTWA, CTWB



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

The bracket (➡) is connected with the right timing chain cover.

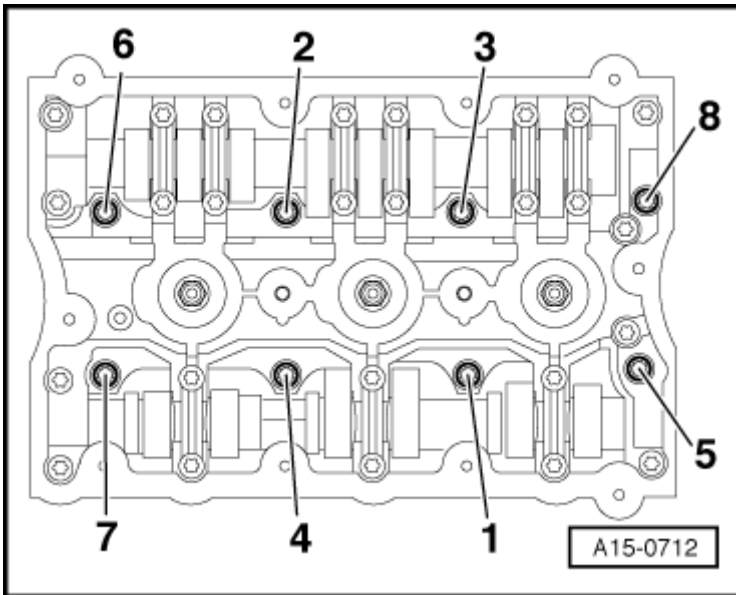
Lower Timing Chain Cover Tightening Specifications



Replace bolts that are tightened to the specification.

Step	Component	Nm
1	Tighten the bolts (➡)	3
2	Tighten bolts 1 through 10 in a diagonal sequence	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)

Cylinder Head Tightening Specifications

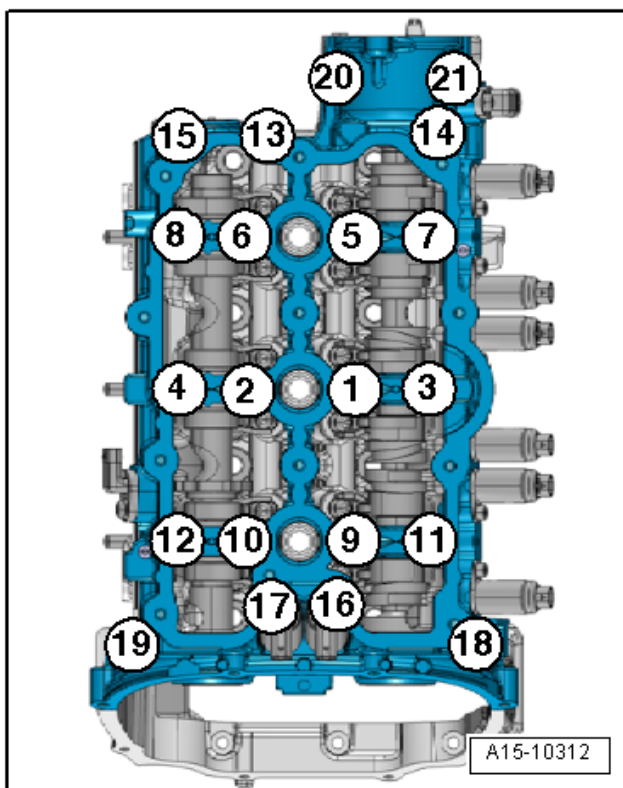


Engine – 3.0L
CTWA, CTWB

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

Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence (replace bolt)	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



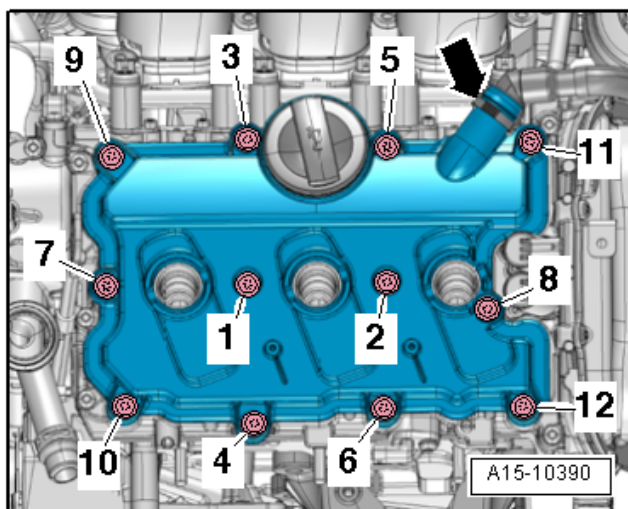
NOTE: The left cylinder head camshaft guide frame is shown.
The right cylinder head camshaft guide frame is identical.

Step	Component	Nm
1	Tighten bolts 1 through 21 in sequence	Hand-tighten ¹⁾²⁾
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 be in contact with the entire contact surface of the cylinder head.

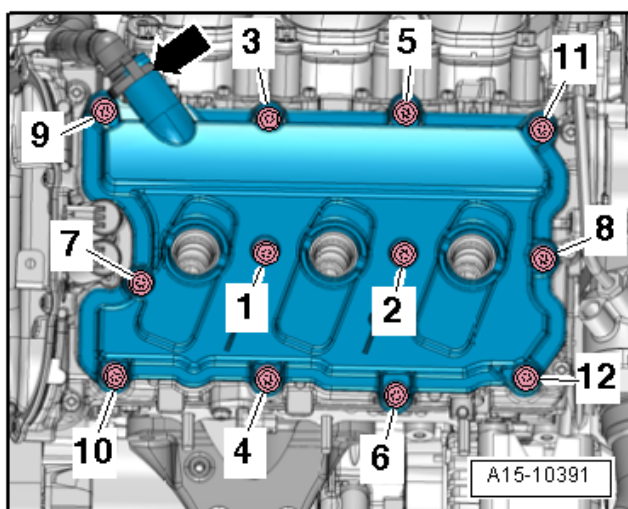
Left Cylinder Head Cover Tightening Specification



Engine – 3.0L
CTWA, CTWB

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

Engine Lubrication – 3.0L CTWA, CTWB

Fastener Tightening Specifications

Component	Nm
Bracket	9
Crankcase ventilation hose-to-oil separator cover bolt	3
Cover with oil separator	9
Engine oil cooler ¹⁾²⁾	3 plus an additional 90° (¼ turn)
	9
Lower oil baffle-to-upper oil pan bolt ¹⁾	3 plus an additional 90° (¼ turn)
Oil check valve	20
Oil drain plug	30
Oil filter housing ³⁾	
- Bolt	9
- Bolt	13
- Union nut	13
- Threaded pin	16
Oil filter housing cap	25
Oil level thermal sensor, nut	9
Oil pressure regulation valve	9
Oil pressure switch	20
Oil pump chain sprocket ¹⁾	30 plus an additional 90° (¼ turn)
Oil pump	20
Reduced oil pressure switch	20
Upper oil baffle-to-upper oil pan bolt ⁴⁾	9

¹⁾ Replace fastener(s).

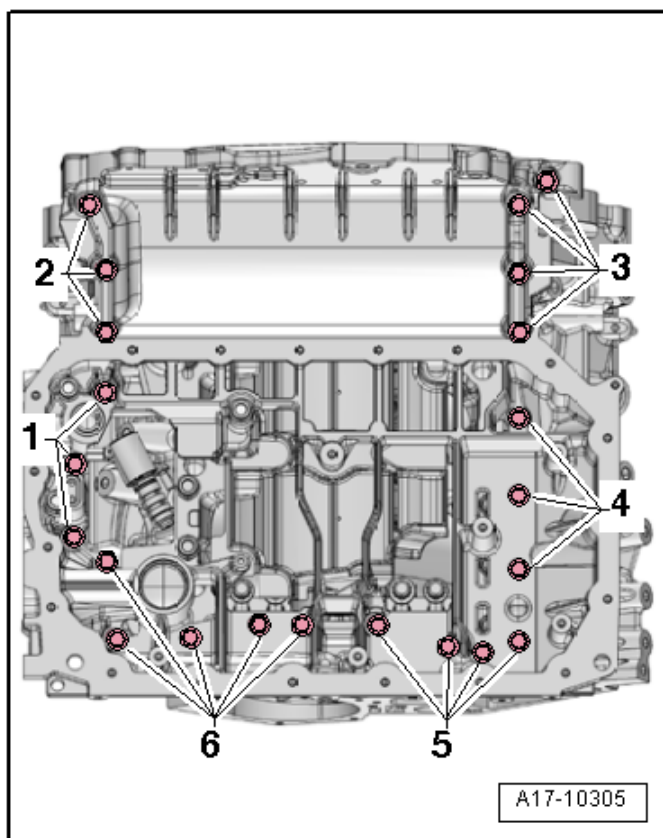
²⁾ For bolt tightening clarification, refer to ElsaWeb, *Upper and Lower Oil Pan Sections, Oil Pump and Oil Cooler Overview*, items 15 and 17.

³⁾ For bolt tightening clarification, refer to ElsaWeb, *Oil Filter Housing Overview*, items 1, 4, 5 and 13.

⁴⁾ Insert with locking compound.

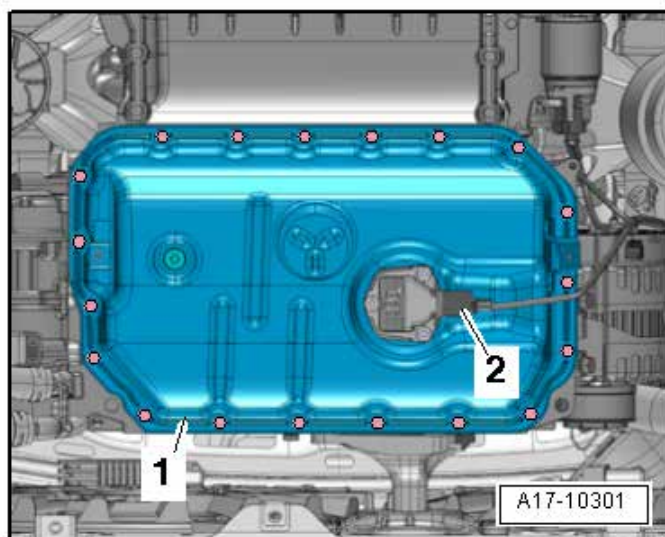
Upper Oil Pan Tightening Specifications

Engine – 3.0L
CTWA, CTWB



Step	Component	Nm
1	Tighten bolts 1 through 6 in a diagonal sequence	8
2	Tighten bolts 1 through 6 in a diagonal sequence	an additional 90° (¼ turn)

Oil Pan Tightening Specifications



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

Cooling System – 3.0L CTWA, CTWB

Fastener Tightening Specifications

Component	Fastener size	Nm
After-Run coolant pump	-	4
Bracket for after-run coolant pump	-	9
Bracket for left front coolant pipes	-	22
Charge air cooling circuit cooler	-	9
Coolant pump	-	9
Coolant pump ribbed belt pulley	-	20
Coolant thermostat	-	9
Connecting piece for coolant hose	-	9
Fan shroud ²⁾	-	5
	-	10
Front coolant pipe	-	9
Left coolant pipes	-	9
Left front coolant pipes	-	9
Left rear coolant pipes on the transmission	-	9
Lower coolant pipe on the supercharger	-	9
Radiator ¹⁾	-	5.5
	-	8
Right coolant pipe on the right side of the transmission	-	9
Upper coolant pipe	-	9
Upper coolant pipe on the supercharger	-	9

¹⁾ For bolt tightening clarification, refer to ElsaWeb, *Radiator Overview*, items 8, 15 and 19.

²⁾ For bolt tightening clarification, refer to ElsaWeb, *Fan Shroud and Coolant Fan Overview*, items 1, 2 and 3.

Fuel Supply – 3.0L CTWA, CTWB

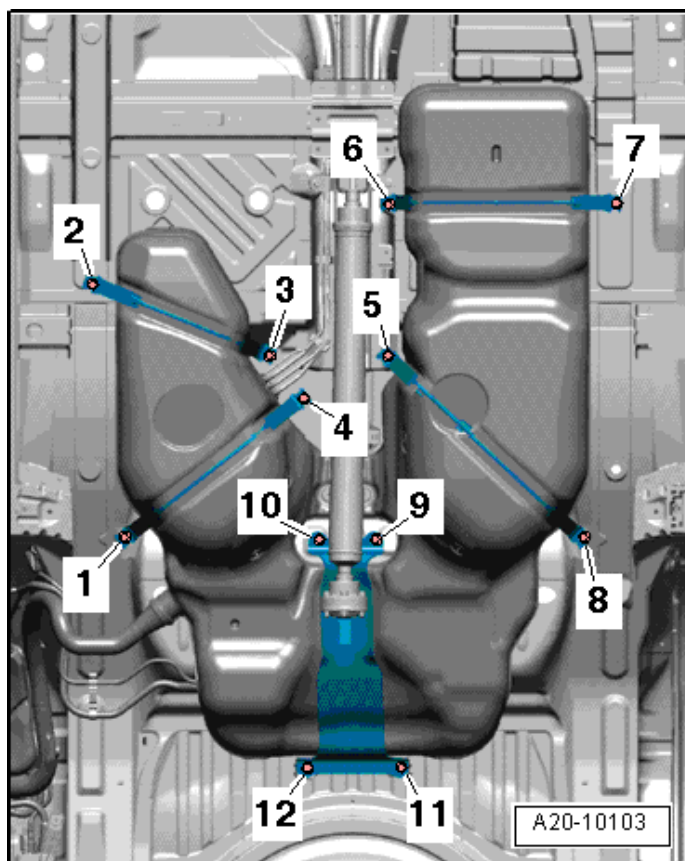
Fastener Tightening Specifications

Component	Nm
Accelerator pedal module	10
EVAP canister ²⁾	1.2
	9
Filter housing cap	10
Fuel pump control module	3.5
Fuel tank ¹⁾	9
	5
Locking flange cover	9
Locking ring	110
Protective plate for fuel delivery connection, nut	9

¹⁾ For bolt tightening clarification, refer to ElsaWeb, *Radiator Overview*, items 8, 15 and 19.

²⁾ For bolt tightening clarification, refer to ElsaWeb, *Fan Shroud and Coolant Fan Overview*, items 1, 2 and 3.

Fuel Tank Tightening Specifications



Engine – 3.0L
CTWA, CTWB

Step	Bolts	Nm
1	Tighten bolts 9, 10, 11, 12 in sequence	33
2	Tighten bolts 1, 4, 5, 8 in sequence	33
3	Tighten bolts 2, 3, 6, 7 in sequence	33

Turbocharger, G-Charger - 3.0L CTWA, CTWB

Fastener Tightening Specifications

Component	Nm
Bleeder screw	1.5 to 3.0
Bracket for change-over valves	9
Charge air pressure sensor ¹⁾	10
Drive head ¹⁾	27
Engine lifting eye	27
Insulation plate	5
Left charge air cooler ¹⁾	10
Right charge air cooler ¹⁾	10
Threaded pin	17
Threaded pin, nut	20

¹⁾ Replace fastener(s).

Exhaust System, Emission Controls – 3.0L CTWA, CTWB

Fastener Tightening Specifications

Component	Nm
Bracket for secondary air injection pump motor	9
Catalytic converter, nut ^{1) 3)}	23
Clamp for the tail pipe	23
Front clamping sleeve	23
Heat shield	10
Hose from secondary air injection combination valve	9
Left secondary air injection combination valve	9
Rear clamping sleeve, nut	23
Right secondary air injection combination valve	9
Secondary air combination valve heat shield	9
Suspended mount ⁴⁾	23
Suspended mount ²⁾	60

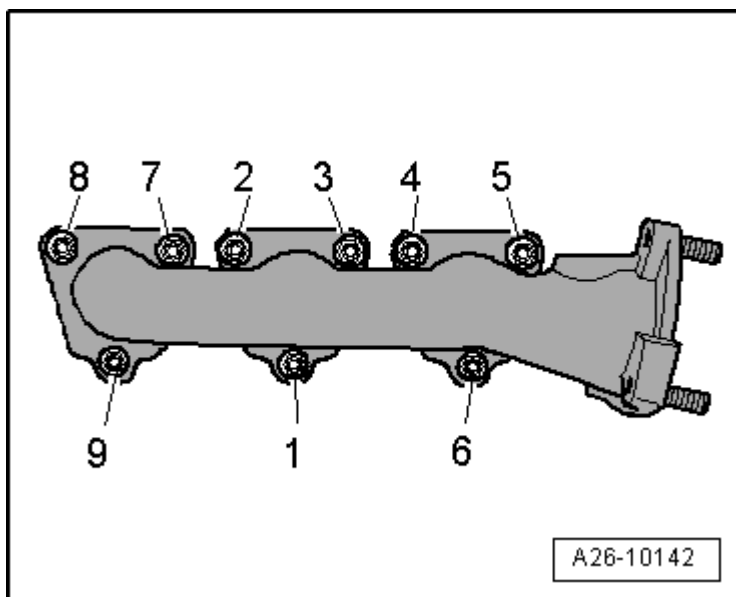
¹⁾ Replace fastener(s).

²⁾ For bolt tightening clarification, refer to ElsaWeb, *Muffler and Catalytic Converter Overview*, Front Muffler item 3.

³⁾ Coat the thread with hot bolt paste

⁴⁾ For bolt tightening clarification, refer to ElsaWeb, *Muffler and Catalytic Converter Overview*, Catalytic Converter items 7, 9 and 13.

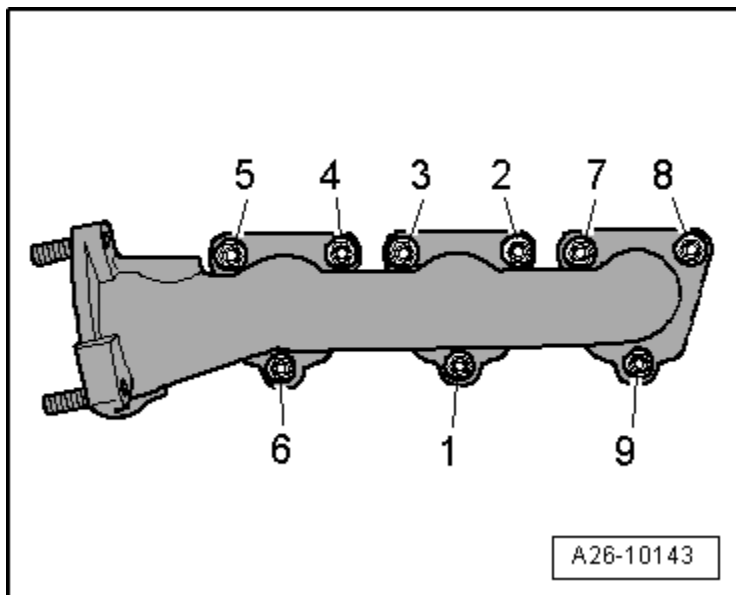
Left Exhaust Manifold Tightening Specifications



Engine – 3.0L
CTWA, CTWB

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 CTWA, CTWB

**Engine – 3.0L
CTWA, CTWB**

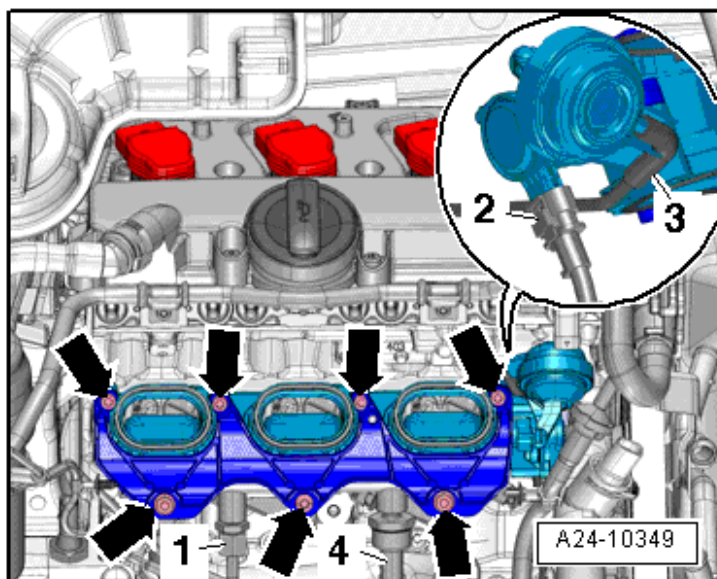
Fastener Tightening Specifications

Component	Nm
Bracket for fuel rail	2.5
Bracket for high-pressure line	9
Camshaft position sensor	9
Connecting piece to high pressure pump	27
Fuel pressure sensor ¹⁾	22
Fuel rail threaded connection	40
Fuel supply line	25
High-pressure line	25
Housing threaded pin	9
Intake Air Temperature (IAT) Sensor/Manifold Absolute Pressure (MAP) Sensor	10
Intake manifold runner position sensor 2	2.5
Low fuel pressure sensor	15
Lower air filter housing	9
Oxygen sensors	55
Protective plate for high pressure line, nut	9
Threaded connection for high-pressure line	40
Throttle valve control module ²⁾	10

¹⁾ Oil the threads.

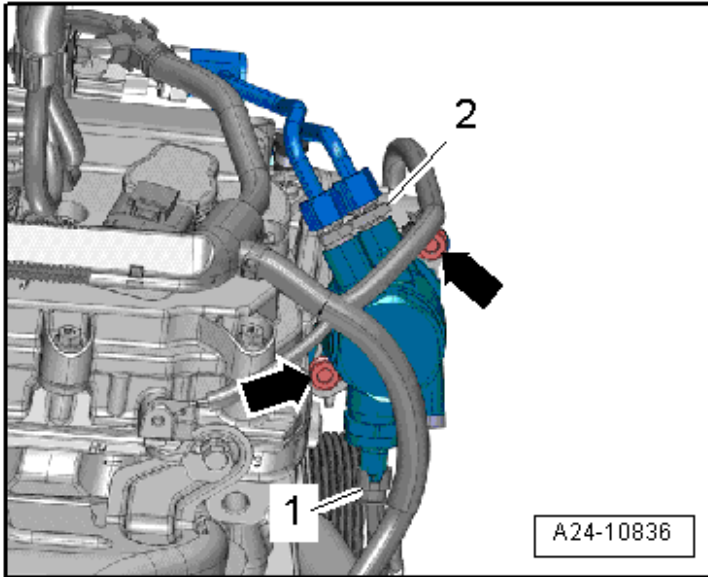
²⁾ Diagonal sequence.

Lower Intake Manifold Tightening Specification



Step	Component	Nm
1	Tighten bolt and nuts (↗) diagonally in stages	9

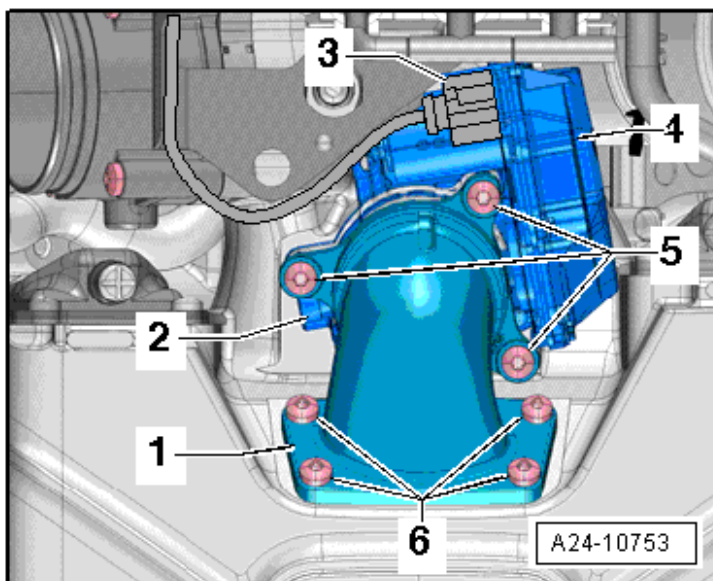
High Pressure Pump Tightening Specification



Engine – 3.0L
CTWA, CTWB

Step	Component	Nm
1	Tighten bolts (➔)	Hand-tighten
2	Tighten bolts (➔)	In steps to 20 Nm

Control Valve Control Unit Tightening Specification



Step	Component	Nm
1	Tighten bolts 5 and 6	Hand-tighten
2	Tighten bolts 6	10
3	Tighten bolts 5	10

Ignition/Glow Plug System – 3.0L CTWA, CTWB

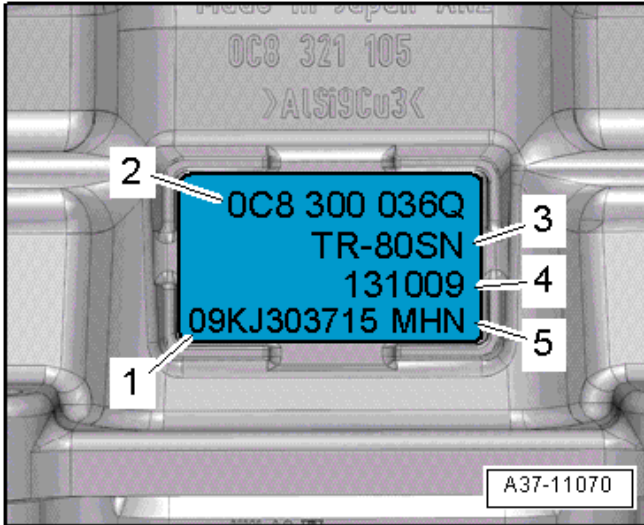
Fastener Tightening Specifications

Component	Nm
Camshaft Position Sensor Bolt	9
Engine Speed Sensor Bolt	9
Knock Sensor Bolt	25
Ignition Coil Wire Harness Clamp Bolt	5
Spark Plug	30

AUTOMATIC TRANSMISSION – 0C8

General, Technical Data – 0C8

Transmission Identification



Automatic Trans. –
0C8

Transmission code letters are located on the type plate on the bottom left side of the transmission.

Example:

- 1 - Code Letters
- 2 - Part number
- 3 - Manufacturer type number
- 4 - Production date
- 5 - Transmission code

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

Code Letters and Transmission Allocations Vehicles with a Gas Engine

Engine	Transmission code
3.L - 200 kW and 245 kW	MHN
1st Gear	4.845
2nd Gear	2.840
3rd Gear	1.864
4th Gear	1.437
5th Gear	1.217
6th Gear	1.000
7th Gear	0.816
8th Gear	0.672
Reverse gear	3.825

Vehicles with a Diesel Engine

Engine	Transmission code
3.0L - 165 kW V6	MHC, MHP, NAB, NAC
1st Gear	4.970
2nd Gear	2.840
3rd Gear	1.864
4th Gear	1.437
5th Gear	1.210
6th Gear	1.000
7th Gear	0.825
8th Gear	0.686
Reverse gear	4.066

Torque Converter

Fastener Tightening Specifications

Component	Nm
Flange for the starter bolt	9
Torque converter drive plate bolt ¹⁾	85

¹⁾ Replace fasteners

Controls, Housing – 0C8

Fastener Tightening Specifications

Component	Fastener size	Nm
ATF Check Plug to the Pan	-	16
Bolt for adjusting the selector lever cable	-	13
Bolts/Nuts	M6	9
	M8	20
	M10	40
	M12	65
Cable mounting bracket for selector lever cable	M6	9
	M8	22
Centering bracket to the lower section of the selector mechanism function unit	-	6.5
Lower section of the selector mechanism function unit to the body ⁴⁾	-	6.4
	-	10
Selector lever cable heat shield	-	9
Mounting ATF pipes to the ATF cooler		
- Bolts	-	10
- Union nuts	-	20
Overflow tube in the opening for the plug	-	1
Selector lever sensor system control module with tiptronic switch	-	1
6-Cylinder Vehicles 3.0L TFSI		
ATF Pipes ¹⁾	M6	8
	M8	20
	-	10
Thermostat	-	8
6-Cylinder Vehicles 3.0L TDI Engine		
ATF pre-heater to ATF pipes	-	20
ATF pipes ²⁾	-	8
ATF pipes ³⁾	-	8
	-	25
ATF auxiliary cooler	-	20
Thermostat	-	8

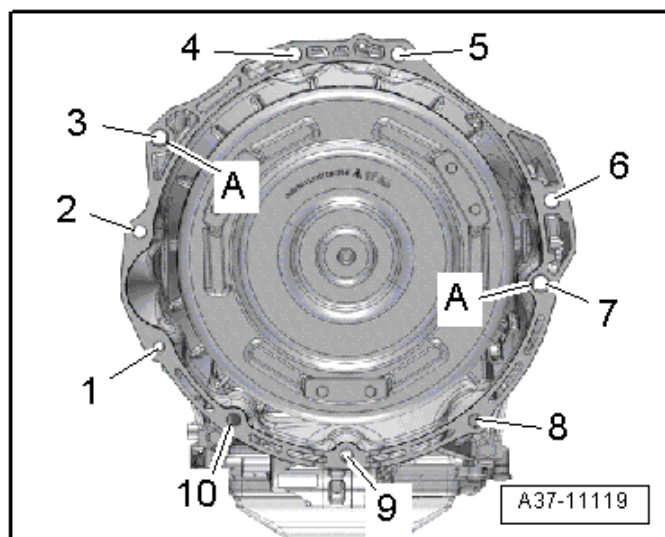
¹⁾ For bolt tightening clarification, refer to ElsaWeb, *ATF Pipe and ATF Cooler Overview*, items 1, 13, 15 and 16.

²⁾ For bolt tightening clarification, refer to ElsaWeb, *ATF Pipes, ATF Cooler and ATF Pre-Heater Overview*, item 2.

³⁾ For bolt tightening clarification, refer to ElsaWeb, *ATF Pipes, ATF Cooler and ATF Pre-Heater Overview*, items 20, 21 and 22.

⁴⁾ For bolt tightening clarification, refer to ElsaWeb, *Selector Mechanism Overview*, items 14 and 15.

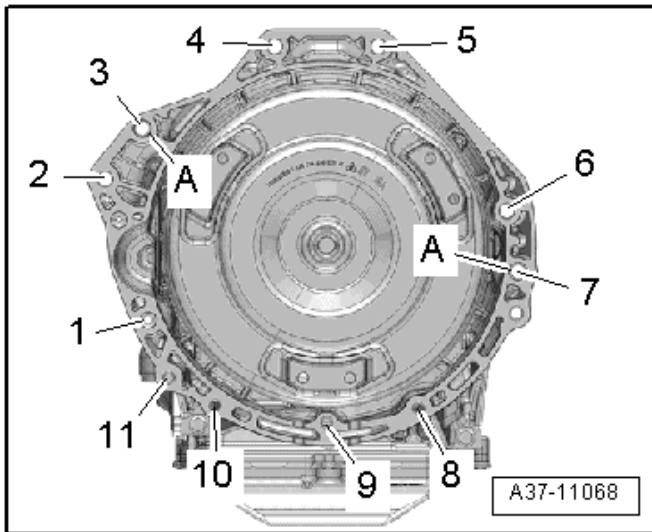
Securing Transmission to a 3.0L TDI Engine



Item	Bolt	Nm
1	M10 x 70 ¹⁾	65
2	M10 x 90 ¹⁾	65
3, 4, 5 and 7	M12 x 80	80
6	M12 x 70	80
8, 9 and 10	M10 x 70	45
A	Alignment sleeves	

¹⁾ Also secures the starter.

Securing Transmission to a 3.0L Engine

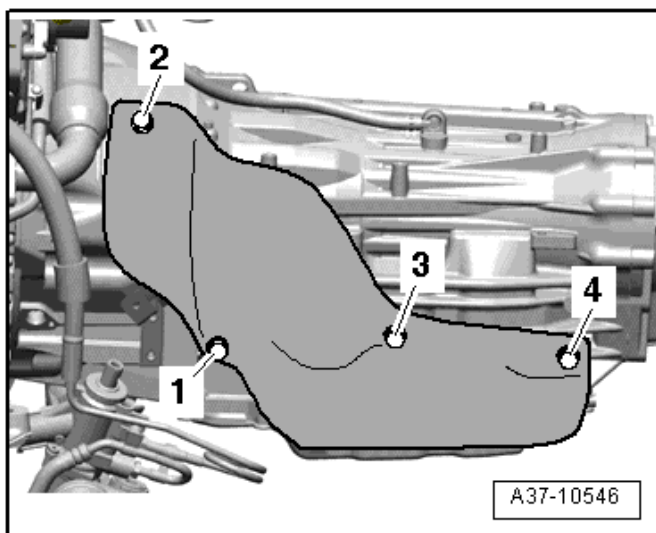


Automatic Trans. –
0C8

Item	Bolt ¹⁾	Nm
1	M10 x 95	15 plus an additional 90° (¼ turn)
2 through 5	M12 x 75	30 plus an additional 90° (¼ turn)
6 and 7	M12 x 140	30 plus an additional 90° (¼ turn)
8, 9 and 10	M10 x 60	15 plus an additional 90° (¼ turn)
11	M10 x 45	15 plus an additional 90° (¼ turn)
A	Alignment sleeves	

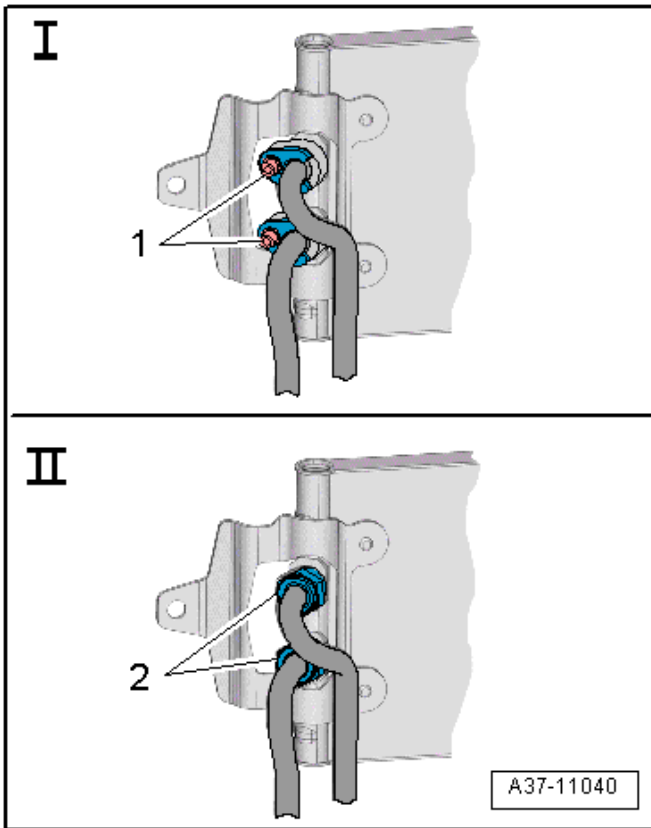
¹⁾ Aluminum bolts may be used two times.

Selector Lever Cable Heat Shield Tightening Specification



Step	Bolt	Nm
1	Tighten bolts 1 through 4 in sequence	9

Mounting ATF Pipes to the ATF Cooler



Automatic Trans. –
0C8

I - Mounting with Clamping Joint:

Tighten the bolts -1- to 10 Nm.

II - Mounting with Threaded Connection:

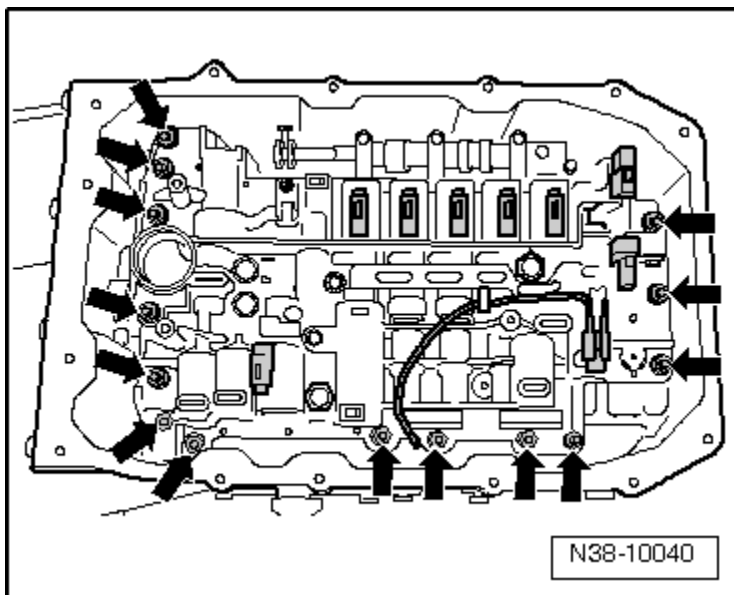
Tighten the bolts -2- to 20 Nm.

Gears, Hydraulic Controls – 0C8

Fastener Tightening Specifications

Component	Nm
Cover for multifunction transmission range switch	12
Gearshift lever, nut	12
Multifunction transmission range switch	
- Bolt	6
- Nut	7
Oil pan to transmission	8
Oil screen to transmission	10
Transmission fluid temperature sensor	10

Valve Body Tightening Specifications



Automatic Trans. –
0C8

Step	Bolts ¹⁾	Nm
1	Tighten bolts (➔) diagonally	Hand-tighten
2	Tighten bolts (➔) diagonally	8
3	Tighten bolts (➔) diagonally	an additional 90° (¼ turn)

¹⁾ Replace bolts that are tightened to the specification.

TRANSFER CASE, FRONT FINAL DRIVE, REAR FINAL DRIVE

General, Technical Data – 0BU

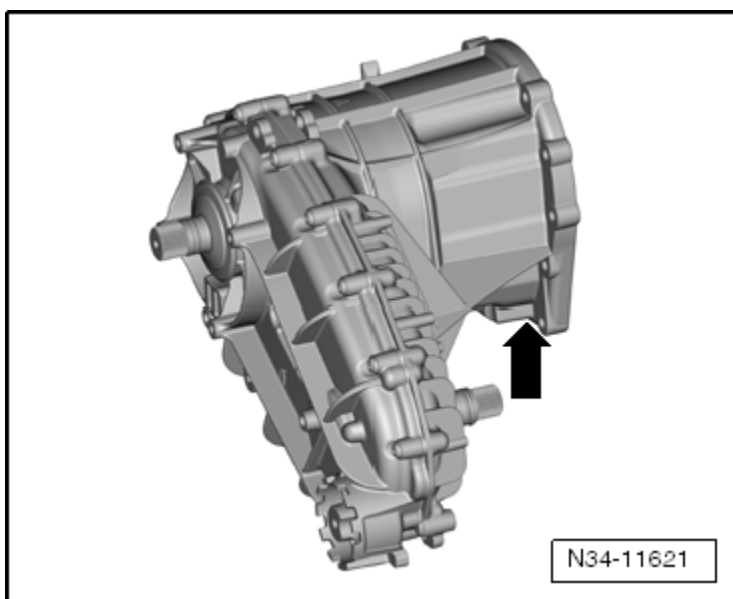
Fastener Tightening Specifications

Component	Nm
Front final drive	
Front subframe, nut/bolts ¹⁾	90 plus an additional 90° (¼ turn)
Lock plate bolts ¹⁾	30 plus an additional 90° (¼ turn)
Transmission fluid filler plug to the front final drive	35
Rear final drive	
Driveshaft center bearing	20
Rear subframe, nut ¹⁾	90 plus an additional 90° (¼ turn)
Transmission fluid filler plug to the rear final drive bolt	35
Tunnel brace bolt	60

¹⁾ Replace fastener(s).

General, Technical Data – 0BU

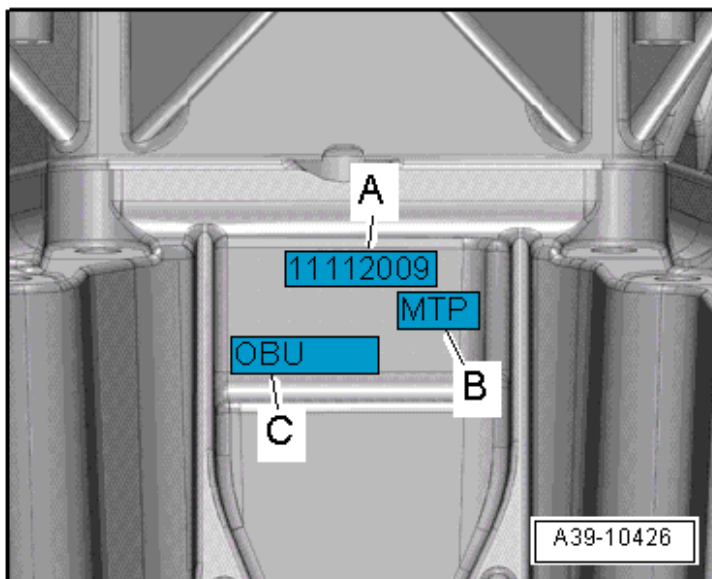
Transfer Case Identification Location



Transfer case 0BU, code letters and dates of manufacture (➡).

Transfer Case, Front
& Rear Final Drive

Transfer Case Identification



A: Transfer case production date

B: Code letters MTP

C: Transfer case OBU with part number

Example:

MPT	11	11	2009
Code letters	Day	Month	Year (2009) of manufacture

Transfer Case Code Letter, Allocation and Capacities

Transfer case		OBU	
Code letters		MTP/LXW	MGF/MTR
Allocation	Type	Audi Q7 from 2007	Audi Q7 from 2007
Engine		3.0l - 165 kW, 176 kW TDI	3.0l - 200 kW, 245 kW TFSI
Capacity		Refer to Fluid Capacity Tables Rep. Gr. 03	

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

- Allocation for the proper vehicle via the code letters on the automatic transmission and PR number.
- Transmission fluid specification.

Fastener Tightening Specifications

Component	Fastener size	Nm
Balance weight-to-transfer case bolt ^{1) 2)}	-	32
Transfer case drain/fill plug ^{1) 3)}	-	50
Bracket to transfer case ⁴⁾	-	20
	-	50 plus an additional 90° (¼ turn)
Transfer case-to-transmission bolt ¹⁾	-	20 plus an additional 90° (¼ turn)
Transfer case carrier-to-underbody bolt ¹⁾	-	50 plus an additional 90° (¼ turn)
Transmission fluid filler plug on the transfer case ⁵⁾	-	20

¹⁾ Replace fastener(s).

²⁾ For bolt tightening clarification, refer to ElsaWeb, *Transfer Case Overview*, item 10.

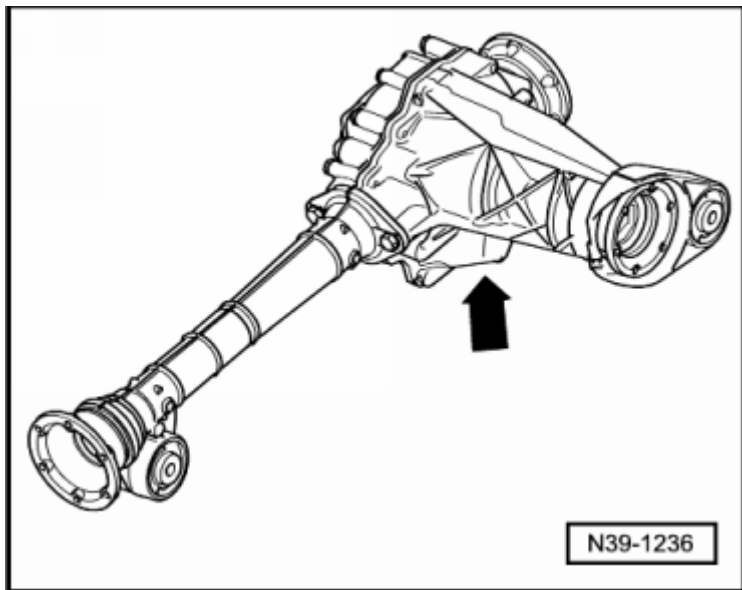
³⁾ For bolt tightening clarification, refer to ElsaWeb, *Transfer Case Overview*, item 11.

⁴⁾ For bolt tightening clarification, refer to ElsaWeb, *Transmission Support and Bracket Overview*, items 4, 5 and 6.

⁵⁾ Insert the transmission fluid filler plug using locking fluid -AMV 185 101 A1-.

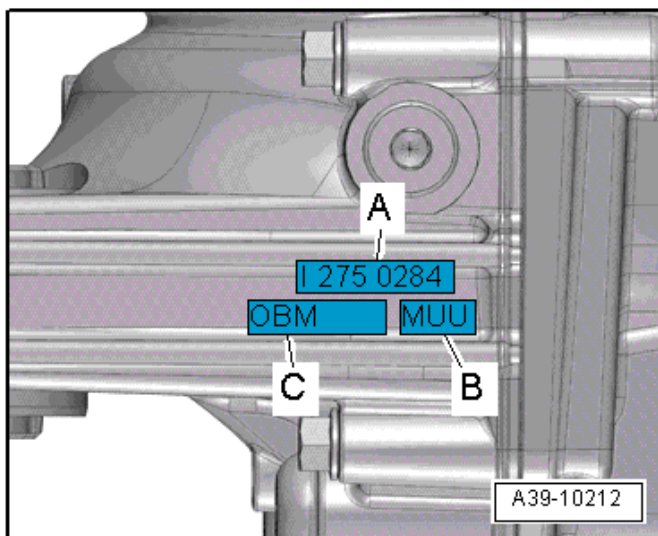
Front Final Drive – 0BM, 0C1

Front Final Drive Identification Location



Front final drive 0BM, 0C1, code letters
and dates of manufacture (➡).

Front Final Drive Identification



A: Dates of Manufacture for the front final drive

B: Code letters MUU

C: Front final drive 0BM and part number

Example:

I	275	0284
Year of manufacture: 2009 I = 2009 K = 2010 L = 2011 M = 2012	Day of manufacture: 275th calendar day (always stated as three digits)	Serial number for the day of production

Front Final Drive Code Letters, Allocation, Ratios and Capacities

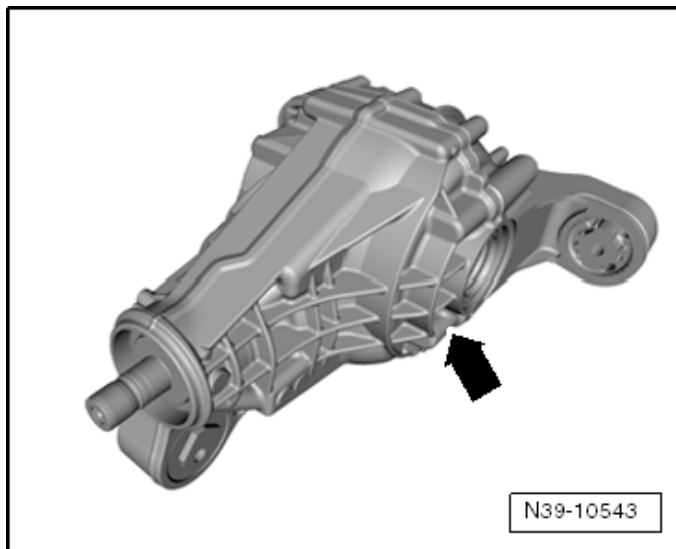
Front final drive		OBM	
Identification codes		MUN	MUU
Allocation	Type	Audi Q7 from 2007	Audi Q7 from 2007
	Engine	3.0I - 165 kW, 176 kW TDI	3.0I - 200 kW, 245 kW TFSI
Ratio: $Z_1: Z_2$	Final drive	36:11 = 3.272	37:10 = 3.700
Capacity		Refer to the Fluid Capacity Tables Rep. Gr. 03	

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

- Allocation of the flange shafts.
- Using the VIN and PR numbers for allocating to the proper vehicle.
- Transmission fluid specification.

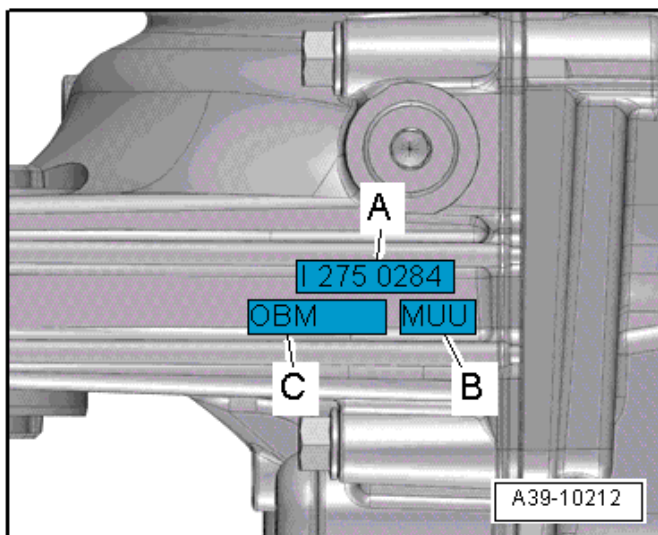
Rear Final Drive – 0BN, 0BP

Rear Final Drive Identification Location



Rear final drive 0BN, 0BP code letters and dates of manufacture (➡).

Rear Final Drive Identification



A: Rear final drive 0BP and part number

B: Code letters MEY

C: Dates of Manufacture for the rear final drive

Example:

I	275	0284
Year of manufacture: 2009 I = 2009 K = 2010 L = 2011 M = 2012	Day of manufacture: 275th calendar day (always stated as three digits)	Serial number for the day of production

Rear Final Drive Code Letters, Allocation, Ratios and Capacities

Rear final drive		0BP	
Identification codes		MEX	MEY
Allocation	Type	Audi Q7 from 2007	Audi Q7 from 2007
	Engine	3.0l - 165 kW, 76 kW TDI	3.0l - 200 kW, 245 kW TFSI
Ratio: $Z_2 : Z_1$	Final drive	36:11 = 3.272	37:10 = 3.700
Capacity		Refer to Fluid Capacity Table Rep. Gr. 03	

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

- Allocation of the flange shafts.
- Using the VIN and PR numbers for allocating to the proper vehicle.
- Transmission fluid specification.

SUSPENSION, WHEELS, STEERING

General Information

Chassis

Front Suspension	Double wishbone axle with subframe, stabilizer bar and twin gas-filled struts. Steel suspension or option air suspension with variable damping characteristics.
Rear Suspension	Double wishbone axle with loose upper steering levels, subframe, stabilizer bar and twin gas-filled struts. Steel suspension or option air suspension with variable damping characteristics.

Steering

Steering gear	Rack-and-pinion steering with speed-dependent servo assist and variable steering ratio.
Turning diameter	Approximately 12.00 meters.

	AWD		
	mm	Standard Suspension 1BA	Comfort Suspension 1BW
- Bolt	mm	approximately 3002	approximately 3002
- Bolt	mm	approximately 1651 ¹⁾	approximately 1651 ¹⁾
- Nut	mm	approximately 1681 ¹⁾	9 approximately 1681 ¹⁾
Connector piece in residual pressure retaining valve	Degree	41° 12'	41° 12'
Connector piece in pressure reservoir	Degree	38°	38°

	AWD		
	mm	Air Suspension 1BK	Sport Suspension (quattro GmbH) 1BV
- Bolt	mm	approximately 3006	approximately 3002
- Bolt	mm	approximately 1654 ^{1) 3)}	approximately 1651 ²⁾
- Nut	mm	approximately 1686 ^{1) 3)}	approximately 1681 ²⁾
Connector piece in residual pressure retaining valve	Degree	41° 12'	41° 12'
Connector piece in pressure reservoir	Degree	38°	38°

¹⁾ These specified values correspond to a wheel offset of ET 53 mm.4.

²⁾ These specified values correspond to a wheel offset of ET 52 mm.

³⁾ These specified values correspond to the standard level on an air spring suspension.

Front Suspension

Fastener Tightening Specifications

Component	Fastener Size	Nm
Air line	-	5
Bracket-to-wheel bearing housing	-	9
Coupling rod-to-stabilizer bar nut ¹⁾	-	110
Coupling rod-to-suspension strut nut ¹⁾	-	110
Cover plate-to-wheel bearing housing	-	20
CV joint boot clamp	-	25
Drive axle-to-final drive bolt ¹⁾	M10	50 plus an additional 90° (¼ turn)
	M12	90 plus an additional 90° (¼ turn)
Drive axle-to-wheel hub nut ¹⁾	-	500
Final drive-to-subframe bolt ¹⁾	-	90 plus an additional 90° (¼ turn)
Level control system sensor bolt	-	5
Level control system sensor-to-upper control arm nut	-	7

Suspension,
Wheels, Steering

Fastener Tightening Specifications (cont'd)

Component	Fastener Size	Nm
Looking plate-to-drive axle nut ¹⁾	M10	50 plus an additional 90° (¼ turn)
	M12	90 plus an additional 90° (¼ turn)
Lower control arm-to-subframe nut ¹⁾	-	180
Lower control arm-to-wheel bearing housing nut ¹⁾	-	105
Mounting bracket-to-body bolt ¹⁾	-	50 plus an additional 90° (¼ turn)
Residual pressure retaining valve-to-air spring	-	8
Shock absorber-to-air spring nut ¹⁾	-	60
Shock absorber-to-shock absorber mount nut, coil spring suspension ¹⁾	-	60
Stabilizer bar-to-coupling rod nut	-	110
Stabilizer bar-to-subframe bolt	-	60
Subframe-to-body bolt ¹⁾	-	120 plus an additional 180° (½ turn)
Suspension strut-to-lower control arm nut ¹⁾	-	150 plus an additional 90° (¼ turn)
Suspension strut-to-mounting bracket nut ¹⁾	-	30
Tie rod end to wheel bearing housing nut ¹⁾	-	90
Upper control arm-to-mounting bracket ¹⁾		
- Coil spring suspension, nut	-	50 plus an additional 90° (¼ turn)
- Air spring suspension, bolt	-	50 plus an additional 90° (¼ turn)
Upper control arm-to-wheel bearing housing nut ¹⁾	-	85
Vibration damper-to-stabilizer bar bolt, tdi	-	60

¹⁾ Replace fastener(s).

Rear Suspension

Fastener Tightening Specifications

Component	Nm
ABS wheel speed sensor bolt	8
Air/coil spring suspension strut-to-crossmember bolt	60
Air/coil spring suspension strut and coupling rod-to-wheel bearing housing bolt ¹⁾	90 plus an additional 90° (¼ turn)
Coupling rod-to-stabilizer bar nut ¹⁾	100
Cover plate-to-wheel bearing housing bolt	20
	8
Crossmember-to-body bolt ¹⁾	90 plus an additional 120° (½ turn)
Drive axle-to-final drive bolt ¹⁾	50 plus an additional 90° (¼ turn)
Lower control arm-to-subframe ¹⁾	
- Front bolt	150 plus an additional 90° (¼ turn)
- Rear nut	180
Lower control arm-to-wheel bearing housing bolt ¹⁾	150 plus an additional 90° (¼ turn)
Mounting bracket-to-air spring bolt	30
Mounting bracket-to-coil spring strut nut	30
Protective cap-to-air spring shock absorber nut	7
Residual pressure retaining valve-to-air spring	8
Shock absorber-to-air spring nut ¹⁾	60
Shock absorber-to-coil spring rubber mount nut ¹⁾	60
Stabilizer bar-to-right connecting link	100
Stabilizer bar-to-subframe bolt	50
Stone protection plate-to-subframe bolt ³⁾	1
Stone protection plate-to-subframe bolt ^{1) 2)}	120 plus an additional 180° (½ turn)
Suspension strut (air suspension)-to-crossmember	60
Subframe-to-body bolt ¹⁾	120 plus an additional 180° (½ turn)
Tie rod-to-subframe nut ¹⁾	180

Fastener Tightening Specifications (cont'd)

Component	Nm
Tie rod-to-wheel bearing housing bolt ¹⁾	150 plus an additional 90° (¼ turn)
Upper front control arm-to-ubframe nut ¹⁾	90 plus an additional 90° (¼ turn)
Upper front control arm-to-wheel bearing housing bolt ¹⁾	150 plus an additional 90° (¼ turn)
Upper rear control arm-to-subframe nut ¹⁾	90 plus an additional 90° (¼ turn)
Upper rear control arm-to-wheel bearing housing bolt ¹⁾	150 plus an additional 90° (¼ turn)

¹⁾ Replace fastener(s).

²⁾ Tighten in sequence. Refer to ElsaWeb, *Subframe, Stabilizer Bar, Coupling Rod and Stone Deflector*, item 21.

³⁾ Tighten in sequence. Refer to ElsaWeb, *Steel Spring Shock Absorber or Air Spring Damper*, items 11 and 24.

Self-Leveling Suspension

Fastener Tightening Specifications

Component	Nm
Air supply unit bracket bolt	20
Air supply unit upper-to-lower part bolt	5
Body acceleration sensor bolt	8
Compressor unit and solenoid valve block bracket ¹⁾	
- Bolt	9
- Bolt	20
- Nut	9
Connector piece in solenoid valve block	3
Connector piece in residual pressure retaining valve	5
Connector piece in pressure reservoir	5
Connector piece in line connector (pressure reservoir t-piece)	3
Solenoid valve block bracket bolt	9
Solenoid valve block-to-bracket bolt	4

¹⁾ Tighten in sequence. Refer to ElsaWeb, *Air Supply Unit and Solenoid Valve Block Overview*, items 19, 20, 21, 22 and 24.

Wheels, Tires

Fastener Tightening Specifications

Component	Nm
Adaptive cruise control sensor bracket bolt	8
Metal valve-to-wheel nut	4
Tire pressure monitoring control module-to-body bolt	2
Tire pressure sensor-to-metal valve bolt	4
Wheel bolt	160

Wheel Alignment Data

Wheel Alignment Specified Values

Specifications valid for all engine versions

Front sus- pension	Standard sus- pension (1BA)	Air sus- pension (1KB)	Sport sus- pension S-Line (1BV)	Comfort sus- pension (1BW)	Air spring sus- pension S-Line (2MB)
Caster angle	8° 10' +10'-30'	8° 35' +10'-30'	8° 10' +10'-30'	8° 10' +10'-30'	8° 35' +10'-30'
Maximum permissible difference between both sides	30'	30'	20'	30'	20'
Camber	-10' ± 15'	-10' ± 15'	-10' ± 15'	-10' ± 15'	-10' ± 15'
Maximum permissible difference between both sides	10'	10'	10'	10'	10'
Toe for each wheel	+7' ± 5'	+7' ± 5'	+7' ± 5'	+7' ± 5'	+7' ± 5'
Maximum permissible difference between both sides	5'	5'	5'	5'	5'
Toe angle difference at 20 degrees ¹⁾	1° 20' ± 30'	1° 30' ± 30'	1° 20' ± 30'	1° 20' ± 30'	1° 30' ± 30'

¹⁾ Wheel stop on outer wheel is reduced by this amount. It can also be indicated negatively in alignment computer, depending on manufacturer.

Wheel Alignment Specified Values (*cont'd*)

Rear sus- sension	Standard sus- sension (1BA)	Air sus- sension (1KB)	Sport sus- sension S-Line (1BV)	Comfort sus- sension (1BW)	Air spring sus- sension S-Line (2MB)
Camber	-1° 20' ± 20'	-1° 20' ± 20'	-1° 20' ± 20'	-1° 20' ± 20'	-1° 20' ± 20'
Maximum permissible difference between both sides	20'	20'	20'	20'	20'
Toe for each wheel	+12' ± 5'	+12' ± 5'	+12' ± 5'	+12' ± 5'	+12' ± 5'
Maximum permissible difference between both sides	5'	5'	5'	5'	5'
Maximum permissible deviation in direction of travel relative to vehicle longitudinal axis	4'	4'	4'	4'	4'

Steering

Fastener Tightening Specifications

Component	Nm
Belt pulley to power steering pump bolt	
- V6 TDI	23
- V6 TFSI	25
Bracket for hydraulic oil cooler on condenser	9
Control line-to-steering gear bolt	12
Control line-to-steering gear banjo bolt	40
Handle-to-steering column bolt	4.5
Heat shield-to-steering gear bolt	10
Power steering line bracket bolt	9
Power steering pressure/return line-to-steering gear mounting bolt	9
Power steering pressure/return line-to-steering gear union nut	32
Power steering pressure/return line union nut	32
Power steering pump to bracket bolt	
- V6 TDI	23
- V6 TFSI	25
Pressure line to power steering pump	
- Banjo bolt	35
- Bolt, v6 tdi engine, generation i with scr and on a v6 tdi engine, generation ii	9
Protective boot nut ¹⁾	4
Reservoir to bracket bolt	8
Servotronic solenoid valve-to-steering gear bolt ³⁾	3
Steering column-to-lateral control arm bolt/nut ²⁾	20
Steering column-to-steering gear bolt ¹⁾	35 plus an additional 90° (¼ turn)
Steering gear-to-subframe nut ¹⁾	90 plus an additional 90° (¼ turn)
Steering wheel-to-steering column bolt ¹⁾	50
Tie rod-to-steering gear	100
Tie rod end-to-tie rod nut	70
Tie rod end-to-wheel bearing housing nut ¹⁾	90

¹⁾ Always replace after removal..

²⁾ Follow tightening sequence.

³⁾ Follow tightening sequence. Refer to ElsaWeb, *Servotronic Solenoid Valve N119*.

BRAKE SYSTEM

General Information

Vehicle Data Label

TYP / TYPE	4LB 0FL
A — Q7 quat.	TDI3.0 V6171 KW DPF A6
MOTOR. / GETR. KB.	---
ENG. CODE / TRANS. CODE	---
LACKNR. / INNENAUSST.	LY7E CH
PAINTNO. / INTERIOR	
M.-AUSST. / OPTIONS	
X9X BOA CJ3 GOR HS9 JOZ D1D -	
B — - 1G1 2ZM 5RU 5SL T41	
OBB 3S2 OG7 8YQ 8GV	
1KF 1LF - 7GG	
C — OY1 4UE 4X3 4K4 NSA STA	
8RY EOA OAB OBB	
OJZ OYZ 1BK	
	A00-10141

The following brakes are installed in this example:

- A - Model
- B - Front brakes - 1LF
- C - Rear brakes - 1KF

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

Brakes

Brembo Front Brakes (18 Inch Plus)		
Production Relevant No. (PR. No.)		1LT
Brake caliper		Brembo 18" Plus
Brake pad, thickness, without backing plate	mm	11
Brake pad, wear limit without backing plate	mm	2
Brake disc	Dia. in mm	368
Brake disc thickness	mm	36
Brake disc wear limit	mm	34
Brake caliper, 6 pistons	Dia. in mm	Each 36 mm

Ceramic Front Brakes		
Production Relevant No. (PR. No.)		1LN / 1LW
Brake caliper		Alcon 8K (20")
Brake pad, thickness, with backing plate	mm	20
Brake pad, wear limit with backing plate	mm	10
Brake disc	Dia. in mm	420
Brake disc thickness	mm	40
Brake disc wear limit	mm	The wear value is the minimum brake rotor thickness during manufacturing and is stamped into the brake rotor cup.
Brake caliper, 8 pistons	Dia. in mm	8 x diameter 30,2

Brembo 18 Inch Front Brakes		
Production Relevant No. (PR. No.)		1LF
Brake caliper		Brembo 18"
Brake pad, thickness, without backing plate	mm	9
Brake pad, wear limit without backing plate	mm	2
Brake disc	Dia. in mm	350
Brake disc thickness	mm	34
Brake disc wear limit	mm	32
Brake caliper, 6 pistons	Dia. in mm	Each 2x 30/ 34/ 38 mm

Fastener Tightening Specifications (cont'd)

Rear Brakes (Disc Brakes 17" and 18")			
Production Relevant No. (PR. No.)		1KF	2EA
Brake caliper		Brembo 17"	Brembo 18"
Brake pad, thickness	mm	11	1
Brake pad, wear limit without backing plate	mm	2	2
Brake disc	Dia. in mm	330	358
Brake disc thickness	mm	28	28
Brake disc wear limit	mm	26	26
Brake caliper, 4 pistons	Dia. in mm	Each 2 x 28/ 30 mm	Each 30

Rear Wheel Brake, 18" Plus Disc Brake		
Production Relevant No. (PR. No.)		1KD
Brake caliper		Brembo 18"
Brake pad, thickness	mm	11
Brake pad, wear limit without backing plate	mm	2
Brake disc	Dia. in mm	358
Brake disc thickness	mm	28
Brake disc wear limit	mm	26
Brake caliper, 4 pistons	Dia. in mm	Each 30

Ceramic - Rear Brakes		
Production Relevant No. (PR. No.)		1KK / 2EF
Brake caliper		TRW C45 EPB (20")
Brake pad thickness with backing plate	mm	16.9
Brake pad wear limit with backing plate	mm	9
Brake disc	Dia. in mm	356
Brake disc thickness	mm	28
Brake disc wear limit	mm	The wear value is the minimum brake rotor thickness during manufacturing and is stamped into the brake rotor cup.
Brake caliper, 4 pistons	Dia. in mm	45

Parking Brake, Drum Brake		
Brake drum	Dia. in mm	210
Brake drum, wear limit	Dia. in mm	211
Brake pad, thickness	mm	30
Brake pad, remaining thickness	mm	5.5

Anti-lock Brake System (ABS)

Fastener Tightening Specifications

Component	Nm
ABS wheel speed sensor bolt	8
Brake lines at abs aggregate	14
ESP sensor unit nut	8
Hydraulic unit bracket bolt	5
Hydraulic unit-to-bracket bolt	8
Master cylinder-to-brake booster nut ¹⁾	49

¹⁾ Always replace after removal.

Mechanical Components

Fastener Tightening Specifications

Component	Nm
Brake disc cover plate bolt	20
Brake line	
- Brembo 18 inch front caliper, rear Brembo 17" and 18"	14
- Front ceramic brakes C/SIC	19
Brake line bracket-to-wheel bearing housing bolt, Brembo 18 inch front caliper	9
Brake line bracket-to-pivot bearing bolt, front ceramic brakes C/SIC	20
Brake line bracket-to-brake caliper bolt, rear Brembo 17" and 18"	8
Brake pedal mounting bracket bolt	8
Brake pedal-to-mounting bracket nut ¹⁾	20
Combination bracket-to-rear brake caliper bolt, ceramic brakes	8
Contact switch for parking brake bolt	2
Front brake caliper bolt ¹⁾	270
Front brake disc to wheel hub bolt	
- Exc. ceramic brakes C/SIC	15
- Ceramic brakes C/SIC	10
Parking brake adjustment screw plug	14

Fastener Tightening Specifications (cont'd)

Component	Nm
Pedal parking brake lever-to-bracket bolt	23
Pedal parking brake transfer module bolt	23
Rear brake caliper bolt ¹⁾	
- Exc. ceramic brakes	180
- Ceramic brakes	150 plus an additional 90° (¼ turn)
Rear brake disc-to-wheel hub bolt	14
Rear brake pad wear display cable bracket bolt, 18" plus	8
Tension strut bolt, brembro 18 inch front caliper	30

¹⁾ Replace fastener(s).

Hydraulic Components

Fastener Tightening Specifications

Component	Nm
Brake booster-to-pedal support bolt ²⁾	25
Brake caliper bleeder valve	12
Brake caliper connecting pipe ¹⁾	17
Brake line-to-master cylinder	14
Master cylinder-to-brake booster nut ²⁾	49
Vacuum hose-to-vacuum pump bolt, diesel	5
Vacuum pump-to-engine bolt, diesel	9

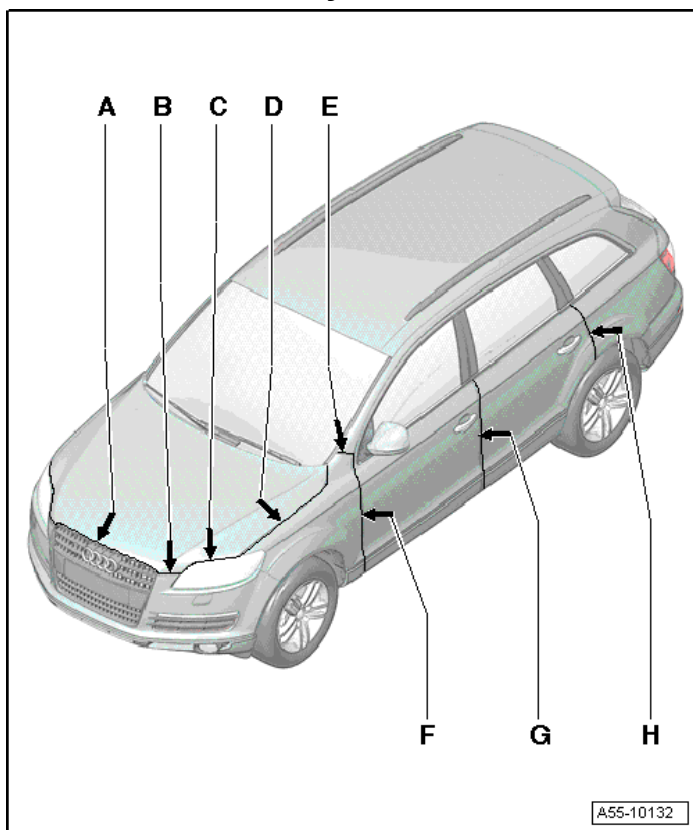
¹⁾ Not installed on all models.

²⁾ Always replace after removal.

BODY

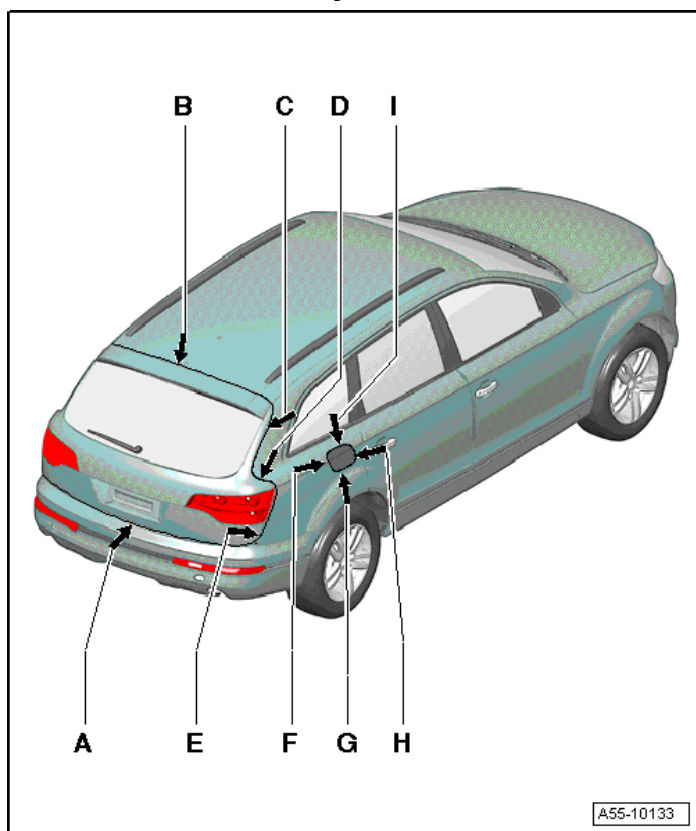
Air Gap Body Dimensions

Body, Front



Component	mm
A	4.5
B	4.5
C	5.0
D	3.0
E	2.5
F	3.5
G	4.5
H	4.5

Body, Rear



Component	mm
A	5.0
B	4.5
C	4.5
D	5.5
E	4.5
F	2.0
G	2.0
H	2.0
I	2.0

Body Exterior

Body Front Fastener Tightening Specifications

Component	Fastener Size	Nm
Angle for fender bolt	-	15
Bumper impact member to lock carrier ²⁾		
- Bolt	-	22
- Bolt	-	60
Center bulkhead bolt	-	8
Connecting piece bolt	M6 x 18	8
End plate to body bolt	-	1.5
Fender bolt	-	15
Fender brace	-	10
Fender flange bolt	-	8
Front noise insulation bolt	-	25
Left bulkhead bolt	-	8
Lock carrier ¹⁾		
- Bolt	-	3
- Bolt	-	6
- Bolt	-	25
- Bolt	-	60
Rear noise insulation bolt	-	8
Right bulkhead bolt	-	8

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

²⁾ For bolt tightening clarification, refer to ElsaWeb, *Lock Carrier with Attachments Overview*, items 2 and 3.

Hood, Lids Fastener Tightening Specifications

Component	Nm
Ball head pin for gas strut bolt (hood)	14
Ball head pin for gas strut bolt (rear lid)	20
Cable cover	2.5
Catch cap nuts	11
Hood hinge to hood bolt/nut	21
Hood release lever bolt	2
Rear lid catch to rear lid nuts	21
Rear lid control module bolt ²⁾	8
	12
Rear lid hinge to rear lid bolt ¹⁾	21
Rear lid drive motor	
- Bolt	12
- Locking nut	6

Fastener Tightening Specifications (cont'd)

Component	Nm
Stop to rear lid bolt	8

- ¹⁾ For bolt tightening clarification, refer to ElsaWeb, *Rear Lid Hinge*, items 1 and 2.
²⁾ For bolt tightening clarification, refer to ElsaWeb, *Rear Lid Control Module -J605-*, items 6 and 8.

Front Doors, Central Locking System Fastener Tightening Specifications

Component	Nm
Bracket to outer door panel bolt	2.5
Bottom door hinge, lower part bolt	32
Door lock bolt	20
Fuel filler door unit bolt	1.5
Side impact member to door	32
Striker pin bolts	25
Window regulator motor bolts	3.5

Rear Doors Fastener Tightening Specifications

Component	Nm
Bracket for outer door panel bolt	2.5
Bottom door hinge, lower part bolt	32
Door lock bolt	20
Side impact member bolts	32
Striker pin bolt	32
Window regulator motor bolts	3.5

Sunroof Fastener Tightening Specifications

Component	Fastener Size	Nm
Panel 1 bolts	-	4.5
Panel 2 bolts	-	4.5
Panel 3 bolts	-	4.5
Panel motors 1 and 3 bolts	-	3.5
Sunroof frame 1	M6 x 16	8
	M6 x 25	6
Tilting mechanism to frame bolts	-	2

Bumpers Fastener Tightening Specifications

Component	Fastener Size	Nm
ACC sensor to shock absorber combination screw	-	8
Air intake grille combination screws	-	1
Bracket to rear impact member bolt	-	60
Bumper crossmember to body		
- Bolts	-	60
- Screw	-	6
Front bumper		
- Combination screw	-	6
- Bolt	-	6
Front bumper cover		
- Combination screw	-	6
- Bolt	-	6
Front wheel spoiler screw	-	2
Guide piece to bumper bolt/nut	-	3
Impact member		
- Nut	-	4.5
- Bolt	-	60
Left guide piece bolts	-	3
Noise insulation to bumper cover	-	2
Rear bumper		
- Bolt	-	2
- Metal screw	-	2
- Nut	-	4.5
Rear impact member	M12 x 1.5	110
Right guide piece		3
Shocker absorber to body bolt		60
Side impact bar to shocker absorber		
- Bolt		23
- Nut		60
Spoiler to wheel housing liner bolt		2
Tailer hitch with crossmember	M12 x 1.5	110
Wheel spoiler to front spoiler (offroad style) bolt		2

Glass, Window Regulators Fastener Tightening Specifications

Component	Nm
Glass, Window Regulators	2.5
Window regulator nuts	6

Exterior Equipment Fastener Tightening Specifications

Component	Nm
Connecting piece bolt	8
Front bumper cover bolt	2
Front cover to body bolt	2
Front door to exterior mirror mount bolt	15
Front noise insulation bolt	8
Front spoiler with impact guard bolt	2
Front wheel spoiler to front wheel housing liner bolt	2
Heat shield	
- Bolt	2
- Spring nut	4.5
Left mount (hoist mount) bolt	9
Rear cover to body bolt	2
Rear noise insulation bolt	8
Rear wheel housing liner bolt/nut	1.5
Rear wheel spoiler bolt	2
Right mount (hoist mount) bolt	9
Right underbody trim bolt	2
Roof rail bolts ²⁾	15
Sill panel molding to body bolt	20
Underbody trim panel ¹⁾	
- Bolt	2
- Bolt	20

¹⁾ For bolt tightening clarification, refer to ElsaWeb, [Underbody Panel, Offroad Style Package Overview](#), items 1, 3 and 6.

²⁾ Replace

Body Interior

Interior Equipment Fastener Tightening Specifications

Component	Nm
Storage Compartments and Covers	
Threaded clip to upper instrument panel cover, driver side bolt	1.4
Driver side lower instrument panel cover to upper instrument panel cover, driver side bolt	1.4
Left knee bar to central tube bolt	10
Right knee bar to central tube bolt	10
Knee bar brace bolt	3

Glove compartment unlock motor -V327- to glove compartment bolt	1
Glove compartment bolt	1.4
Center Console	
Center console mounting bracket bolt	2.0
Front ashtray/front compartment to center console bolt	2
Multimedia Control Head -E380- installation frame to Multimedia Control Head -E380-	0.85
Lower part of support foot to center console bolt ¹⁾	4
	8
Support foot cover to center console bolt	2
Front Center Armrest with Foldable Padding	
Lower part of support foot bolt	8
Upper part of support foot bolt ²⁾	4
	7.5
Storage compartment to cell phone/Bluetooth handset mount bolt	0.9
Cup holder to Storage compartment bolt	1.2
Lining mat to storage compartment bolt	0.9
Storage compartment to carrier bolt	0.9
Carrier to Lower trim bolt	1
Support foot cover bolt	2
Front Center Armrest with Fixed Padding	
Lower part of support foot bolt	7.5
Upper part of support foot bolt ³⁾	4
	8
Cup holder bolt	1.2
Upper trim bolt	0.9
Carrier to lower trim bolt	1
Support foot cover bolt	2
Multibox	
Mount multibox screws	1.3
Cup holder to multibox trim screws ⁴⁾	1.1
	1.3
Lever bolt	1.3
Release cable nut	2
Multibox to front bracket bolt	6

¹⁾ For bolt tightening clarification, refer to ElsaWeb, *Center Console Assembly Overview*, items 17 and 18.

²⁾ For bolt tightening clarification, refer to ElsaWeb, *Front Center Armrest Assembly Overview*, items 3, 27 and 28.

³⁾ For bolt tightening clarification, refer to ElsaWeb, *Front Center Armrest Assembly Overview*, items 4, 17 and 18

⁴⁾ For bolt tightening clarification, refer to ElsaWeb, *Multibox Components Assembly Overview* items 16 and 30

Passenger Protection, Airbags, Seat Belts Fastener Tightening Specifications

Component	Nm
Airbag unit nut ²⁾	7
Belt anchor bolt (3rd row seat belt) ¹⁾	55
Belt relay bolt ¹⁾	55
Belt roller/belt tensioner bolt ¹⁾	55
Belt roller bolt (center 2nd row three-point seat belt) ¹⁾	55
Belt height adjustment bolt ¹⁾	21
Belt tensioner connector bolt ¹⁾	55
Front belt guide nut	5
Left airbag unit bracket nut ²⁾	7
Side curtain airbag connector	
- Bolt ²⁾	5
- Cap nut (on ground bolt)	9

¹⁾ If being removed for accident repairs, replace.

²⁾ Replace

Interior Trim Fastener Tightening Specifications

Component	Nm
A-pillar lower trim	2.0
A/C unit bracket bolt ⁴⁾	10
	1.5
Access/Start Authorization Switch -E415- bolt	1.4
Antennas in interior for access and start authorization bolt	2
Balancing element to instrument panel central tube bolt	23
Belt anchor/seat belt to body body	55
C-pillar trim screw	3
Center air duct bolt	0.6
Central tube left angle bracket to instrument panel central tube bolt	23
D-pillar bracket nut	3
D-pillar trim screw	3
Door pocket bolt	2
Door trim mount bolt	2.5
Footrest bracket to floor nut	3
Footrest cover to footrest bracket bolt	3
Front door trim bolt	2.5
Front passenger airbag unit nut ²⁾	7
Headliner bolt ¹⁾	3
	4

Indirect ventilation trim	1.4
Inside door release mechanism bolt	1.2
Installation frame ³⁾	0.6
	1.4
Instrument cluster bolt	1.4
Instrument panel	1.4
Instrument panel central tube bolt ⁵⁾	10
	23
Interior Door Mechanism Bolt	2.5
Left bracket for front passenger airbag unit nut	7
Left gap cover bolt	2.5
Lower rear lid trim	1.5
Luggage compartment side trim bolt	2.5
Passenger side sun visor bolt	3
Pull handle bolt	2.5
Rear cross panel trim bolt	3.5
Rear door armrest bolt	2.5
Rear door trim bolt	2.5
Right central tube angle bracket bolt	10
Right front passenger airbag unit bracket nut	7
Right retaining track bolt	6
Roof Grab Handle screw ²⁾	4
Sill panel strip bolt	2.5
Speaker to instrument panel bolt	1.8
Switch mount bolt	2.5
Sun shade bolt	1.2
Sun shade mount bolt	1.6
Sun visor center bracket cover	3
Trim/mount	2.5
Upper A-pillar trim screw	3
Upper left rear lid trim bolt	1.5

¹⁾ For bolt tightening clarification, refer to ElsaWeb, *Headliner Overview*, items 12, 14 and 21.

²⁾ Replace

³⁾ For bolt tightening clarification, refer to ElsaWeb, *Instrument Panel Components Overview*, items 8 and 9.

⁴⁾ For bolt tightening clarification, refer to ElsaWeb, *Instrument Panel Central Tube Overview*, items 7 and 8.

⁵⁾ For bolt tightening clarification, refer to ElsaWeb, *Front Center Armrest Assembly Overview*, items 9, 12, 20, 21 and 22.

Seat Frames Fastener Tightening Specifications

Component	Nm
Backrest bolts ¹⁾⁷⁾	20
	40
	75
Backrest adjustment lever with handle bolt	10
Backrest adjustment lever with handle to frame bolt	10
Belt guide to seat pan bolt	3.5
bracket for Memory Seat/Steering Column Adjustment Control Module -J136- or -J521- to front seat bolt	3.5
Center armrest screw	10
Center seat lock screw	18
Comfort Front Seat to floor bolt	45
Cover to Housing (entry assistance) bolt	0.6
Driver seat to floor bolt ¹⁾	45
Driver seat angle adjustment motor -V243- or front passenger seat angle adjustment motor -V244- screw ²⁾	20
Driver Seat Height Adjustment Motor -V245- or Front Passenger's Seat Height Adjustment Motor -V246- bolt ²⁾	28
Front bracket to floor bolt ¹⁾	50
Front backrest to seat pan bolt ¹⁾	20
Front seat trim to front seat bolt	3.5
Front passenger seat to floor bolt ¹⁾	45
Headrest bolt	10
Housing (entry assistance) bolt	6
Inner seat rail nut ⁵⁾	24
	48
	10
Left side, inner part trim to seat bolt	3.5
Lumbar support adjustment switch to Sill-side trim bolt	0.5
Memory Seat/Steering Column Adjustment Control Module -J136- or -J521- to bracket bolt	3.5
Outer seat rail nut ⁶⁾	24
	48
	10
Rear bracket to floor bolt ¹⁾	8
Retaining bracket to seat pan bolt	3.5
Right console bolt ¹⁾	50
Right side, inner part trim to seat bolt	3.5
Seat angle adjustment motor bolt ³⁾	12
	20
Seat cushion fan bolt	1.5
Seat depth adjustment base plate nut	35

Seat height adjustment motor to Lower seat pan frame bolt	18
Switch for seat fore and aft adjustment -E418- to trim bolt	1.5
Trim bracket to seat pan bolt	3.5
Upper seat pan frame screw ²⁾	28
Upper seat pan frame bolt/nut	28
Upper seat pan frame to Lower seat pan frame screw ⁴⁾	20
	28
2nd Row, 3-Seater individual seat bolt	20
3rd Seat Row to floor bolt ¹⁾	50

¹⁾ Replace if removed

²⁾ Replace.

³⁾ For bolt tightening clarification, refer to ElsaWeb, *Seat Angle Adjustment Motor V244/ V243 Assembly Overview* items 2 and 3.

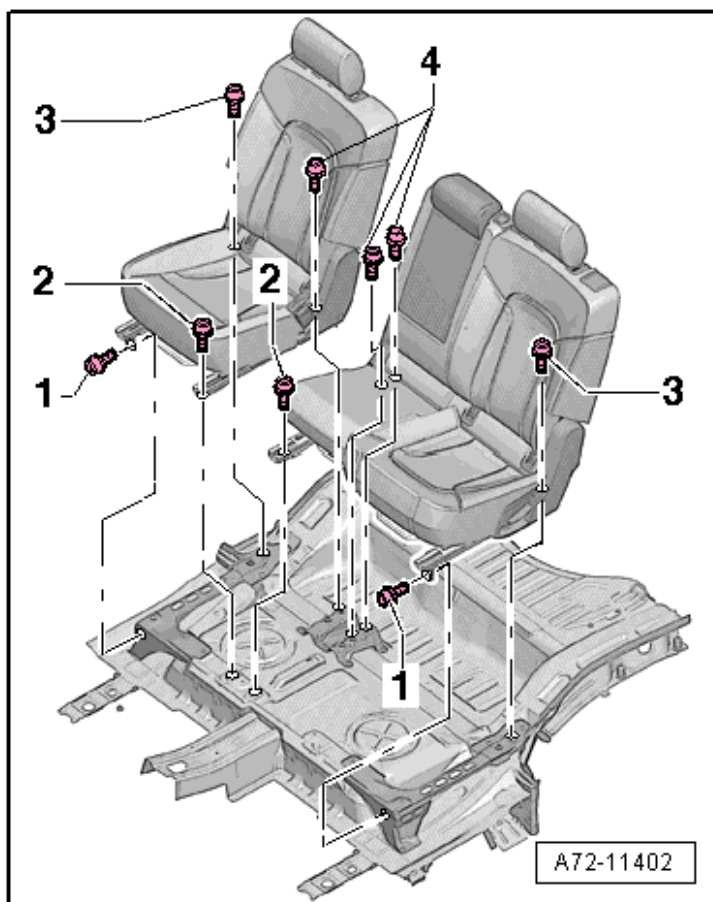
⁴⁾ For bolt tightening clarification, refer to ElsaWeb, *Seat Frame Assembly Overview* items 3, 4, 5, 8 and 10.

⁵⁾ For bolt tightening clarification, refer to ElsaWeb, *Seat Rail Assembly Overview* items 3, 4 and 5.

⁶⁾ For bolt tightening clarification, refer to ElsaWeb, *Seat Rail Assembly Overview* items 9, 10 and 11.

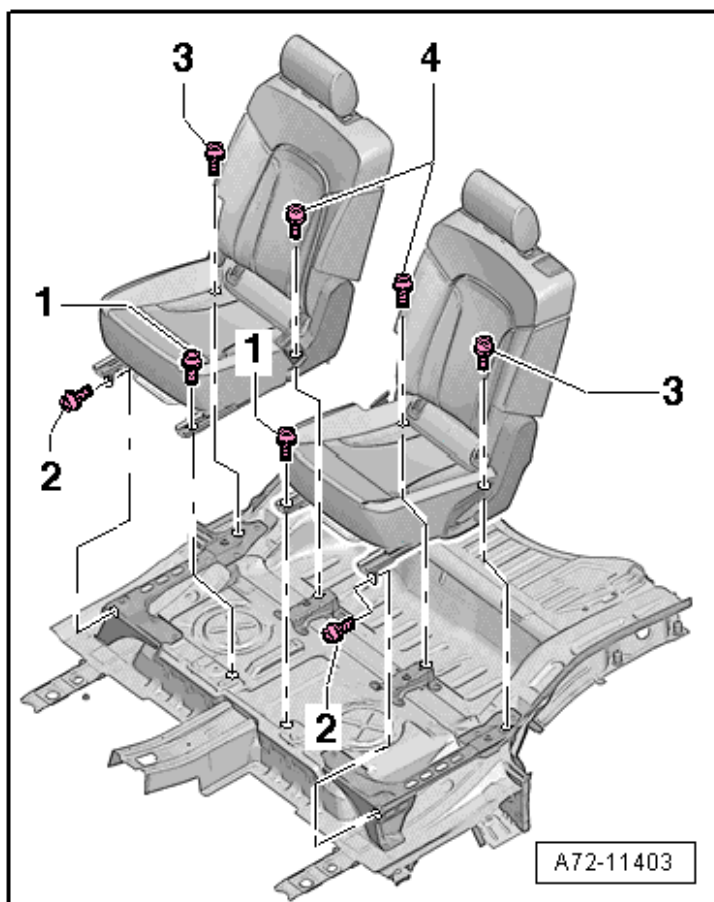
⁷⁾ For bolt tightening clarification, refer to ElsaWeb, *Right and Left Backrest Assembly Overview* items 2, 3, 7 and 8.

2nd Row, 3-Seater Assembly Sequence and Tightening Specifications:



Step	Bolts	Nm
1	Tighten bolts -2-	50
2	Insert bolts -1- "but do not tighten"	
3	Tighten bolts -4-	50
4	Tighten bolts -3-	50
5	Slide the adjustable seat all the way to the front in order to tighten bolts -1-.	50

2nd Row, 2-Seater Assembly Sequence and Tightening Specifications:



Step	Bolts	Nm
1	Tighten bolts -2-	50
2	Insert bolts -1- "but do not tighten"	
3	Tighten bolts -4-	50
4	Tighten bolts -3-	50
5	Slide the adjustable seat all the way to the front in order to tighten bolts -1-.	50

Seat Upholstery, Covers Fastener Tightening Specifications

Component	Nm
Center armrest screws	10
Center seat backrest bolt	10
Center seat backrest lock screw	18
Headrest bolt ¹⁾	10
Left and right side covers	2
Release mechanism screw	1.5
Side airbag bolt ¹⁾	10
Side airbag on the driver/passenger side bolt ¹⁾	10

¹⁾ Replace if removed

Camper Cabinets, Shelves, Water Tank Fastener Tightening Specifications

Component	Nm
Circuit Board bolt	0.9
Clips bolt	1.5
Connector bolt	2
Cooler -J698- bolt	5
Fan bolt	2
Hinge pin bolt	2.5

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
Auxiliary heater ground connection	-	9
Compressor belt pulley drive plate (diesel)	-	35
Compressor bolt	-	25
Compressor driveshaft	-	60
Compressor drive plate hex socket head bolt	-	10
Compressor drive plate	-	30
Drive plate retaining screw (V6 gasoline)	-	20
Fluid reservoir	-	10
Front expansion valve	-	10
High pressure relief valve	-	10
High pressure sensor	-	5
Oil drain plug	-	30
Rear expansion valve	-	10
Rear fresh air blower control moduel	-	10
Rear refrigerant lines-to-retaining plate	-	10
Rear refrigerant line retaining plate-to-body	-	10
Refrigerant lines-to-compressor	-	20
Refrigerant lines-to-condenser	-	20
Refrigerant lines-to-front expansion valve	-	10
Refrigerant line connection points	M6	10
	M8	20
Refrigerant temperature sensor	-	8

ELECTRICAL SYSTEM

Communication Equipment

Communication Tightening Specifications

Component	Nm
Antenna amplifiers	2
Digital sound system control module	5
Digital sound system control module 2 screw	3.5
Digital sound system control module 2 bracket screw	3
Front camera	2
Front information display control head	2
Navigation system with cd drive control module screw	2
Navigation system with cd drive control module nut	4
Radio	2
Rear DVD changer bracket nut	8
Rear DVD changer to bracket screw	2
Rear view camera system	
- Control module retainer to body nut	4
- Control module retainer to body nut	2
- Rear view camera	4
Roof antenna	6
Speakers, bass screw	4
Speakers, treble and midrange, screw	2
Telephone baseplate in center armrest	2
Tiptronic switch	3

Electrical Equipment

Battery, Starter, Generator, Cruise Control Tightening Specifications

Component	Nm
After run coolant pump bracket-to-longitudinal member (3.0L TDI)	22
Automatic Transmission Fluid (ATF) line-to-upper part of oil pan (3.0L TDI)	9
Automatic Transmission Fluid (ATF) line-to-transmission (3.0L TDI)	9
B+ wire-to-starter (3.0L TDI)	16
B+ wire-to-starter (3.0L TFSI)	15
Battery terminal-to-battery post	6
Battery jump start terminal-to-bracket	8
Energy management control module-to-chassis	20
Floor vent-to-battery cover	2
Generator-to-engine	
- 3.0L TFSI	23
- 3.0L TDI	22
Ground (GND) wire-to-energy management control module	20
Ground (GND) wire-to-ground point	20
Starter-to-transmission	
- 3.0L TDI upper bolt, without 16 mm open end wrench (T10388)	65
- 3.0L TDI upper bolt, with T10388 and torque wrench (VAG 1332)	53
- 3.0L TDI upper bolt, with T10388 and torque wrench (VAS 5820)	50
- 3.0L TDI lower bolt	45
- 3.0L starter-to-transmission lower bolt (Generation II)	65
Terminal 30/B+ to generator	16
Terminal 50-to-starter	8
Threaded pins with battery bracket-to-battery mount	20
Upper battery bracket-to-battery mount	9
Voltage stabilizer screws	4.5
Wires to the battery jump start terminal	15

Instrument Fastener Tightening Specifications

Component	Nm
12V socket 5 nut	2
Data bus On Board Diagnostic (OBD) interface-to-chassis	3.5
Instrument cluster lining-to-instrument panel	1.4
Radio frequency controlled clock receiver at bumper cover	3.5
Signal horn/dual tone horn-to-bracket	10

Windshield Wiper/Washer Fastener Tightening Specifications

Component	Nm
Headlamp washer nozzle-to-bumper cover	2.5
Rear window wiper motor-to-rear lid nut	8
Rear window wiper arm-to-wiper axle nut	12
Washer fluid reservoir-to-body	8
Windshield wiper arm-to-wiper axle nut	35
Windshield wiper motor-to-wiper frame bolt	11
Windshield wiper frame bolt	8
Windshield wiper fluid reservoir filler tube-to-coolant reservoir	8

Exterior Lights, Switches Tightening Specifications

Component	Nm
Access/start authorization switch-to-mount	1.4
Center instrument panel relay and fuse panel-to-central tube	3
Cruise control switch-to-steering column electronic systems control module	0.65
Exterior mirror housing-to-mirror mount	0.9
Fog lamp housing-to-bumper cover	2
Mechanical steering column adjustment handle trim	4.5
Headlamp housing mount-to-lock carrier bolt	4.5
HID headlamp range contro module screw	1.4
HID headlamp control module-to-headlamp	1.4
HID headlamp ballast	1.4
HID headlamp power output stages	1.4
Lower trim-to-steering column	3
Mirror mount-to-cover	0.9
Mount with access/start authorization switch-to-instrument panel	1.4
Rear lid tail lamp nut	3.5
Rear lid closed sensor-to-rear lid end panel trim panel	0.9
Side marker lamp and turn signal housing-to-bumper cover	2.5
Steering column switch module	3
Steering column switch module-to-steering column electronic systems control module	0.65
Tail lamp cap nut	3.5
Tail lamp in rear bumper screw	2.5
Trim for steering column switch	0.6
Turn signal switch retainer bolt	3
Turn signal inside the exterior mirror to the cover	0.9
Turn signal LED in exterior mirror-to-cover	0.9
Windshield wiper/washer switch-to-steering column electronic systems control module	0.65

Interior Lights, Switches Tightening Specifications

Component	Nm
Access/start authorization button-to-switch panel	0.8
Access/start authorization button-to-multimedial control head	0.8
Vehicle interior access/start authorization antenna 1-to-center console	3.5
Luggage compartment access/start authorization antenna-to-body	2
Air guide-to-air guide channel	1.4
Alarm horn-to-body	23
Ashtray housing-to-front center console frame	1.4
Bracket-to-alarm horn	8
Cover-to-E-box plenum chamber	2.5
Driver access/start authorization antenna-to-door trim	2
Front passenger access/start authorization antenna-to-door trim	2
Garage door opener control module-to-bumper cover	2.5
Inside door release mechanism-to-door trim	2.5
Interior/reading light-to-roof trim	2.6
Lane change assistance control modules screws	3.5
Lower trim-to-steering column	3.5
Steering column adjust switch-to-bottom trim	2.5
Sunroof regulator-to-interior/reading light	1.5
Steering column switch trim	0.6

Wiring Tightening Specifications

Component	Nm
Antenna ground wire	9
Basemount with fuse pane-to-central tube for instrument panel	3
Cover-to-E-box plenum chamber	2.5
Electrical wires-to-main fuse panel	4.5
Floor vent-to-battery cover	2
Main fuse panel-to-body	6
Positive wires-to-main fuse panel	15
Relay and fuse panel-to-body	3
Side curtain airbag screws	4
E-box plenum chamber uper part-to-lower parts	1.2
Vehicle eletrical system control module-to-instrument panel central tube	4.5
Vehicle eletrical system control module 2 mount-to-seat console	2

DTC CHART

Engine Code - CNRB

Fuel and Air Mixture, Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P0045	Turbocharger/Supercharger Boost Control "A" Circuit/Open	Diagnostic signal from power stage > 0.8 V (Out 1) and < 2 V (Out 2)
P0047	Turbocharger/Supercharger Boost Control "A" Circuit Low	Signal current > 8.00 to 18.00 A
P0048	Turbocharger/Supercharger Boost Control "A" Circuit High	Signal current > 8.00 to 18.00 A
P0071	Ambient Air Temperature Sensor Circuit "A" Range/Performance	<ul style="list-style-type: none"> • Number of detected faults ≥ 6.00 Cross Checks for Fault Detection • AAT (Outside Air Temperature) vs. ECT @ cylinder head > 40.0 K • AAT (Outside Air Temperature) vs IAT > 35.0 K • AAT (Outside Air Temperature) vs FTS > 35.0 K • AAT (Outside Air Temperature) vs EOT > 35.0 K • AAT (Outside Air Temperature) vs ECT @ radiator outlet > 35.0 K • AAT (Outside Air Temperature) vs ECT @ Cylinder block > 35.0 K
P0072	Ambient Air Temperature Sensor Circuit "A" Low	AAT (Outside Temperature Sensor) signal short to ground
P0073	Ambient Air Temperature Sensor Circuit "A" High	AAT (Outside Temperature Sensor) signal short to battery / open circuit
P0087	Fuel Rail/System Pressure - Too Low Bank 1	<ul style="list-style-type: none"> • Positive control deviation step 1 > 17000 - 50000 kPa • Positive control deviation step 2 > 15000 kPa • Minimum Fuel Rail Pressure < 0.00 - 12500 kPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P0088	Fuel Rail/System Pressure - Too High	<ul style="list-style-type: none"> • Control deviation < -20,000 to -30,000 kPa • Pressure > 215,000 kPa
P0090	Fuel Pressure Regulator 1 Control Circuit/Open	Signal voltage < 4.70 V
P0091	Fuel Pressure Regulator 1 Control Circuit Low	Signal voltage 2.97 V
P0092	Fuel Pressure Regulator 1 Control Circuit High	Signal Current > 3.0 A
P00AF	Turbocharger/Supercharger Boost Control "A" Module Performance	<ul style="list-style-type: none"> • Control deviation > 8.00% or • Control deviation < -8.00% • Actual position ≤ 30.0% or • Control deviation < -8.00% • Actual position > 30.0% • Mean amplitude of air mass (characteristic value) < 0.190 to 5.505%
P00C6	Fuel Rail Pressure Too Low - Engine Cranking Bank 1	Rail high pressure < 12000.00 to 23000.00 kPa
P0101	Mass or Volume Air Flow Sensor "A" Circuit Range/ Performance	<ul style="list-style-type: none"> • Ratio of modeled and measured air mass flow < 0.85 • Ratio of modeled and measured air mass flow > 1.15
P0102	Mass or Volume Air Flow Sensor "A" Circuit Low	MAF sensor signal < 83.0 μs
P0103	Mass or Volume Air Flow Sensor "A" Circuit High	MAF sensor signal > 4500.0 μs
P0104	Mass or Volume Air Flow Sensor "A" Circuit Intermittent	MAF sensor signal period failed

DTC	Error Message	Malfunction Criteria and Threshold Value
P0111	Intake Air Temperature Sensor 1 Circuit Range/Performance Bank 1	<ul style="list-style-type: none"> Number of detected faults ≥ 6.00 Cross Checks for Fault Direction: <ul style="list-style-type: none"> IAT vs. ECT @ cylinder head > 35.0 K IAT vs. AAT (Outside Air Temperature) > 35.0 K IAT vs. FTS > 35.0 K IAT vs. EOT > 35.0 K IAT vs. ECT @ radiator outlet > 35.0 K IAT vs. ECT @ cylinder block > 35.0 K
P0112	Intake Air Temperature Sensor 1 Circuit Low Bank 1	Signal voltage < 0.10 V
P0113	Intake Air Temperature Sensor 1 Circuit High Bank 1	Signal voltage > 3.255 V
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/Performance	<ul style="list-style-type: none"> ECT increase $< 2.00^{\circ}$ C ECT $< 66.0^{\circ}$ C Evaluation timer > 80.0 to 1200.0 Sec Number of detected faults ≥ 6.00 Cross Checks for Fault Detection: <ul style="list-style-type: none"> ECT @ cylinder head vs. IAT > 35.0 K ECT @ cylinder head vs. FTS > 35.0 K ECT @ cylinder head vs. AAT (Outside Air Temperature) > 40.0 K ECT @ cylinder head vs. ECT @ radiator outlet > 35.0 K ECT @ cylinder head vs. ECT @ cylinder block > 35.0 K ECT @ cylinder head vs. EOT > 35.0 K
P0117	Engine Coolant Temperature Sensor 1 Circuit Low	Signal voltage < 0.22 V
P0118	Engine Coolant Temperature Sensor 1 Circuit High	Signal voltage > 4.92 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0121	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance	<ul style="list-style-type: none"> Position sensor signal 0.15 to 0.30 V Out of range: <ul style="list-style-type: none"> Position sensor signal > 1.00 V
P0122	Throttle/Pedal Position Sensor/Switch "A" Circuit Low	Position sensor signal < 0.15 V
P0123	Throttle/Pedal Position Sensor/Switch "A" Circuit High	Position sensor signal \geq 4.85 V
P0128	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)	ECT @ cylinder head < 66.0° C
P0130	O2 Sensor Circuit Bank 1 Sensor 1	Short to Battery Voltage: <ul style="list-style-type: none"> Virtual mass (VM) > 3.00 V Nernst voltage (UN) > 4.00 V Adjustment voltage (IA/IP) >1.50 V Shorted to Ground: <ul style="list-style-type: none"> Virtual mass (VM) < 2.00 V Nernst voltage (UN) < 1.75 V Adjustment voltage (IA/IP) < 0.30 V
P0132	O2 Sensor Circuit High Voltage Bank 1 Sensor 1	Signal voltage > 3.20 V
P0133	O2 Sensor Circuit Slow Response Bank 1 Sensor 1	Time to reach 0 to 60% oxygen > 4.00 Sec.
P0134	O2 Sensor Circuit No Activity Detected Bank 1 Sensor 1	<ul style="list-style-type: none"> Integrated oxygen sensor temperature > 280000 to 917491 K Oxygen sensor heating not active
P0135	O2 Sensor Heater Circuit Bank 1 Sensor 1	<ul style="list-style-type: none"> Signal current > 2.20 A Short to ground <ul style="list-style-type: none"> Signal voltage < 2.15 V Open circuit <ul style="list-style-type: none"> Signal voltage > 4.40 V Rationality check <ul style="list-style-type: none"> O2S ceramic temp > 840.0° C O2S ceramic temp < 720.0° C
P016A	Excessive Time To Enter Closed Loop Air/Fuel Ratio Control	Control intervention 0%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0171	System Too Lean Bank 1	Fuel mass correction value < -0.03 g/rev
P0172	System Too Rich Bank 1	Fuel mass correction value < -0.03 g/rev
P0181	Fuel Temperature Sensor "A" Circuit Range/Performance	<ul style="list-style-type: none"> • Number of detected faults ≥ 6.00 Cross checks for fault detection: • FTS vs. ECT @ cylinder head > 35 K • FTS vs. IAT > 35.0 K • FTS vs. EOT > 35.0 K • FTS vs. AAT > 45 K • FTS vs. ECT @ radiator outlet > 35.0 K • FTS vs. ECT @ cylinder block > 35.0 K
P0182	Fuel Temperature Sensor "A" Circuit Low	Signal voltage < 0.10 V
P0183	Fuel Temperature Sensor "A" Circuit High	Signal voltage > 4.90 V
P0191	Fuel Rail Pressure Sensor Circuit Range/Performance Bank 1	<ul style="list-style-type: none"> • Adaptation factor of Fuel Rail Pressure Regulator Valve > 125.31% • Adaptation factor of Fuel Rail Pressure Regulator Valve < 83.20% • Offset plausibility check, signal voltage either < 0.428 V or > 0.613 V
P0192	Fuel Rail Pressure Sensor A Circuit Low Input	Signal voltage < 0.2 V
P0193	Fuel Rail Pressure Sensor Circuit High Bank 1	Signal voltage > 4.80 V
P01BA	Engine Oil Temperature Sensor "B" Range/Performance	<ul style="list-style-type: none"> • EOT cross checks for fault detection: ≥ 6 detected faults • EOT vs. ECT 3, IAT, FTS, AAT or ECT 2 > 35 Kelvin
P01BB	Engine Oil Temperature Sensor "B" Circuit Low	Signal voltage < 0.20 V for ≥ 5 sec.
P01BC	Engine Oil Temperature Sensor "B" Circuit High	Signal voltage > 4.85 V for ≥ 5 Sec.

DTC	Error Message	Malfunction Criteria and Threshold Value
P01BD	Engine Oil Temperature Sensor "B" Circuit Intermittent/ Erratic	<ul style="list-style-type: none"> • Oil temperature increase < 3.0 K • Oil temperature < 66° C • Evaluation timer > 59.0 to 1490 Sec
P01E3	Engine Coolant Temperature Sensor 3 Circuit	Signal voltage > 4.92 V
P01E4	Engine Temperature Control Sensor Circuit Range/ Performance	<ul style="list-style-type: none"> • Number of detected faults ≥ 6.00 Cross Checks for Fault Detection: <ul style="list-style-type: none"> • ETC @ cylinder block vs. IAT > 35.0 K • ECT @ cylinder block vs FTS > 35.0 K • ECT @ cylinder block vs AAT (Outside Air Temperature) > 35.0 K • ECT @ cylinder block vs ECT @ radiator outlet > 35.0 K • ECT @ cylinder block vs ECT @ Cylinder head > 35.0 K • ECT @ cylinder block vs EOT > 35.0 K
P01E5	Engine Coolant Temperature Sensor 3 Circuit Low	Signal voltage < 0.22 V
P0201	Cylinder 1 Injector "A" Circuit	<ul style="list-style-type: none"> • Signal from power stage > 60.0 V Short to battery plus (low side) <ul style="list-style-type: none"> • Signal voltage failed Short circuit over load: <ul style="list-style-type: none"> • Signal voltage > 30.0 V Short circuit (low side) <ul style="list-style-type: none"> • Deviation between set and actual signal voltage after charging > 30.0% • Deviation between set and actual signal voltage before charging. 45.0%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0202	Cylinder 2 Injector "A" Circuit	<ul style="list-style-type: none"> • Signal from power stage > 60.0 V Short to battery plus (low side) • Signal voltage failed Short circuit over load • Short circuit over load signal Voltage > 30 V Short circuit low side: • Deviation between set and actual signal voltage after charging > 30.0% • Deviation between set and actual signal voltage before charging. 45.0%
P0203	Cylinder 3 Injector "A" Circuit	<ul style="list-style-type: none"> • Signal from power stage > 60.0 V Short to battery plus (low side) • Signal voltage failed Short circuit over load • Signal voltage > 30.0 V • Deviation between set and actual signal voltage after charging > 30.0% • Deviation between set and actual signal voltage before charging. 45.0%
P0204	Cylinder 4 Injector "A" Circuit	<ul style="list-style-type: none"> • Signal from power stage > 60.0 V Short to battery plus (low side) • Signal voltage failed Short circuit over load • Signal voltage > 30.0 V • Deviation between set and actual signal voltage after charging > 30.0% • Deviation between set and actual signal voltage before charging. 45.0%

DTC Chart

DTC	Error Message	Malfunction Criteria and Threshold Value
P0205	Cylinder 5 Injector "A" Circuit	<ul style="list-style-type: none"> • Signal from power stage > 60.0 V Short to battery plus (low side) • Signal voltage failed Short circuit over load • Signal voltage > 30.0 V • Deviation between set and actual signal voltage after charging > 30.0% • Deviation between set and actual signal voltage before charging. 45.0%
P0206	Cylinder 6 Injector "A" Circuit	<ul style="list-style-type: none"> • Signal from power stage > 60.0 V Short to battery plus (low side) • Signal voltage failed Short circuit over load • Signal voltage > 30.0 V • Deviation between set and actual signal voltage after charging > 30.0% • Deviation between set and actual signal voltage before charging. 45.0%
P0234	Turbocharger/Supercharger "A" Overboost Condition	<ul style="list-style-type: none"> • Difference set value boost pressure vs. actual boost pressure value < -22.0 kPa or • Boost pressure > 160.00 to 300.00 kPa
P0236	Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance	Difference barometric sensor signal vs. boost pressure signal > 14.00 kPa
P0237	Turbocharger/Supercharger Boost Sensor "A" Circuit Low	Sensor voltage < 0.40 V
P0238	Turbocharger/Supercharger Boost Sensor "A" Circuit High	Sensor voltage > 4.90 V
P0263	Cylinder 1 Contribution/Balance	<ul style="list-style-type: none"> • Injection balancing amount per cylinder. > 0.0005 to 0.006 g/rev • Calibration value of injector energizing time either < 109 to 167 or > 224 412 μs • Diagnostic signal from power stage failed

DTC	Error Message	Malfunction Criteria and Threshold Value
P0266	Cylinder 2 Contribution/ Balance	<ul style="list-style-type: none"> Injection balancing amount per cylinder. > 0.0005 to 0.006 g/ rev Calibration value of injector energizing time either < 109 to 167 or > 224 412 μs Diagnostic signal from power stage failed
P026A	Charge Air Cooler Efficiency Below Threshold	Filtered charge air cooler efficiency < 7
P0269	Cylinder 3 Contribution/ Balance	<ul style="list-style-type: none"> Injection balancing amount per cylinder. > 0.0005 to 0.006 g/ rev Calibration value of injector energizing time either < 109 to 167 or > 224 412 μs Diagnostic signal from power stage failed
P0272	Cylinder 4 Contribution/ Balance	<ul style="list-style-type: none"> Injection balancing amount per cylinder. > 0.0005 to 0.006 g/ rev Calibration value of injector energizing time either < 109 to 167 or > 224 412 μs Diagnostic signal from power stage failed
P0275	Cylinder 5 Contribution/ Balance	<ul style="list-style-type: none"> Injection balancing amount per cylinder. > 0.0005 to 0.006 g/ rev Calibration value of injector energizing time either < 109 to 167 or > 224 412 μs Diagnostic signal from power stage failed
P0278	Cylinder 6 Contribution/ Balance	<ul style="list-style-type: none"> Injection balancing amount per cylinder. > 0.0005 to 0.006 g/ rev Calibration value of injector energizing time either < 109 to 167 or > 224 412 μs Diagnostic signal from power stage failed

DTC	Error Message	Malfunction Criteria and Threshold Value
P0299	Turbocharger/Supercharger "A" Underboost Condition	<ul style="list-style-type: none"> • Difference set value boost pressure vs. actual boost pressure value: depending on ECT > 30.00 to 99.90 kPa • Difference set value boost pressure vs. actual boost pressure value: depending on engine speed and fuel quantity > 35.00 to 100.00 kPa • Boost pressure < 0.00 to 85.00 kPa
Start here		
P2002	Particulate Trap Bank 1 Efficiency Below Threshold	<ul style="list-style-type: none"> • Differential pressure < f (volumetric flow rate, soot load) or • Differential pressure < f (volumetric flow rate)
P2004	Intake Manifold Runner Control (Bank 1) Stuck Open	<ul style="list-style-type: none"> • Control deviation > 10% • Actual position ≤ 40%V
P2005	Intake Manifold Runner Control (Bank 2) Stuck Open	<ul style="list-style-type: none"> • Control deviation > 10% • Actual position ≤ 40%V
P2006	Intake Manifold Runner Control (Bank 1) Stuck Closed	<ul style="list-style-type: none"> • Control deviation > 10% • Actual position > 40%V
P2007	Intake Manifold Runner Control (Bank 2) Stuck Closed	<ul style="list-style-type: none"> • Control deviation > 10% • Actual position > 40%V
P2008	Intake Manifold Runner (Bank 1) Control Circuit/Open	<ul style="list-style-type: none"> • Diagnostic signal from power stage > 0.8 V (output 1) and < 2 V (output 2) or • Diagnostic signal from power stage = 8 to 18 A or • Diagnostic signal from power stage > 5 V or < 3.4 V
P2009	Intake Manifold Runner (Bank 1) Control Circuit Low	Diagnostic signal from power stage 8 to 18 A
P2010	Intake Manifold Runner Control Circuit High (Bank 1)	Diagnostic signal from power stage = 8 to 18 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P2011	Intake Manifold Runner (Bank 2) Control Circuit Stuck Open	<ul style="list-style-type: none"> • Diagnostic signal from power stage > 0.8 V (output 1) and < 2 V (output 2) or • Diagnostic signal from power stage = 8 to 18 A or • Diagnostic signal from power stage > 5 V or < 3.4 V
P2012	Intake Manifold Runner Bank 2 Control Circuit Low	Diagnostic signal from power stage 8 to 18 A
P2013	Intake Manifold Runner Bank 2 Control Circuit High	Diagnostic signal from power stage = 8 to 18 A
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance	<ul style="list-style-type: none"> • Position sensor signal < 3550 mV • Position sensor signal > 1450 mV or • Position sensor signal > 550 mV and < 250 mV or • Position sensor signal > 4450 mV and < 4750 mV
P2016	Intake Manifold Runner Position Sensor Circuit Low	Position sensor signal \leq 250 mV
P2017	Intake Manifold Runner Position Sensor Circuit High	Position sensor signal \geq 4750 mV
P202A	Reducing Agent Tank Heater Control Circuit/Open	Conductance @ start of heating \leq 0.10 1/Ohm
P202B	Reducing Agent Tank Heater Control Circuit Low	Conductance @ start of heating < 0.30 1/Ohm
P202C	Reducing Agent Tank Heater Control Circuit High	Conductance @ start of heating > 1.50 1/Ohm
P2020	Intake Manifold Runner Position Sensor Circuit (Bank 2) Range/Performance	<ul style="list-style-type: none"> • Position sensor signal < 3550 mV • Position sensor signal 1450 mV or • Position sensor signal > 550 mV and < 250 mV or • Position sensor signal > 4450 mV and < 4750 mV

DTC	Error Message	Malfunction Criteria and Threshold Value
P2021	Intake Manifold Runner Position Sensor Circuit (Bank 2) Low	Position sensor signal \leq 250 mV
P2022	Intake Manifold Runner Position Sensor Circuit (Bank 2) High	Position sensor signal \geq 4750 mV
P203B	Reducing Agent Level Sensor Circuit Range/Performance	<ul style="list-style-type: none"> • Signal Voltage not equal Full Level $<$ 1.76 V or $>$ 2.02 V or • Signal Voltage not Equal Half Full Level , 2.03 V or $>$ 2.31 V or • Signal Voltage not Equal Empty Level $<$ 1.32 V or $>$ 1.53 V or • Signal Voltage not Equal SCR Values $<$ 0.25 V $>$ 2.35 V
P203C	Reducing Agent Level Sensor Circuit Open or Grounded	Signal Voltage $<$ 0.25 V
P203D	Reducing Agent Level Sensor Circuit Short to Battery Voltage	Signal Voltage $>$ 2.35 V
P2031	Exhaust Gas Temperature Sensor 2 Circuit	Signal voltage $>$ 1652 mV
P2032	Exhaust Gas Temperature (Sensor 2) Circuit Low	Signal voltage $<$ 330 mV
P204A	Reducing Agent Pressure Sensor Circuit Open / Short Ground	Signal voltage $<$ 0.8 V
P204B	Reducing Agent Pressure Sensor Circuit Range/ Performance	Actual pressure Reduction Agent delivery system $>$ 50.00 kPa
P204D	Reducing Agent Pressure Sensor Circuit High	Signal voltage $>$ 4.90 V
P2047	Reducing Agent Injection Valve Circuit Open	Signal Voltage $<$ 4.7 V
P2048	Reducing Agent Injection Valve Circuit Grounded	<ul style="list-style-type: none"> • Signal Voltage $<$ 2.97 V or • Signal Current $>$ 1.6 A
P2049	Reducing Agent Injection Valve Circuit Short to Battery Voltage	<ul style="list-style-type: none"> • Signal Current $>$ 1.8 A or • Analog measure $<$ 200 mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P205A	Reducing Agent Tank Temperature Sensor Circuit Short to Battery Voltage or Open	Signal voltage > 4.30 V
P205B	Reducing Agent Tank Temperature Sensor Circuit Range/Performance	Case 1: <ul style="list-style-type: none"> • AAT > 25 °C • Difference between Reducing agent (AdBlue®) to ECT < -30 °K Case 2: <ul style="list-style-type: none"> • AAT < 25 °C • Difference between reducing agent (AdBlue®) to ECT < -30 °K • Reducing agent temperature increase while heating tank < 1.5 K • For time < 1500.0 s
P205C	Reducing Agent Tank Temperature Sensor Circuit Grounded	Signal voltage < 0.04 V
P207F	Reducing Agent Quality Performance	Average efficiency < 0.50 [-]
P208A	Reducing Agent Pump Control Circuit/Open	Signal voltage > 4.7 V
P208C	Reducing Agent Pump Control Circuit Grounded	Signal voltage < 2.74 V
P208D	Reducing Agent Pump Control Circuit High	Signal current > 4.0 A
P208E	Reducing Agent Injection Valve Stuck Closed (Bank 1 Unit 1)	Missing number of signal peaks > 50
P2080	Exhaust Gas Temperature Sensor Circuit Bank 1 Range/Performance	<ul style="list-style-type: none"> • Temperature difference to temp EGR T3, T4, T5, T6 > 60 °K or <ul style="list-style-type: none"> • Mean value of modeled to measured T4 > 100 °K
P2084	Exhaust Gas Temperature Sensor 2 Circuit Range/Performance	<ul style="list-style-type: none"> • Temperature difference to temp EGR T3, T4, T5, T6 > 60 °K or <ul style="list-style-type: none"> • Mean value of modeled to measured T3 > 100 °K

DTC	Error Message	Malfunction Criteria and Threshold Value
P20BB	Reducing Agent Tank Heater Control Circuit Shorted to Ground	Diagnostic signal from power stage < 2.97 V
P20BC	Reducing Agent Tank Heater Control Circuit Shorted to Battery Voltage	Diagnostic signal from power stage > 2.2 A
P20BD	Reducing Agent Heater 2 Control Circuit/Open	Diagnostic signal from power stage > 4.7 V
P20BF	Reducing Agent Heater 2 Control Circuit/Low	Diagnostic signal from power stage < 2.97 V
P20B5	Reducing Agent Metering Unit Heater Control Circuit/Open	Conductance during heating ≤ 0.10 1/Ohm
P20B7	Reducing Agent Metering Unit Heater Control Circuit Low	Conductance @ start heating < 0.30 1/Ohm
P20B8	Reducing Agent Metering Unit Heater Control Circuit High	Conductance @ start heating > 1.00 1/Ohm
P20B9	Reducing Agent Tank Heater Control Circuit Open	Diagnostic signal from power stage < 4.7 V
P20C0	Reducing Agent Heater 2 Control Circuit High	Diagnostic signal from power stage > 2.2 A
P20EE	SCR NOx Catalyst Efficiency Below Threshold	Difference between calculated and measured efficiency < 0.2[-]
P20E8	Reducing Agent Pressure Too Low / Functional Check	<ul style="list-style-type: none"> • Actual pressure < 300.00 kPa for 55 s or • Actual pressure < 400.00 kPa for 60 s or • Pressure built up for 21.00[-] Attempts > 350 kPa
P20E9	Reducing Agent Pressure Too High	<ul style="list-style-type: none"> • Actual pressure > 790.00 kPa for 0.0 s or • Actual pressure > 650.00 kPa for 10 s or • Pressure @ Dosing end > 50 kPa
P20F4	Reducing Agent Consumption Too High	SCR adaptive value ≥ 1.79
P20F5	Reducing Agent Consumption Too Low	SCR adaptive value ≤ 0.51

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	<ul style="list-style-type: none"> • Counted misfire per cylinder > 180.00 • Number of combustion cycles tested \geq 220.00 • Number of cylinders with detected misfire > 1.00
P0301	Cylinder 1 Misfire Detected	<ul style="list-style-type: none"> • Counted misfire per cylinder > 180.00 • Number of combustion cycles tested \geq 220.00
P0302	Cylinder 2 Misfire Detected	<ul style="list-style-type: none"> • Counted misfire per cylinder > 180.00 • Number of combustion cycles tested \geq 220.00
P0303	Cylinder 3 Misfire Detected	<ul style="list-style-type: none"> • Counted misfire per cylinder > 180.00 • Number of combustion cycles tested \geq 220.00
P0304	Cylinder 4 Misfire Detected	<ul style="list-style-type: none"> • Counted misfire per cylinder > 180.00 • Number of combustion cycles tested \geq 220.00
P0305	Cylinder 5 Misfire Detected	<ul style="list-style-type: none"> • Counted misfire per cylinder > 180.00 • Number of combustion cycles tested \geq 220.00
P0306	Cylinder 6 Misfire Detected	<ul style="list-style-type: none"> • Counted misfire per cylinder > 180.00 • Number of combustion cycles tested \geq 220.00
P0321	Ignition/Distributor Engine Speed Input Circuit Range/Performance	<ul style="list-style-type: none"> • Counted teeth vs. reference > 200.0 or • Monitoring reference gap failure
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	<ul style="list-style-type: none"> • Camshaft signals > 3.00 and • Camshaft signals = no signal
P0381	Glow Plug/Heater Indicator Control Circuit/Open	Glow plug indicator control (sent message) vs. glow plug indicator (received message) status not equal

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0401	EGR "A" Flow Insufficient Detected	Control deviation (EGR) < - 45.0 to 200.0 g/rev
P0402	EGR "A" Flow Excessive Detected	Mass air flow ratio calculated from: mass air flow measured vs. mass air flow modeled > 1.29
P0403	EGR "A" Control Circuit/Open	<ul style="list-style-type: none"> • Signal current > 8.00 to 18.0 A • Control deviation > 10.00% or • Control deviation <-10.00% • Actual position > 17.00%
P0404	EGR "A" Control Circuit Range/Performance	<ul style="list-style-type: none"> • Control deviation > 10% • Actual position > 17%
P0405	EGR Sensor "A" Circuit Low	Position sensor signal \geq 0.25 V
P0406	EGR Sensor "A" Circuit High	Position sensor signal \geq 4.75 V
P040B	EGR Temperature Sensor "A" Circuit Range/Performance	<ul style="list-style-type: none"> • Measured sensor temperature - mean value of modelled temperature < -90.0 to -40.0 K Cross Checks for Fault Detection: <ul style="list-style-type: none"> • TEGR vs. EGT upstream Catalyst > 40.0 K • TEGR vs. EGT downstream Catalyst > 40.0 K • TEGR vs. EGT downstream DPF > 40.0 K • TEGR vs. EGT upstream Turbocharger > 40.0 K
P040C	EGR Temperature Sensor "A" Circuit Low	Signal voltage < 0.68 V
P040D	EGR Temperature Sensor "A" Circuit High	Signal voltage > 2.61 V
P0420	Catalyst System Efficiency Below Threshold Bank 1	Ratio of measured and modeled heat < 0.30
P046C	EGR Sensor "A" Circuit Range/Performance	<ul style="list-style-type: none"> • Position sensor signal > 1.05 V Out of range • Position sensor signal 0.25 to 0.35 V
P04DD	Cold Start EGR "A" Flow Insufficient Detected	Control deviation < f (engine speed, injection quantity, target air mass flow)

DTC	Error Message	Malfunction Criteria and Threshold Value
P04DE	Cold Start EGR "A" Flow Excessive Detected	Ratio of modeled and measured air mass flow > f (turbo charger position)

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor "A" Circuit Range/Performance	Vehicle speed < 2.00 MPH
P0502	Vehicle Speed Sensor "A" Circuit Low	<ul style="list-style-type: none"> • Sensor signal failure or • Speed sensor signal: electrical error
P0506	Idle Control System RPM - Lower Than Expected	Difference between target and measured idle engine speed < 10.0%
P0507	Idle Control System RPM - Higher Than Expected	Difference between target and measured idle engine speed > 10.0%
P050A	Cold Start Idle Control System Performance	Idle speed control deviation more than 10% under or 10% above desired idle speed
P050E	Cold Start Engine Exhaust Temperature Too Low	<ul style="list-style-type: none"> • Calculated SCR-temperature < 150.0 to 200.0 °C • Modeled heat quantity ≥ 120.0 to 200.0 kJ
P052F	Glow Plug Control Module 1 System Voltage	Voltage supply via LIN message = 0.00 V
P0544	Exhaust Gas Temperature Sensor Circuit Bank 1 Sensor 1	Signal voltage > 2.61 V
P0545	Exhaust Gas Temperature Sensor Circuit Low Bank 1 Sensor 1	Signal voltage < 0.68 V
P054E	Idle Control System - Fuel Quantity Lower Than Expected	Expected fuel quantity vs. actual fuel quantity < 0.004 g/rev.
P054F	Idle Control System - Fuel Quantity Higher Than Expected	Expected fuel quantity vs. actual fuel quantity > 0.018 to 0.033 g/rev

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0604	Internal Control Module Random Access Memory (RAM) Error	EEPROM error
P0605	Internal Control Module Read Only Memory (ROM) Error	Internal self test failed
P0606	Control Module Processor	<ul style="list-style-type: none"> • Number of camshaft revolutions with irregular Pol 1 shut offs > 10.00 • Number of camshaft revolutions with irregular Pol 2 shut offs > 10.00
P0607	Control Module Performance	<ul style="list-style-type: none"> • Supply voltage for IC < 9.00 V Communication check • Internal check failed Signal range check • Oxygen sensor adaption value is either > 0.20 or < -0.20 V Short to ground • Sensor voltage < 0.94 V Short to battery / open circuit • Sensor voltage > 4.76 V
P0634	Control Module Internal Temperature "A" Too High	Power stage temperature > 150.0 °C
P0638	Throttle Actuator Control Range/Performance Bank 1	Diagnostic signal = low state
P0641	Sensor Reference Voltage "A" Circuit/Open	Signal voltage deviation > +/- 0.30 V
P064C	Glow Plug Control Module 1	Message from glow plug control module incorrect
P0651	Sensor Reference Voltage "B" Circuit/Open	Signal voltage deviation > +/- 0.30 V
P066A	Cylinder 1 Glow Plug Control Circuit Low	Glow current \geq 70.0 A
P066B	Cylinder 1 Glow Plug Control Circuit High	Message from glow plug control module incorrect
P066C	Cylinder 2 Glow Plug Control Circuit Low	Glow current \geq 70.0 A
P066D	Cylinder 2 Glow Plug Control Circuit High	Message from glow plug control module incorrect
P066E	Cylinder 3 Glow Plug Control Circuit Low	Glow current \geq 70.0 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P066F	Cylinder 3 Glow Plug Control Circuit High	Message from glow plug control module incorrect
P0671	Cylinder 1 Glow Plug Circuit/ Open	Glow current ≤ 2.20 A
P0672	Cylinder 2 Glow Plug Circuit/ Open	Glow current ≤ 2.20 A
P0673	Cylinder 3 Glow Plug Circuit/ Open	Glow current ≤ 2.20 A
P0674	Cylinder 4 Glow Plug Circuit/ Open	Glow current ≤ 2.20 A
P0675	Cylinder 5 Glow Plug Circuit/ Open	Glow current ≤ 2.20 A
P0676	Cylinder 6 Glow Plug Circuit/ Open	Glow current ≤ 2.20 A
P067A	Cylinder 4 Glow Plug Control Circuit Low	Glow current ≥ 70 A
P067B	Cylinder 4 Glow Plug Control Circuit High	Message from Glow Plug Control Module incorrect
P067C	Cylinder 5 Glow Plug Control Circuit Low	Glow current ≥ 70 A
P067D	Cylinder 5 Glow Plug Control Circuit High	Message from Glow Plug Control Module incorrect
P067E	Cylinder 6 Glow Plug Control Circuit Low	Glow current ≥ 70 A
P067F	Cylinder 6 Glow Plug Control Circuit High	Message from Glow Plug Control Module incorrect
P0683	Glow Plug Control Module 1 to PCM Communication Circuit	LIN message no feedback
P0697	Sensor Reference Voltage "C" Circuit/Open	Signal voltage deviation $> +/- 0.30$ V
P06B0	Sensor Power Supply "A" Circuit/Open	Sensor supply voltage < 2.00 to > 5.30 V
P06B9	Cylinder 1 Glow Plug Circuit Range/Performance	<ul style="list-style-type: none"> • Glow plug resistance (between 4 - 9 Sec.) < 0.3 ohm • Glow plug resistance (between 9 - 14 Sec.) < 0.4 ohm • Glow plug resistance (after 14 Sec.) < 0.5 ohm • Glow plug resistance anytime > 1.2 ohm

DTC	Error Message	Malfunction Criteria and Threshold Value
P06BA	Cylinder 2 Glow Plug Circuit Range/Performance	<ul style="list-style-type: none"> • Glow plug resistance (between 4 - 9 Sec.) < 0.3 ohm • Glow plug resistance (between 9 - 14 Sec.) < 0.4 ohm • Glow plug resistance (after 14 Sec.) < 0.5 ohm • Glow plug resistance anytime > 1.2 ohm
P06BB	Cylinder 3 Glow Plug Circuit Range/Performance	<ul style="list-style-type: none"> • Glow plug resistance (between 4 - 9 Sec.) < 0.3 ohm • Glow plug resistance (between 9 - 14 Sec.) < 0.4 ohm • Glow plug resistance (after 14 Sec.) < 0.5 ohm • Glow plug resistance anytime > 1.2 ohm
P06BC	Cylinder 4 Glow Plug Circuit Range/Performance	<ul style="list-style-type: none"> • Glow plug resistance (between 4 - 9 Sec.) < 0.3 ohm • Glow plug resistance (between 9 - 14 Sec.) < 0.4 ohm • Glow plug resistance (after 14 Sec.) < 0.5 ohm • Glow plug resistance anytime > 1.2 ohm
P06BD	Cylinder 5 Glow Plug Circuit Range/Performance	<ul style="list-style-type: none"> • Glow plug resistance (between 4 - 9 Sec.) < 0.3 ohm • Glow plug resistance (between 9 - 14 Sec.) < 0.4 ohm • Glow plug resistance (after 14 Sec.) < 0.5 ohm • Glow plug resistance anytime > 1.2 ohm
P06BE	Cylinder 6 Glow Plug Circuit Range/Performance	<ul style="list-style-type: none"> • Glow plug resistance (between 4 - 9 Sec.) < 0.3 ohm • Glow plug resistance (between 9 - 14 Sec.) < 0.4 ohm • Glow plug resistance (after 14 Sec.) < 0.5 ohm • Glow plug resistance anytime > 1.2 ohm
P06C5	Cylinder 1 Glow Plug Incorrect	Internal resistance < 0.11 and > 1.15 Ω
P06C6	Cylinder 2 Glow Plug Incorrect	Internal resistance < 0.11 and > 1.15 Ω

DTC	Error Message	Malfunction Criteria and Threshold Value
P06C7	Cylinder 3 Glow Plug Incorrect	Internal resistance < 0.11 and > 1.15 Ω
P06C8	Cylinder 4 Glow Plug Incorrect	Internal resistance < 0.11 and > 1.15 Ω
P06C9	Cylinder 5 Glow Plug Incorrect	Internal resistance < 0.11 and > 1.15 Ω
P06CA	Cylinder 6 Glow Plug Incorrect	Internal resistance < 0.11 and > 1.15 Ω
P06E5	Glow Plug Control Module 1 Performance	Ground offset ≥ 1.76 V or ≤ -1.76 V
P06FE	Cold Start Diesel Intake Air Flow Control Performance	Signal low
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus Performance	Global time out. Receiving no messages.
U0028	Vehicle Communication Bus A	CAN message = no feedback
U0029	Vehicle Communication Bus A Performance	Global time out. Receiving no messages.
U0101	Lost Communication with TCM	No TCM messages received.
U0106	Lost Communication with Glow Plug Control Module	No message received
U0121	Lost Communication with Anti-Lock Brake System (ABS) Control Module	No CAN messages received from ABS module
U0140	Lost Communication with Body Control Module	No CAN messages from BCM
U0146	Lost Communication with Gateway "A"	CAN messages from Gateway = no message.
U0155	Lost Communication with Instrument Panel Cluster (IPC) Control Module	No CAN messages received from Instrument cluster
U02A3	Lost Communication with PM Sensor	No CAN message received
U0302	Software Incompatibility with Transmission Control Module	Auto trans messages received from ECM
U0307	Software Incompatibility with Glow Plug Control Module	Error bit = set

DTC	Error Message	Malfunction Criteria and Threshold Value
U0402	Invalid Data Received From Transmission Control Module	Wrong TCM messages received.
U0407	Invalid Data Received From Glow Plug Control Module	Implausible messages received
U0415	Invalid Data Received From Anti-Lock Brake System Control Module	<ul style="list-style-type: none"> • Error bit = set • Implausible data from ABS or • Speed sensor signal = 655.35 km/h
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	Error message sent from instrument cluster = invalid data
U0447	Invalid Data Received From Gateway "A"	Implausible message from gateway
U04A4	NOx Sensor Communication Check / Signal Range Check	Communication error
U1006	NOx Sensor 1 (Front) No communication	No messages from NOx sensor 1 module
U1024	Communications Bus Fault	Error bit set
U1034	NOx Sensor 1 (Front) Implausible Signal	Data from NOx sensor 1 module implausible
U10C1	NOx Sensor 1 (Rear) Implausible Signal	Data from NOx sensor 2 module implausible
U10C2	NOx Sensor 1 (Rear) No Communication	No messages from NOx sensor 2 module
P1103	ECM: Production Mode	Production mode = Active

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P1419	Exhaust Gas Recirculation Cooler Switch-Over Valve 2 Short Circuit to Voltage	Diagnostic signal from power stage > 1.5 A
P146D	Heater 1 for Reducing Agent Sensor Short Circuit to Voltage	Signal voltage > 4.70 V
P146F	Heater 2 for Reducing Agent Sensor Short Circuit to Voltage	Signal voltage > 4.70 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P148F	Exhaust Gas Recirculation Cooler Switch-Over Valve 2 Electrical Malfunction	Diagnostic signal from power stage < 2.97 V
P1499	Exhaust Gas Recirculation Cooler Switch-Over Valve 2 Open Circuit/Short Circuit to Ground	Diagnostic signal from power stage > 4.5 V
P149D	Reducing agent transfer pump Open circuit	Signal voltage < 4.70 V
P149E	Reducing Agent Transfer Pump Circuit Grounded	Signal voltage < 2.97 V
P149F	Reducing Agent Transfer Pump Circuit Short to Battery Voltage	Signal Current > 3.0 A
P150A	Engine Off Time Performance	ECM time - IPC time > 12 Sec.
P2100	Throttle Actuator Control Motor Circuit/Open	Signal from power stage > 3.26 V and < 5.40 V
P2101	Throttle Actuator Control Motor Circuit Range/Performance	Signal = no change
P2102	Throttle Actuator Control Motor Circuit Low	Signal from power stage \leq 3.26 V
P2103	Throttle Actuator Control Motor Circuit High	Signal from power stage > 1.50 V and > 50 mA
P2122	Throttle/Pedal Position Sensor/Switch D Circuit Low Input	Signal voltage < 0.646 V
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High Input	Signal voltage > 4.889 V
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low Input	Signal voltage < 0.276 V
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.644 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage sensor 1 vs. sensor 2 > 143 - 260 mV
P2146	Fuel Injector Group "A" Supply Voltage Circuit Open	Diagnostic signal from power stage = internal signal

DTC	Error Message	Malfunction Criteria and Threshold Value
P2149/ P2152	Fuel Injector Group C Supply Voltage Circuit/Open	Diagnostic signal from power stage = internal signal
P2181	Engine Coolant Temperature Sensor On Radiator Outlet Circuit Rationality Check	Deviation between target and measured ECT < -7.5 Kelvin
P2183	Engine Coolant Temperature Sensor On Radiator Outlet Circuit Cross Check	ECT 2 at radiator outlet vs IAT or AAT or FTS at start up > 35 Kelvin
P2184	Engine Coolant Temperature Sensor On Radiator Outlet Circuit Grounded	Signal voltage < 162 mV
P2185	Engine Coolant Temperature Sensor On Radiator Outlet Circuit Short to Battery Voltage	Signal voltage > 3255 mV
P2195	O2 Sensor Signal Stuck Lean (Bank 1, Sensor 1)	<ul style="list-style-type: none"> • Measured oxygen concentration @ fuel cutoff > 25.6% or • Measured oxygen concentration @ part load > (calculated) 6.5%
P2196	O2 Sensor Signal Stuck Rich (Bank 1, Sensor 1)	Measured oxygen concentration @ fuel cutoff > 14.7%
P220A	NOx Sensor Front Circuit Supply Voltage	Sensor supply voltage > 1.5 or < 12 V
P220B	NOx Sensor Rear Supply Voltage Circuit	Sensor supply voltage > 1.5
P2200	NOx Sensor Front Circuit Failure	NOx sensor signal ratio of validity > = 0.50 [-]
P2201	NOx Sensor Circuit Range/ Performance	<ul style="list-style-type: none"> • NOx 40 - 70%, time > 5 Sec. or 40% value not reached within 7 Sec. • Ratio > 3 or < -0.75 • Average NOx Offset value > 50 or < -30 ppm
P2202	NOx Sensor Front Circuit Low	NOx value < -105 ppm
P2203	NOx Sensor Front Circuit High	NOx value > 1655 ppm
P2209	NOx Sensor Front Rationality Check	NOx control active time since dew point exceeded

DTC	Error Message	Malfunction Criteria and Threshold Value
P2237	O2 Sensor Positive Current Control Circuit (Bank 1 Sensor 1) Open	Measured oxygen concentration < 0.005
P2243	O2 Sensor Reference Voltage Circuit (Bank 1 Sensor 1) Open	<ul style="list-style-type: none"> • O2S internal resistance > 3 V • Oxygen signal < -1.3 V or > 1.5 V
P2251	O2 Sensor Negative Current Control Circuit (Bank 1 Sensor 1) Open	<ul style="list-style-type: none"> • O2S internal resistance voltage > 3 V • Oxygen signal < -1.3 V or > 1.5 V
P2263	Turbocharger Boost System Performance	Control deviation > 8%
P2279	Turbocharger Boost Pressure Intake Air System Leak	Ratio of measured and modeled mass air flow = 0.45 - 0.80[-]
P229E	NOx Sensor Rear Circuit Short or Open	<ul style="list-style-type: none"> • Message From NOx Sensor = Failure or • NOx sensor status ratio of validity $\geq 0.5[-]$
P229F	NOx Sensor Rear Circuit Range /Performance	<ul style="list-style-type: none"> • Average NOx offset value > 50 ppm • Number of checks = 2 or • Average NOx offset value > 50 or < -30 ppm • Number of checks = 2[-] or • Measured oxygen concentration compared with calculated oxygen concentration deviation @ part load > 5.3%
P2294	Fuel Pressure Metering Valve Control Circuit Open	Signal Voltage < 4.7 V
P2295	Fuel Pressure Metering Valve Control Circuit Grounded	Signal Voltage < 2.97 V
P2296	Fuel Pressure Metering Valve Control Circuit Short to Battery Voltage	Signal Current > 3.0 A
P22A0	NOx Sensor Rear Circuit Low	NOx value < -105 ppm
P22A1	NOx Sensor Rear Circuit High	NOx value > 1655 ppm
P22A7	NOx Sensor Rear Rationality Check	NOx control active time since dew point exceeded >180 s

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P240F	Exhaust Gas Recirculation Slow Response	<ul style="list-style-type: none"> • Calculated characteristic value (for positive gradients of desired air flow) > 70 or • Calculated characteristic value (for negative gradients of desired air flow) > 50
P242A	Exhaust Gas Temperature Sensor Circuit (Bank 1 Sensor 3)	Signal voltage > 1652 mV
P242B	Exhaust Gas Temperature Sensor Circuit (Bank 1 Sensor 3) Range/Performance	<ul style="list-style-type: none"> • Temperature difference to EGR temp, T3, T4, T5, T6 > 60 °K or • Mean value of modeled - measured T5 > 100 °K
P242C	Exhaust Gas Temperature Sensor Circuit Low (Bank 1 Sensor 3)	Signal voltage < 330 mV
P2425	Exhaust Gas Recirculation Cooling Valve Control Circuit Open	Diagnostic signal from power stage > 4.5 V
P2426	Exhaust Gas Recirculation Cooling Valve Control Circuit Low	Diagnostic signal from power stage < 2.97 V
P2427	Exhaust Gas Recirculation Cooling Valve Control Circuit Shorted Battery Voltage	Diagnostic signal from power stage > 2.2 A
P244C	Exhaust Temperature Too Low For Particulate Filter Regeneration (Bank 1)	Time to closed loop 120 - 300 Sec.
P245B	Exhaust Gas Recirculation Cooler Bypass Control Circuit Range/Performance	<ul style="list-style-type: none"> • Positive difference between measured and target temperature too high = 10.0 - 70.0 [K] or • Negative difference between measured and target temperature too low = -12.0 -7.0 [K]
P2452	Diesel Particulate Filter Differential Pressure Sensor Circuit	Sensor voltage > 4.9 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2453	Diesel Particulate Filter Differential Pressure Sensor Circuit Range/Performance	Pressure drop > 3 kPa or < -3 kPa
P2454	Diesel Particulate Filter Differential Pressure Sensor Circuit Low	Sensor voltage < 0.2 V
P2458	Diesel Particulate Filter Regeneration Duration	Time of regen duration > 3600 Sec
P2459	Diesel Particulate Filter Regeneration Frequency	Measured soot mass > f(volumetric flow rate) grams
P246E	Exhaust Gas Temperature Sensor Circuit (Bank 1 Sensor 4)	Signal voltage > 1652 mV
P246F	Exhaust Gas Temperature Sensor Circuit (Bank 1 Sensor 4) Range/Performance	<ul style="list-style-type: none"> • Temperature difference to EGR temp, T3, T4, T5, T6 > 60 °K or • Mean value of modeled - measured T5 > 100 °K
P2463	Diesel Particulate Filter - Soot Accumulation	Calculated particulate matter trap loading > 40 g
P247A	Exhaust Gas Temperature Out of Range (Bank 1 Sensor 3)	Control deviation (T5) > 200 K or < -100 K
P2470	Exhaust Gas Temperature Sensor Circuit Low (Bank 1 Sensor 4)	Signal voltage < 330 mV
P24AE	PM Sensor Functional Check / Shorted or Open	<ul style="list-style-type: none"> • Current (IDE) @ measurement 1 < 2 µA • Difference between current (IDE) measurement 1 and 2 or • Signal voltage positive connection (IDE) > 4.7 [V] • Signal voltage positive connection (IDE) < 0.3 [V]
P24AF	PM Sensor Monitoring, Rationality Check	<ul style="list-style-type: none"> • Signal current (IDE) > 5 µA or • Accumulated change in heater voltage ≤ 0.40 V
P24B1	PM Sensor Circuit Shorted or Open	<ul style="list-style-type: none"> • Signal voltage negative connection (IDE) > 4.1 [V] • Signal voltage negative connection (IDE) = 0.0 [V]

DTC	Error Message	Malfunction Criteria and Threshold Value
P24B3	PM Sensor Heater functional Check	<ul style="list-style-type: none"> • Heater Coil resistance > 1.06 - 2.31 Ω • Heater Coil resistance < 2.94 - 5.13 Ω
P24B5	PM Sensor Heater Short to Ground	<ul style="list-style-type: none"> • Heater Current < 1.0 A or • Heater Current > 15.0 A
P24B6	PM Sensor Heater Short to Battery Voltage	Heater current \geq 0.2 A
P24C7	PM Sensor Plausibility Check	Measured sensor temperature vs. mean value of modeled temperature < -100 Kelvin
P24CC	Reducing Agent Tank Cap Switch Functional Check	Dosed + Offset amount of Reducing Agent Mass \geq 27.2 kg
P24CD	Reducing Agent Tank Cap Switch Circuit Short to Ground	Signal Voltage < 0.65 V
P24CE	Reducing Agent Tank Cap Switch Circuit Short Battery Voltage	Signal Voltage > 1.2 V
P24D0	PM Sensor Monitoring, Range / Performance Check	<p>Signal range check low: difference between measured PM Sensor supply wire voltage and battery voltage (ECM):</p> <ul style="list-style-type: none"> • Value > 1.90 [V] or • Value > 2.60 [V] or • Value > 3.00 [V] <p>Signal Range Check High: difference between measured battery voltage (ECM) and Sensor supply wire voltage:</p> <ul style="list-style-type: none"> • Value > 3.00 [V] or • Value > 2.10 [V] or • Value > 1.10 [V]
P2564	Turbocharger Boost Control Position Sensor Circuit Low	Sensor signal voltage < 0.15 V
P2565	Turbocharger Boost Control Position Sensor Circuit High	Sensor signal voltage > 4.85 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P261A	Coolant Pump "B" Control Circuit/Open	<ul style="list-style-type: none"> • Open circuit signal voltage < 5 V • Functional voltage = 3.2 - 3.5 V
P261C	Coolant Pump "B" Control Circuit Low	Signal voltage < 3 V
P261D	Coolant Pump "B" Control Circuit High	Signal voltage > 1.8 V
P268A	Fuel Injector Calibration Not Learned/Programmed	Accumulated global release time of zero fuel calibration but disabled by rail pressure deviation.
P310E	Exhaust Gas Recirculation Cooler Bypass Valve 2 Implausible Signal	Measured temperature < 0.8
P3348	Turbocharger Control Module Circuit Malfunction	<ul style="list-style-type: none"> • Diagnostic signal from power stage = 8 - 18 A or • Diagnostic signal from power stage > 5 V or < 3.4 V

DTC CHART

Engine Code - CTWA, CTWB

Fuel and Air Mixture, Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	A Camshaft Position Slow Response Bank 1	<ul style="list-style-type: none"> • Adjustment angle difference < 5° CA • Number of checks 10 times
P000C	A Camshaft Position Slow Response Bank 2	<ul style="list-style-type: none"> • Adjustment angle difference < 5° CRK • Number of checks 10 times
P000D	Exhaust (B) Camshaft Position - Slow Response (Bank 2)	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Adjustment angle 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° CRK
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	<ul style="list-style-type: none"> • Adjustment angle difference > 10° CRK • 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 High Bank 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	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
P050A	Idle Air Control System RPM Lower or Higher Than Expected	Out of range-low • Engine speed deviation < 80 RPM Out of range-high • Engine speed deviation > 80 RPM
P0051	O2S 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 1, Sensor 1) Short to Battery Voltage	Heater current > 8 - 11 A
P0056	HO2S Heater Control Circuit Bank 2, Sensor 2	Heater current (hardware values) < 8 to 40 mA
P0057	HO2S Heater Control Circuit Low Bank 2 Sensor 2	Heater voltage < 1.9 - 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Deviation fuel press control < -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 Pressure Regulator 1 Control Circuit High	Short to battery plus signal current > 8 to 11 A
P0096	Intake Air Temperature Sensor 2 Circuit Range/Performance Bank 1	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	Intake Air Temperature Sensor 1 Circuit Range/Performance Bank 1	<ul style="list-style-type: none"> • 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	IAT > 129° C
P0113	Intake Air Temperature Sensor 1 Circuit High Bank 1	IAT < - 40° C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	<ul style="list-style-type: none"> • 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)
P0117	Engine Coolant Temperature Sensor 1 Circuit Low	ECT, < - 45.8° C
P0118	Engine Coolant Temperature Sensor 1 Circuit High	ECT, > 141 °C
P0121	Throttle/Pedal Position Sensor/Switch "A" Circuit Range/Performance	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Pressure difference in cross check between boost pressure sensor 1/2; inlet charger pressure and ambient pressure sensor > 7 kPa • Pressure difference in cross check between boost pressure sensor 1/2 and inlet charger pressure (1) > 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 temperature < 640 °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 or > 965° C
P0136	HO2 Sensor Circuit Bank 1 Sensor 2	Oscillation check <ul style="list-style-type: none"> • O2S signal rear not oscillating at reference +/- 10 mV Signal range check <ul style="list-style-type: none"> • Signal voltage > 0.02 V
P0137	HO2 Sensor Circuit Low Voltage Bank 1 Sensor 2	<ul style="list-style-type: none"> • Signal voltage, < 20mV. and • Internal resistance < 10Ω
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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Arithmetic filtered max differential transient time at lean to rich transition ≤ 800 mV/s • Number of checks ≥ 2

DTC	Error Message	Malfunction Criteria and Threshold Value
P013C	HO2 Sensor Slow Response - Rich to Lean Bank 2 Sensor 2	<ul style="list-style-type: none"> • Arithmetic filtered max differential transient time at rich to lean transition ≤ 800 mV/s • Number of checks ≥ 2
P013D	Oxygen Sensors Slow Response - Lean to Rich Bank 2, Sensor 2	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Arithmetic filtered max differential transient time at rich to lean transition ≥ 800 mV/s • Number of checks ≥ 3
P013F	HO2 Sensor Delayed Response - Lean to Rich Bank 1, Sensor 2	<ul style="list-style-type: none"> • Arithmetic filtered max differential transient time at lean to rich transition ≥ 800 mV/s • Number of checks ≥ 3
P0140	HO2 Sensor Circuit No Activity Detected Bank 1 Sensor 2	<ul style="list-style-type: none"> • Signal voltage, 0.376 - 0.474 V • O2S rear internal resistance > 60 KΩ
P0141	HO2 Sensor Heater Circuit Bank 1 Sensor 2	Heater resistance, > 10 K Ω
P014A	HO2 Sensor Circuit Delayed Response - Lean to Rich Bank 2, Sensor 2	<ul style="list-style-type: none"> • Arithmetic filtered max differential transient time at rich to lean transition ≥ 800 mV/s • Number of checks ≥ 3
P014B	HO2 Sensor Circuit Delayed Response - Lean to Rich Bank 2 Sensor 2	<ul style="list-style-type: none"> • Arithmetic filtered max differential transient time at lean to rich transition ≥ 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

DTC	Error Message	Malfunction Criteria and Threshold Value
P0155	HO2 Sensor Heater Circuit Bank 2, Sensor 1	UEGO ceramic temperature < 680 or > 965° C
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 < 10Ω
P0158	HO2 Sensor Circuit High Voltage Bank 2 Sensor 2	Signal voltage > 1.2 V
P0159	HO2 Sensor Circuit Slow Response Bank 2 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	Plausability 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	<ul style="list-style-type: none"> • Measured cylinder head temperature below modeled temperature • 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	<ul style="list-style-type: none"> • Signal current < 10 A and • Signal voltage > 3.5 V
P0202	Injector Circuit/Open - Cylinder 2	<ul style="list-style-type: none"> • Signal current < 10 A and • Signal voltage > 3.5 V
P0203	Injector Circuit/Open - Cylinder 3	<ul style="list-style-type: none"> • Signal current < 10 A and • Signal voltage > 3.5 V
P0204	Injector Circuit/Open - Cylinder 4	<ul style="list-style-type: none"> • Signal current < 10 A and • Signal voltage > 3.5 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0205	Injector Circuit/Open - Cylinder 5	<ul style="list-style-type: none"> • Signal current < 10 A and • Signal voltage > 3.5 V
P0206	Injector Circuit/Open - Cylinder 6	<ul style="list-style-type: none"> • Signal current < 10 A and • Signal voltage > 3.5 V
P0221	Throttle Pedal Position Sensor Switch "B" Circuit Range Performance	<ul style="list-style-type: none"> • 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 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 kPa, depending on altitude
P0236	Turbocharger/Supercharger Boost Sensor "A" Circuit Range/Performance	<ul style="list-style-type: none"> • Pressure difference in cross check between boost pressure sensor 1/2; inlet charger pressure and ambient pressure sensor > 7 kPa • Pressure difference in cross check between boost pressure sensor 1/2 and inlet charger pressure (1) > 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	<ul style="list-style-type: none"> • Pressure difference in cross check between boost pressure sensor 1/2; inlet charger pressure and ambient pressure sensor > 7 kPa • Pressure difference in cross check between boost pressure sensor 1/2 and inlet charger pressure (1) > 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%
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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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 Low	Signal voltage < 1.95 to 2.2 V
P2010	Intake Manifold Runner Control Circuit High	Signal current 1.2 A
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
P2088	A Camshaft Position Actuator Control Circuit High 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

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

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	<ul style="list-style-type: none"> • Emission threshold misfire 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	<ul style="list-style-type: none"> • Emission threshold misfire 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	<ul style="list-style-type: none"> • Emission threshold misfire 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
P0303	Cylinder 3 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold misfire 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	<ul style="list-style-type: none"> • Emission threshold misfire rate (MR) 1st interval > 1.5% • Emission threshold misfire rate (MR) > 1.5% • Catalyst damage, misfire rate (MR) > 1.5 - 15%
P0305	Cylinder 5 Misfire Detected	<ul style="list-style-type: none"> • Emission threshold misfire 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	<ul style="list-style-type: none"> • Emission threshold misfire 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Lower threshold < 0.029 V • Upper threshold > 1.992 V
P0332	Knock Sensor 2 Circuit Low Bank 2	Lower threshold, < 0.18 V
P0333	Knock Sensor 1 Circuit Short to Battery Voltage	Upper threshold > 1.00 V
P0335	Engine Speed Sensor	<ul style="list-style-type: none"> • Open circuit > 1 V • Short to grnd < 1.5 V • Short to Battery voltage > 3.5 V • Signal check no signal

DTC	Error Message	Malfunction Criteria and Threshold Value
P0336	Crankshaft Position Sensor "A" Circuit Range/Performance	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Signal voltage no altering @ 4 Rev
P0341	Camshaft Position Sensor "A" Circuit Range/Performance Bank 1 or Single Sensor	<ul style="list-style-type: none"> • 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
P0345	Camshaft Position Sensor "A" Circuit Bank 2	Signal activity check <ul style="list-style-type: none"> • Signal voltage no altering @ 4 Rev
P0346	Camshaft Position Sensor "A" Circuit Range/Performance Bank 2	<ul style="list-style-type: none"> • 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 <ul style="list-style-type: none"> • Signal current, < -0.05 - 0.2mA • Hardware value from final stage > 0.04 - 0.2 mA
P0352	Ignition Coil "B" Primary/ Secondary Circuit	Short to ground <ul style="list-style-type: none"> • Signal current, < -0.05 - 0.2mA • Hardware value from final stage > 0.04 - 0.2 mA
P0353	Ignition Coil "C" Primary/ Secondary Circuit	Short to Battery voltage <ul style="list-style-type: none"> • Signal current, < -0.05 - 0.2mA • Hardware value from final stage > 0.04 - 0.2 mA
P0354	Ignition Coil "D" Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current, < -0.05 - 0.2mA • Hardware value from final stage > 0.04 - 0.2 mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P0355	Ignition Coil "E" Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current, < -0.05 - 0.2mA • Hardware value from final stage > 0.04 - 0.2 mA
P0356	Ignition Coil "F" Primary/ Secondary Circuit	<ul style="list-style-type: none"> • Signal current, < -0.05 - 0.2mA • 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	<ul style="list-style-type: none"> • Signal Current 8 to 40 mA • Signal Voltage 2.9 to 3.2 V
P0414	Secondary Air Injection System Switching Valve "A" Circuit Shorted	Short to Battery Voltage: <ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Deviation HO2S control < 4% • Deviation throttle controller < 8.0% • Deviation press. control < 4 kpa
P0442	Evaporative Emission System Leak Detected (Small Leak)	Time for pressure drop < 1.06 - 1.3 s.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal current < 0.8mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P0445	Evaporative Emission System Purge Control Valve Short to Ground	<ul style="list-style-type: none"> Signal voltage < 2.0 V Signal current > 5.0 A
P0455	Evaporative Emission System Leak Detected (large leak)	Time for pressure drop < 0.65 - 0.7 s.
P0456	Evaporative Emission System Leak Detected (very small leak)	Time for press drop < 3.2 - 5.5 s
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage, < 2.15 - 3.25 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.20 A
P0491	Secondary Air Injection System Insufficient Flow Bank 1	Difference between reference AIR mass flow and calculated AIR mass flow > 18 to 21 [kg/h]
P0492	Secondary Air Injection System Insufficient Flow Bank 2	Difference 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 <ul style="list-style-type: none"> Sensor signal failure
P0502	Vehicle Speed Sensor "A" Circuit Low	Communication check <ul style="list-style-type: none"> 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 <ul style="list-style-type: none"> Engine speed deviation 1 < 80 - 250 RPM Out of range high <ul style="list-style-type: none"> Engine speed deviation 2 > 80 - 250 RPM

DTC	Error Message	Malfunction Criteria and Threshold Value
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	<ul style="list-style-type: none"> • Adjustment angle difference > 10° CA • Number of checks 2
P052C	Cold Start "A" Camshaft Position Timing Over-Advanced Bank 2	<ul style="list-style-type: none"> • Adjustment angle difference > 10° CA • Number of checks 2
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	Check sum incorrect
P0606	Control Module Processor ECM fault	EEPROM check..failed
P0627	Fuel Pump "A" Control Circuit /Open	<ul style="list-style-type: none"> • Internal error fuel pump control unit • Feedback from fuel pump control unit Pump blocked short circuit to battery +, ground or open circuit

DTC	Error Message	Malfunction Criteria and Threshold Value
P0638	Throttle Actuator Control Range/Performance Bank 1	Functional check: close movement <ul style="list-style-type: none"> • Open to 15° > 1.275 s • Then close to ref. point > 1.28 s • Gradient < 7° per second Functional check open movement <ul style="list-style-type: none"> • Close to 1.99° > 1.275 s • Then open to ref. point > 1.28 s • Gradient < 7° per second Signal range check @ mechanical stop low <ul style="list-style-type: none"> • TPS 1 signal voltage out-off range 0.208 - 0.852 V or <ul style="list-style-type: none"> • 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
P0642	Sensor Reference Voltage A Circuit Low	Signal voltage, < 4.62 V
P0643	Sensor Reference Voltage A Circuit High	5 V 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	5 V 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	<ul style="list-style-type: none"> • 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

DTC	Error Message	Malfunction Criteria and Threshold Value
P0688	ECM / PCM Power Relay Sense Circuit	<ul style="list-style-type: none"> • 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 \pm 0.3 V
P0698	Sensor Reference Voltage C Circuit Low	Signal voltage, < 4.6-5 V
P0699	Sensor Reference Voltage C Circuit High	5 V 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
U0100	Lost Communication with ECM/PCM A	<ul style="list-style-type: none"> • Failure of all CAN engine messages, time out > 490 mSec. • Failure of all CAN engine messages, but not all CAN messages, time out > 1010 mSec.
U0101	Lost Communication with TCM	No message received from TCM
U0121	CAN ABS Brake Unit	No CAN communication with TCU, time-out
U0140	CAN communication with BCM 1	CAN message no message
U0146	CAN gateway A	CAN communication with gateway, implausible message
U0155	Communication with ICL	No CAN communication with IPC, time-out
U0302	Software Incompatibility with Transmission Control Module	Manual transmission vehicle, ECM coded as AT vehicle.
U0322	Communication with Body Control Module	Ambient temperature value (module not encoded for ambient temperature sensor) FDh -
U0323	CAN: Instrument Cluster Audi Only	Ambient temp value module not encoded for ambient temp sensor, 00h

DTC	Error Message	Malfunction Criteria and Threshold Value
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 Only A6	• 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
U0415	CAN Link to Speed Sensor Only S4	• Out of range: receiving fault value 2.03.5 mph • Out of range: receiving fault value > 202.81 mph • Out of range: receiving fault value < 1.24 mph
U0422	CAN: Instrument Cluster	Ambient temp. value (initialization), Audi, 01h
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

Transmission

DTC	Error Message	Malfunction Criteria and Threshold Value
P0705	Transmission Range Sensor Circuit Malfunction (PRNDL Input)	---
P0706	Transmission Range Sensor "A" Circuit Range/Performance	4 bit position code, incorrect
P0707	Transmission Range Sensor Circuit Low	---
P0708	Transmission Range Sensor Circuit High	---

DTC	Error Message	Malfunction Criteria and Threshold Value
P0710	Transmission Fluid Temperature Sensor "A" Circuit	Sensor short circuit: <ul style="list-style-type: none"> • U_sensor (+), and U_sensor (-) diagnosis by ASIC
P0711	Transmission Fluid Temperature Sensor "A" Circuit Range/Performance	Discontinual temperature: <ul style="list-style-type: none"> • ATF temperature delta T between 2 measurements, > 20° C Sensor stuck: <ul style="list-style-type: none"> • Comparison ATF vs. chip temperature, ATF temp. must follow chip temp. in certain ranges, 25-40° C
P0712	Transmission Fluid Temperature Sensor "A" Circuit Low	Circuit low: <ul style="list-style-type: none"> • U_sensor (+), and U_sensor (-) diagnosis by ASIC
P0713	Transmission Fluid Temperature Sensor "A" Circuit High	Circuit high: <ul style="list-style-type: none"> • U_sensor (+), and U_sensor (-) diagnosis by ASIC
P0714	Transmission Fluid Temperature Sensor "A" Circuit Intermittent	Circuit high: <ul style="list-style-type: none"> • U_sensor (+), and U_sensor (-) diagnosis by ASIC
P0716	Input/Turbine Speed Sensor "A" Circuit Range/Performance	Signal higher or lower than threshold <ul style="list-style-type: none"> • Higher, > + 8000 RPM • Lower, < 20 RPM
P0717	Input/Turbine Speed Sensor "A" Circuit No Signal	Hardware detection
P0721	Output Speed Sensor Circuit Range/Performance	<ul style="list-style-type: none"> • Signal > threshold, > 10000 RPM • Difference between last and actual value > threshold, -1000 RPM • Difference to wheel speeds, > 500 RPM and input speed, > 200 RPM
P0722	Engine Speed Input Circuit No Signal	Hardware detection
P0727	Engine Speed Input Circuit No Signal	CAN message signal error flag, = 1
P0741	Torque Converter Clutch Circuit Performance or Stuck Off	Rate of (setting of nominal value) - actual value, > 50 RPM

DTC	Error Message	Malfunction Criteria and Threshold Value
P0746	Pressure Control Solenoid 'A' Performance or Stuck Off	PWM hardware detection, 0 or 100%
P0747	Pressure Control Solenoid 'A' Stuck On	PWM hardware detection, 0 or 100%
P0748	Pressure Control Solenoid 'A' Electrical	<ul style="list-style-type: none"> • Current higher or lower than threshold, > 220 mA • EDS output voltage at short to ground or open circuit ~ 0,5 V smaller than EDS supply voltage • Static leakage current flow
P0751	Shift Solenoid "A" Performance or Stuck Off	<ul style="list-style-type: none"> • If PWM = 0%, diagnosis by ASIC • If $0\% \leq \text{PWM}$, 7.6% voltage return lead (low), < 0.75 V • If $7.6\% \leq \text{PWM}$, 92.4% voltage return lead (high), < 0.75 V • If $7.6\% \leq \text{PWM}$, 92.4% voltage return lead (low), < 0.75 V
P0752	Shift Solenoid "A" Stuck On	<ul style="list-style-type: none"> • If PWM = 100%, diagnosis by ASIC • If $7.6\% \leq \text{PWM} \leq 100\%$ voltage return lead (high), >0.3 V
P0754	Shift Solenoid "A" Intermittent	<ul style="list-style-type: none"> • If PWM = 0%, diagnosis by ASIC • If $0\% \leq \text{PWM}$, 7.6% voltage return lead (low), < 0.75 V • If $7.6\% \leq \text{PWM}$, 92.4% voltage return lead (high), < 0.75 V • If $7.6\% \leq \text{PWM}$, 92.4% voltage return lead (low), 0.75 V
P0776	Pressure Control Solenoid "B" Performance or Stuck Off	PWM hardware detection, 0 or 100%
P0777	Pressure Control Solenoid "B" Stuck On	PWM hardware detection, 0 or 100%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0778	Pressure Control Solenoid "B" Electrical	<ul style="list-style-type: none"> • Current higher or lower than threshold, < 730 mA • EDS output voltage at short to ground or open circuit ~ 0,5 V smaller than EDS • Static leakage current flow
P0796	Pressure Control Solenoid "C" Performance or Stuck Off	PWM hardware detection, 0 or 100%
P0797	Pressure Control Solenoid "C" Stuck On	PWM hardware detection, 0 or 100%
P0798	Pressure Control Solenoid "C" Electrical	<ul style="list-style-type: none"> • Current higher or lower than threshold, >220 mA • EDS output voltage at short to ground or open circuit ~ 0.5 V smaller than EDS supply voltage • Static leakage current flow
P0889	TCM Power Relay Circuit Range / Performance	FET drive, not possible
P0890	TCM Power Relay Circuit Low	<ul style="list-style-type: none"> • Solenoid power supply voltage, <1.4 V • Drop voltage over high side FET, > 1 V
P0891	TCM Power Relay Circuit High	Hardware detection
P0892	TCM Power Relay Circuit Intermittent	Hardware detection
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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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
P2735	Pressure Control Solenoid "F" Intermittent	PWM hardware detection, 0 or 100%

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P10A0	Actuation Regulating Flap for Intake Air Electrical Error	<ul style="list-style-type: none"> • Duty cycle > 95 [%] and/or duty cycle < -95 [%] • Duty cycle > 0.3 s at > 98%
P10A4	Regulating Flap for Intake Air Mechanical Malfunction	<ul style="list-style-type: none"> • Diff. 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

DTC	Error Message	Malfunction Criteria and Threshold Value
P10A8	Adaptation Regulating Flap for Intake Air Lower Limit Not Reached	RFP signal voltage in closed position ≤ 0.35 - ≥ 0.65 V
P1114	Internal Resistance Too Large (Bank 1, Sensor 2)	Heater resistance, (128-648)*(8-40)1.02-25.9 k Ω (dep. on mod. exhaust temp. and heater power)
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	<ul style="list-style-type: none"> • Deviation fuel rail pressure control > 0.060 g/Rev • Deviation HO2S control $< 22.5\%$
P12A2	Fuel Rail Pressure Sensor Inappropriately High	<ul style="list-style-type: none"> • Deviation fuel rail pressure control < 0.051 g/Rev • Deviation HO2S control $> 30\%$
P12A4	Fuel Rail Pressure Metering Valve Function Check Valve Stuck Closed	<ul style="list-style-type: none"> • Deviation fuel rail pressure control < 0.120 g/Rev • 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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Duty cycle > 0.4 s at $> 98\%$ • Actual TPS reference point $> 1.5^\circ$ • Actual TPS calc value > 0.4 s at $> 8^\circ$
P2106	Throttle Actuator Control System - Forced Limited Power	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

DTC	Error Message	Malfunction Criteria and Threshold Value
P2128	Throttle/Pedal Position Sensor/Switch "E" Circuit High	Signal voltage > 2.8 V
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	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Adaptive value < -10% or • > 10%
P219D	Cylinder 2 Air-Fuel Ratio Imbalance	<ul style="list-style-type: none"> • Adaptive value < -10% or • > 10%
P219E	Cylinder 3 Air-Fuel Ratio Imbalance	<ul style="list-style-type: none"> • Adaptive value < -10 % or • > 10%
P219F	Cylinder 4 Air-Fuel Ratio Imbalance	<ul style="list-style-type: none"> • Adaptive value < -10% or • > 10%

DTC	Error Message	Malfunction Criteria and Threshold Value
P21A0	Cylinder 5 Air-Fuel Ratio Imbalance	<ul style="list-style-type: none"> • Adaptive value < -10% or • > 10%
P21A1	Cylinder 6 Air-Fuel Ratio Imbalance	<ul style="list-style-type: none"> • 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., ambient press. >7 kPa
P2237	HO2 Sensor Positive Current Control Circuit Open Bank 1, Sensor 1	<ul style="list-style-type: none"> • Signal activity check-failed • Open Circuit pump Current (IP)
P2240	O2 Sensor Positive Current Control Circuit Open (Bank 2 Sensor 1)	<ul style="list-style-type: none"> • Signal activity check-failed • Open Circuit pump Current (IP)
P2243	HO2 Sensor Reference Voltage Circuit/Open Bank 1 Sensor 1	<ul style="list-style-type: none"> • Signal activity check-failed • Open Circuit Nernst Voltage (UN)
P2247	HO2 Sensor Reference Voltage Circuit/Open Bank 2 Sensor 1	<ul style="list-style-type: none"> • Signal activity check-failed • Open Circuit Nernst Voltage (UN)
P2251	HO2 Sensor Negative Current Control Circuit Open Bank 1, Sensor 1	<ul style="list-style-type: none"> • Signal activity check-failed • Open Circuit Nernst Voltage (UN)
P2254	HO2 Sensor Negative Current Control Circuit Open Bank 2, Sensor 1	<ul style="list-style-type: none"> • Signal activity check-failed • Open Circuit Nernst Voltage (UN)
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 > 5 A
P2270	HO2 Sensor Signal Biased/Stuck Lean Bank 1 Sensor 2	<ul style="list-style-type: none"> • Signal voltage > 0.15 V • Number of checks ≥ 2
P2271	HO2 Sensor Signal Biased/Stuck Rich Bank 1 Sensor 2	<ul style="list-style-type: none"> • Signal voltage < 0.750 V • Number of checks ≥ 2
P2272	HO2 Sensor Signal Biased/Stuck Lean Bank 2 Sensor 2	<ul style="list-style-type: none"> • Signal voltage < 0.750 V • Number of checks ≥ 2
P2273	HO2 Sensor Signal Biased/Stuck Rich Bank 2 Sensor 2	<ul style="list-style-type: none"> • Signal voltage > 0.15 V • Number of checks ≥ 2

DTC	Error Message	Malfunction Criteria and Threshold Value
P2293	Fuel Pressure Regulator 2 Performance	<ul style="list-style-type: none"> • 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	< 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
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal current < 0.8 mA
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current > 2.0 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	<ul style="list-style-type: none"> • Low signal voltage > 0.5 s • Time > 1 s
P2404	Evaporative Emission System Leak Detection Pump Sense Range/Performance	<ul style="list-style-type: none"> • High signal voltage and • Time > 0.36 s
P2414	HO2 Sensor Exhaust Sample Error Bank 1, Sensor 1	O2S signal front > 3.1 V
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 > 4.80 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	<ul style="list-style-type: none"> • O2S signal front > 4.7 V • Open circuit adjustment voltage (IA)
P2629	HO2 Sensor Pumping Current Trim Circuit Open Bank 2 Sensor 1	<ul style="list-style-type: none"> • O2S signal front > 4.7 V • Open circuit adjustment voltage (IA)

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