



**2013**

# **Jetta Hybrid**

**Quick Reference  
Specification Book**



# 2013 VW Jetta Hybrid 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

## N·m-to-lb·ft (ft·lb)

To calculate: N·m x 0.738 = lb·ft

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

## N·m-to-lb·in (in·lb), kg·cm

To calculate:  $N \cdot m \times 8.85 = lb \cdot in$  •  $N \cdot m \times 10.20 = kg \cdot cm$

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

## N·cm-to-lb·in (in·lb), kg·cm

To calculate:  $N \cdot cm \times 0.089 = lb \cdot in$  •  $N \cdot cm \times 0.102 = kg \cdot cm$

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)*

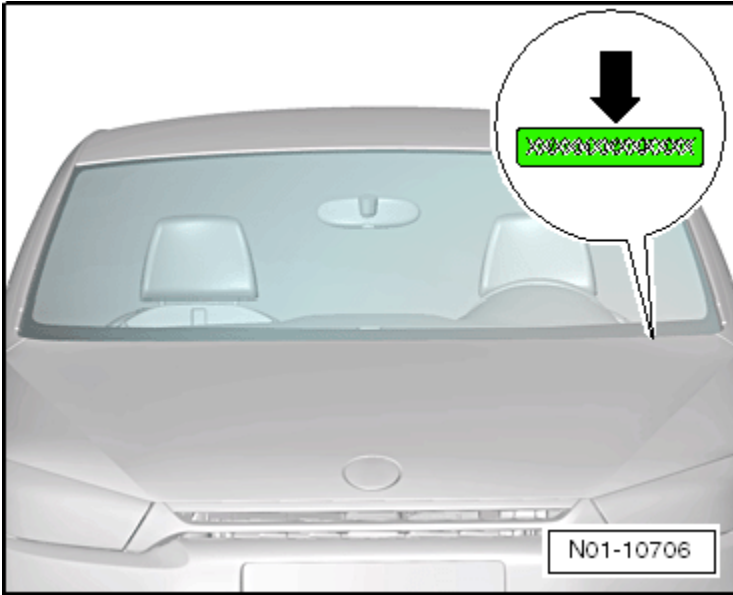
## **CAUTIONS** *(cont'd)*

- 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

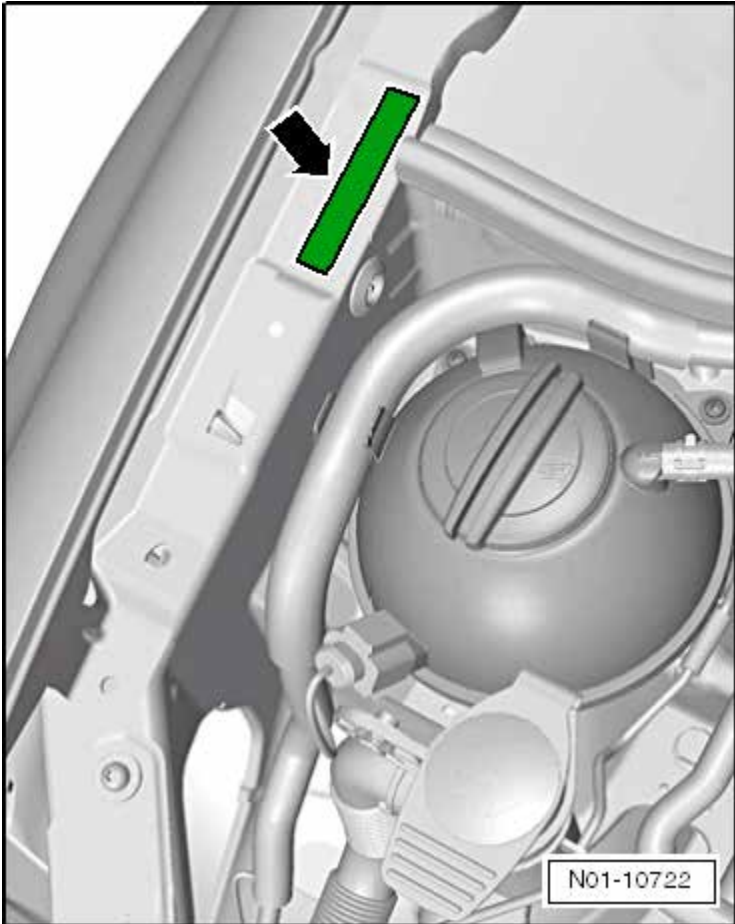
## VIN on Lower Edge of Windshield



Vehicle  
Identification

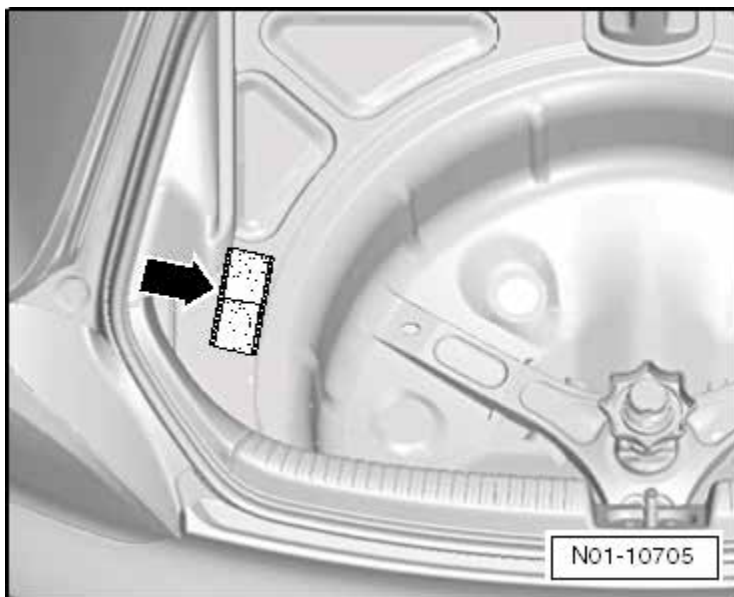
The VIN ➔ is on the left side of the vehicle in the area of the windshield wiper mount. It is visible from outside.

## VIN on Longitudinal Member Extension



The Vehicle Identification Number (VIN) is located on the extension of the longitudinal member ➡.

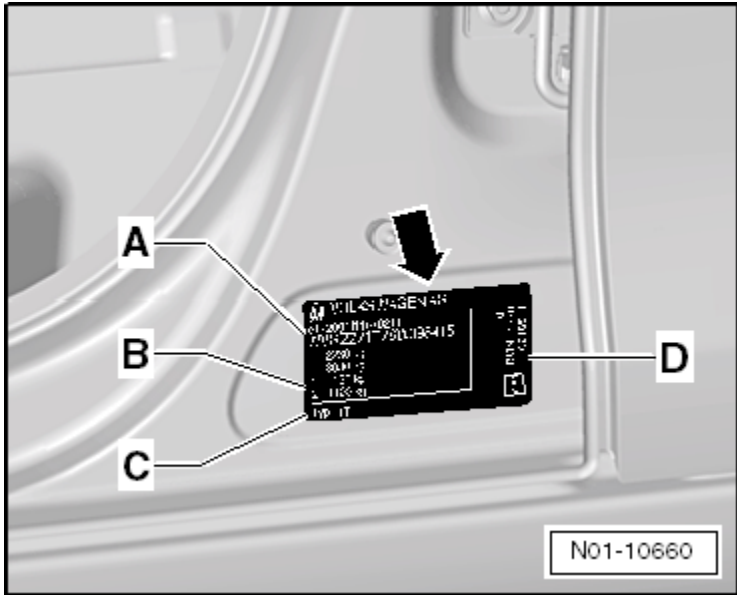
## Vehicle Data Label



The vehicle data label ➔ is located in the left rear of vehicle in the spare wheel well. The vehicle data sticker can also be found in the customer's service schedule.

Vehicle  
Identification

## Type Plate



The type plate ➔ is visible at the bottom of the B-pillar when the left front door is open.

The type plate contains the following vehicle information:

- A – Vehicle Identification Number (VIN)
- B – Variable specifications (axle loads, total permissible weights, permissible towing weights)
- C – Type number
- D – Engine code

# VIN Decoder

## 2013 Volkswagen VIN Decoder (except Routan)

### Series:

**A=** CC Sport w/Man Trans, Golf Zdr w/5 Spd Manual, Passat S, Tiguan w/Auto Trans  
**B=** CC Sport/Sport w/Auto Trans, Eos Kombi/Sport w/Auto Trans, Golf Zdr w/Auto Trans, Jetta SE w/5 Spd Man, Passat SE, Tiguan w/Auto Trans and 4-Motion  
**C=** Golf 4dr w/5 Spd Manual, Passat SEL, Tiguan w/Man Trans  
**D=** Golf 4dr w/Auto Trans, Jetta SE w/Auto Trans  
**E=** GTI Zdr w/Man Trans, Touareg V6 FSI/TDI /Hybrid  
**F=** Beetle w/6 Spd Auto Trans, Eos Lux/Esc w/Auto Trans, GTI Zdr w/Auto Trans  
**G=** CC V6 Esc w/Auto Trans and 4Motion, GTI 4dr w/Man Trans, Jetta SEL w/5 Spd Man Trans  
**H=** CC V6 Lux w/Auto Trans, Beetle 2.5L TDI w/5 Spd Manual, GTI 4dr w/Auto Trans  
**J=** Beetle 2.5L TDI w/6 Spd

**K=** Jetta SportWagen w/5 Spd Man Trans  
**L=** Jetta SEL/TDI w/Auto Trans  
**M=** Golf Zdr w/6 Spd Manual, Jetta SportWagen w/6 Spd Manual  
**N=** Golf 4dr w/6 Spd Manual  
**P=** Golf R 4dr w/Man Trans, Jetta SportWagen w/6 Spd Auto Trans  
**R=** Beetle TDI w/6 Spd Man, CC Lux w/Auto Trans, Golf R Zdr w/Man Trans  
**V=** Beetle Turbo w/6 Spd Auto Trans  
**W=** Jetta / S w/5 Spd Manual  
**X=** Jetta / S w/Auto Trans  
**3=** Jetta TDI w/6 Spd Man  
**4=** Beetle Turbo w/6 Spd Manual, Jetta GLI w/Auto Trans  
**5=** Beetle Conv. 2.5 L TDI w/6 Spd Auto Trans, Jetta GLI w/6 Spd Manual  
**6=** Beetle Conv. TDI w/6 Spd Man Trans, Jetta Hybrid w/Auto Trans  
**7=** Beetle Conv. Turbo w/6 Spd Auto Trans  
**8=** Beetle Conv. Turbo w/6 Spd Man Trans

Country of origin	Manufacturer	Vehicle Type	Series	Engine	Restraint system	Model (7&8)	Check digit	Model year	Assembly plant	12	13	14	15	16	17	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17

**D = 2013**

Sequential production number (position 12 - 17)

**W** = Europe - Pass. Car  
**V** = USA - Pass. Car  
**W** = Mexico - Pass. Car  
**V** = Europe - S.U.V.

**A3\*\*\*** = Passat  
**AH (1F)** = Eos  
**AJ (16)\*\*\*** = Golf, Golf R, GTI, Jetta, Jetta SportWagen  
**AN (3C)** = CC  
**AT** = Beetle, Beetle Conv.  
**AX (5N)** = Tiguan  
**BP (7P)** = Touareg

**C** = Chattanooga  
**B** = Bratislava  
**E** = Emden  
**M** = Mexico  
**P** = Mosel  
**V** = Portugal  
**W** = Wolfsburg

**A=** 4 cyl 2.0L 200hp (CBFA-PZEVI) Beetle, Beetle Convertible, Jetta, Jetta GLI  
**A=** 5 cyl 2.5L 170hp (CBTA-M) Golf  
**B=** 5 cyl 2.5L 170hp (CBTA-M-PZEVI) Golf  
**D=** 4 cyl 2.0L 200hp (CBFA-M-PZEVI) GTI  
**D=** 4 cyl 2.0L 200hp (CCTA) Eos  
**F=** 4 cyl 2.0L 256hp (CRZA) Golf R  
**F=** VR6 3.6L 280hp (CGR) Touareg  
**G=** 8 cyl 3.0L 333hp + 34 Kw (CQFA) Touareg Hybrid  
**H=** 5 cyl 2.5L 170hp (CBTA-M) Passat  
**K=** 4 cyl 2.0L 115hp (CBPA) Jetta  
**L=** 4 cyl 2.0L TDI 140hp (CJAA) Jetta, Jetta SportWagen, Beetle, Beetle Convertible  
**M=** 4 cyl 2.0L TDI 140hp (CJAA) Golf  
**M=** VR6 3.6L 280hp (CQVB) Passat  
**N=** 4 cyl 2.0L 200hp (CCTA) CC  
**N=** 4 cyl 2.0L TDI 140hp (CKRA) Passat  
**P=** 4 cyl 2.0L 200hp (CBFA-PZEVI) CC  
**P=** 5 cyl 2.5L 170hp (CBTA-M-PZEVI) Beetle, Beetle Convertible, Jetta, Jetta SportWagen, Passat  
**P=** VR6 3.0L TDI 240hp (CNRB) Touareg  
**U=** VR6 3.6L 280hp (CNNA) CC  
**V=** 4 cyl 2.0L 200hp (CCTA) GTI, Tiguan  
**W=** 4 cyl 2.0L 200hp (CBFA-SULEV) Eos  
**X=** 5 cyl 2.5L 170hp (CBTA-M) Beetle, Beetle Convertible, Jetta, Jetta SportWagen  
**3=** 4 cyl 1.4L 150hp + 28 Kw (CNLA) Jetta Hybrid  
**6=** 4 cyl 2.0L 200hp (CCTA) Beetle, Beetle Convertible, Jetta GLI

**\* PZEV** = Partial Zero Emissions Vehicle  
**\*\* SULEV** = Super Low Emissions Vehicle  
**\*\*\*** 7 position US model characters are alphabetic beginning with 2011 MY. ROW model characters, where different, are listed in parenthesis (), for reference only.  
**\*\*\*\*** Jetta and Jetta SportWagen models are identified by WMI code of **3WV, GTI** and **Golf** models are identified by WMI code of **WVV**.

October 1, 2012 (Rev 4)

Vehicle Identification

**2013 Restraint System:**  
**All** = Active-Dri/Pass - Front Air Bag - Dri/Pass  
**7** = Advanced Front Air Bags + Side Impact Air Bags - Front + Side Curtain Air Bags  
**8 (Eos Only)** = Advanced Front Air Bags + Side Impact Air Bags - Front + Knee Air Bags - Front + Side Curtain Air Bags  
**8 (Jetta Only) or 9 (All Others)** = Advanced Front Air Bags + Side Impact Air Bags - Fr. Rr. + Side Curtain Air Bags  
**(Tiguan)** = Advanced Front Air Bags + Side Impact Air Bags - Fr. Rr. + Side Curtain Air Bags  
**9 (Touareg)** = Advanced Front Air Bags + Side Impact Air Bags - Front + Side Curtain Air Bags

**M** = 1991  
**N** = 1992  
**P** = 1993  
**R** = 1994  
**S** = 1995  
**T** = 1996  
**V** = 1997  
**W** = 1998  
**X** = 1999  
**Y** = 2000  
**1** = 2001  
**2** = 2002  
**3** = 2003  
**4** = 2004  
**5** = 2005  
**6** = 2006  
**7** = 2007  
**8** = 2008  
**9** = 2009  
**A** = 2010  
**B** = 2011  
**C** = 2012  
**D** = 2013

1	Country of origin
2	Manufacturer
3	Vehicle Type
4	Series
5	Engine
6	Restraint system
7	Model
8	(position 7 & 8)
9	Check digit
10	Model year
11	Assembly plant
12	Sequential production number (position 12 - 17)
13	
14	
15	
16	
17	

2013 Volkswagen VIN Decoder (except Routan)

# SALES CODES

## Engine Codes

<b>CNLA</b>	1.4L 4-cylinder 4V
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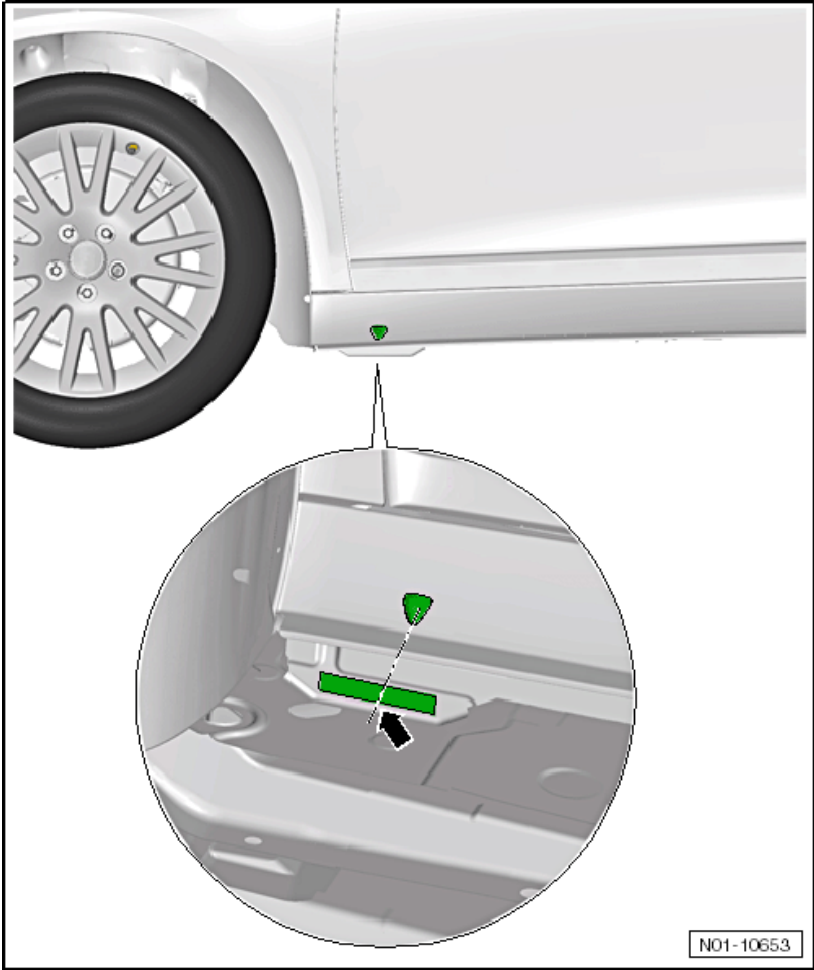
## Transmission Codes

<b>0CG</b>	7-speed direct shift
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# VEHICLE LIFTING

## *Hoist and Jack Mounting Points*

Front

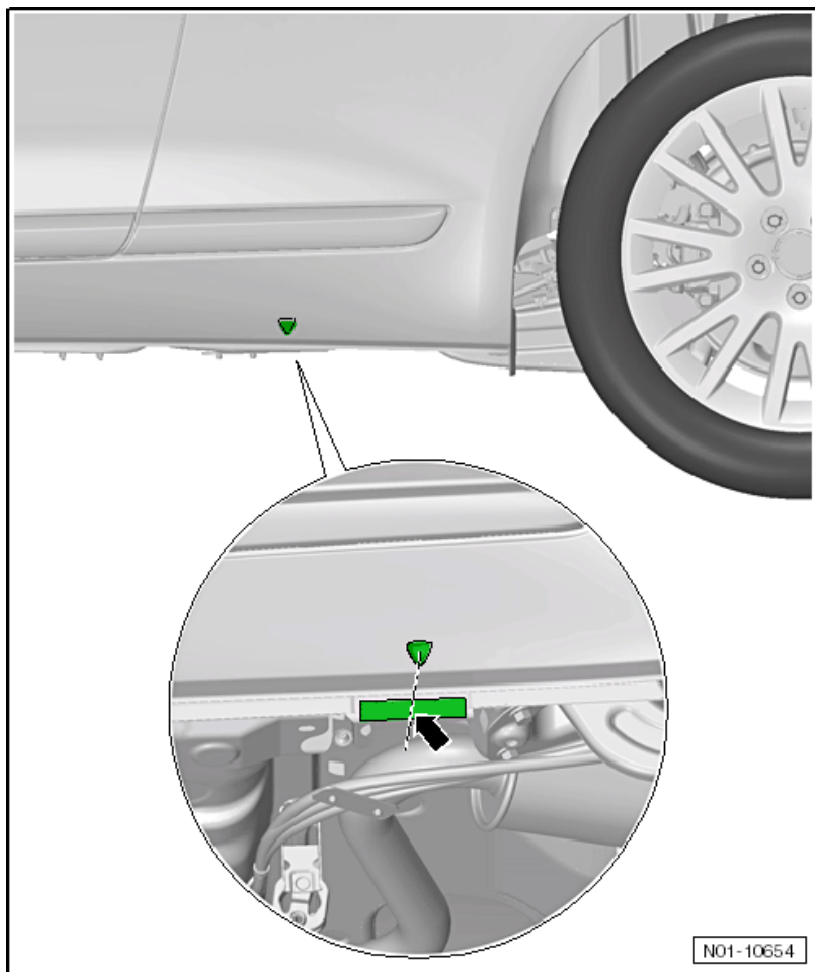


Position the support plate in the side member vertical reinforcement area ➡.

Sales  
Codes

Vehicle  
Lifting

## Rear



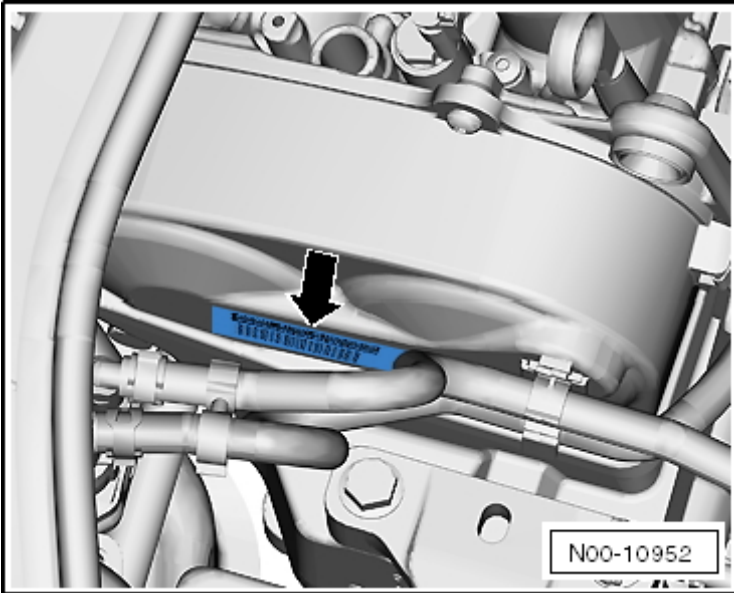
Position the support plate in the side member vertical reinforcement area ➡.



# ENGINE – 1.4L CNLA

## General Information – 1.4L CNLA

### Engine Number



The label ➔ on the upper toothed belt cover lists the engine code and the engine serial number.

The engine code can also be found on the vehicle data label and on the crankcase above the transmission.

The engine number consists of up to nine alphanumeric characters.

The first part (maximum 3 letters) represents the “engine code”, the second (six digit) is the “serial number”. If more than 999,999 engines with the same engine code are produced, the first of the six characters is replaced with a letter.

#### **Vehicles with a Four Digit Engine Code:**

- Four digit engine codes begin with the letter “C”.
- The first three positions describe the engine type and are stamped onto the engine.
- The fourth position describes the engine output and torque.
- The 4 digit engine code is also stored in the ECM and is also found on the type plate and the vehicle data label.

## Engine Data

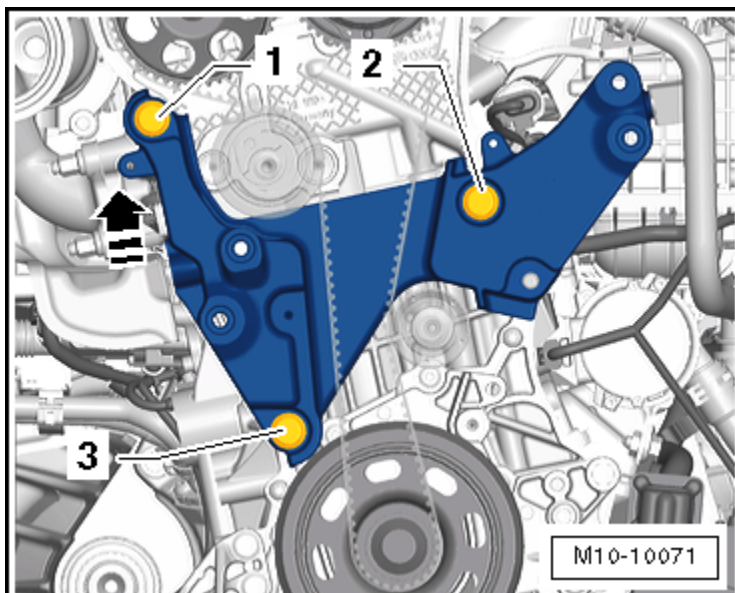
Code Letters		CNLA
Manufactured		from 07012
Emission values in accordance with		ULEV2/SULEV
Displacement	cm3	1395
Output	kW at RPM	110/5000
Torque	Nm at RPM	250/1400-3500
Bore	Diameter mm	74.5
Stroke	mm	80.0
Compression ratio		10.5
Valves per cylinder		4
Research Octane Number (RON)	Minimum	95 unleaded (in exceptional cases, minimum 91 RON, but with reduced performance)
Fuel injection		Motronic ME 1701.6
Ignition sequence		1-3-4-2
Secondary Air Injection (AIR) system		Yes

## *Engine Assembly – 1.4L CNLA*

### Fastener Tightening Specifications

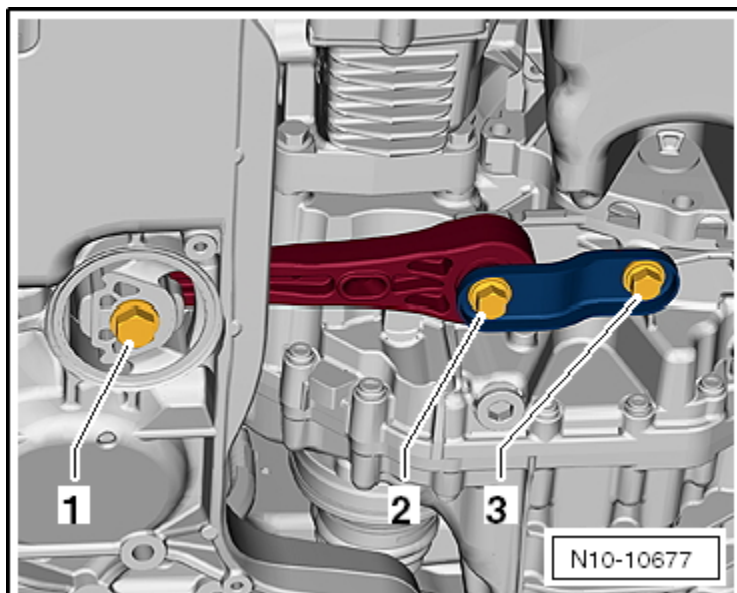
Component	Fastener Size	Nm
Bolts and nuts		
	M6	9
	M7	15
	M8	20
	M10	40
	M12	65

## Engine Bracket Tightening Specifications



Stage	Bolts	Tightening specification/additional turn
1	1 to 3	Install so that they are loose
2	1 to 3	Push the engine mount bracket upward in -direction of arrow- and tighten it hand-tight so that it cannot move anymore.
3	1 to 3	40 Nm
4	1 to 3	Tighten an additional 90° (¼ turn)

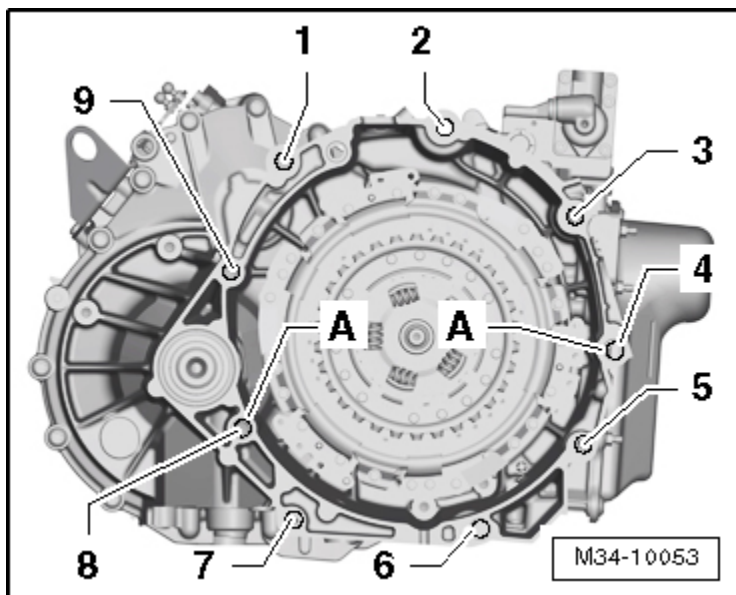
## Pendulum Support Tightening Specifications



Replace the bolts that have been tightened to additional torque.

Stage	Bolts	Tightening specification/additional turn
1	2, 3	50 Nm
2	1	130 Nm
3	1 to 3	Tighten an additional 90° (¼ turn)

## DSG Transmission to Engine Tightening Specifications



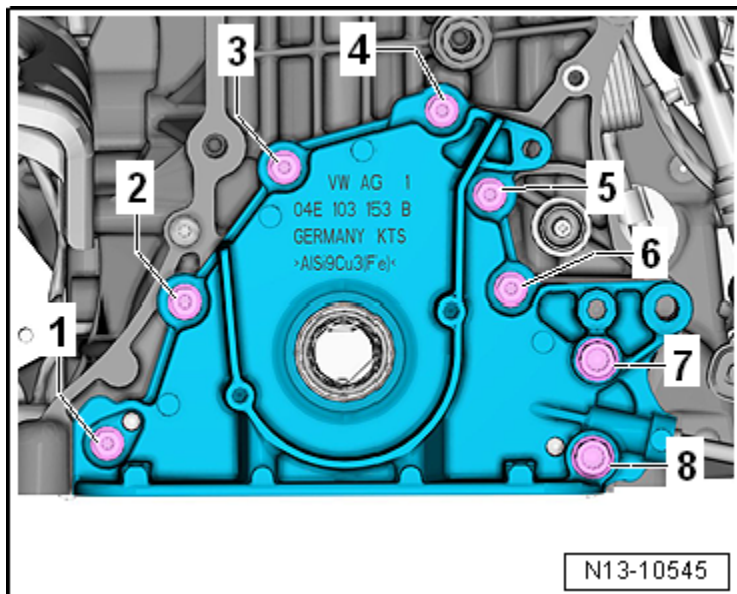
Replace the bolts that have been tightened to additional torque.

Item	Bolt	Nm
1, 2	M12 x 50	80
3, 4	M12 x 105	80
5, 6, 7	M10 x 50	40
8, 9 <sup>1)</sup>	M12 x 70	80
A	Alignment sleeves for centering	

• Bolted from the engine side

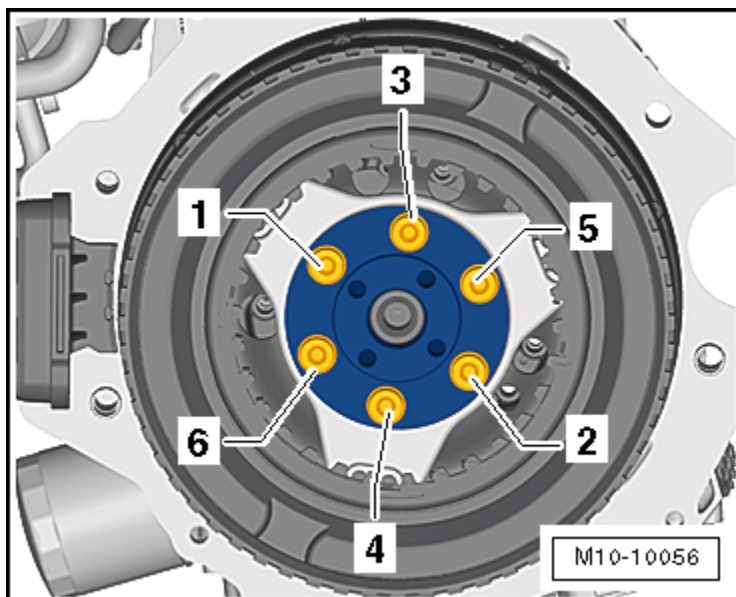
## Crankshaft, Cylinder Block – 1.4L CNLA

### Ribbed Belt Pulley Side Sealing Flange - Tightening Specifications and Sequence



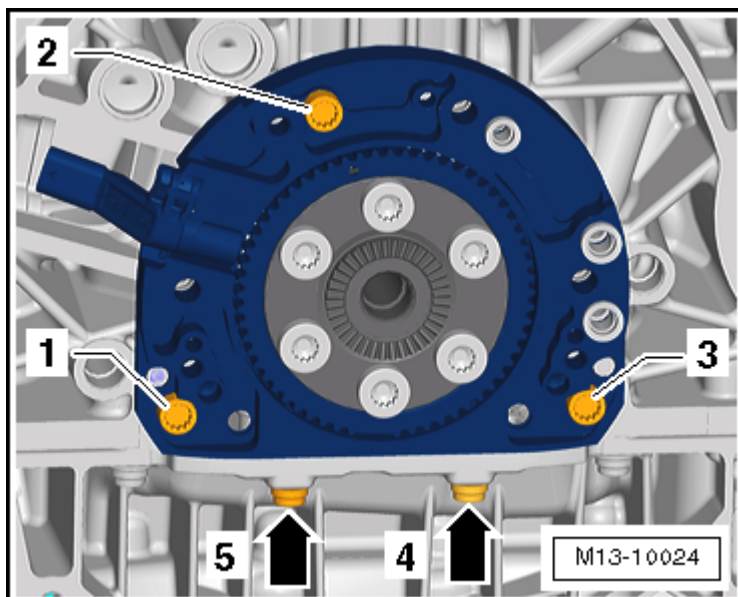
Stage	Bolts	Tightening specification/additional turn
1	1 to 8	Install all the way in by hand.
2	1 to 8	In a diagonal sequence, to 8 Nm
3	7, 8	20 Nm
4	1 to 8	Tighten 90° additional turn

## Crankshaft Flange to Drive Motor - Tightening Sequence and Tightening Specification



Stage	Bolts	Tightening specification/additional turn
1	1 to 6	Install all the way in by hand.
2	1 to 6	Tighten lastly to 60 Nm in diagonal sequence and in stages
3	1 to 6	Tighten further 90° diagonally and in steps

## Ribbed Belt Transmission Side Sealing Flange - Tightening Specifications and Sequence



Stage	Bolts	Tightening specification/additional turn
1	1 to 5	Install all the way in by hand.
2	1 to 5	Tighten lastly to 10 Nm in diagonal sequence and in stages

## Crankshaft Dimensions

Honing dimension in mm	Connecting rod journal diameter mm	
Basic dimension	48.00	- 0.022
		- 0.042

## Piston Dimension

Piston diameter in mm	
Nominal dimension	74.42 <sup>1)</sup>

<sup>1)</sup> Dimension without coating (thickness 0.018 mm each side).

## Piston Ring End Gap

Piston ring gap Dimensions in mm	New	Wear limit
Compression rings	0.20 + 0.15	1.0
Oil scraping ring	0.25 + 0.20	3.0



## Piston Ring Groove Clearance

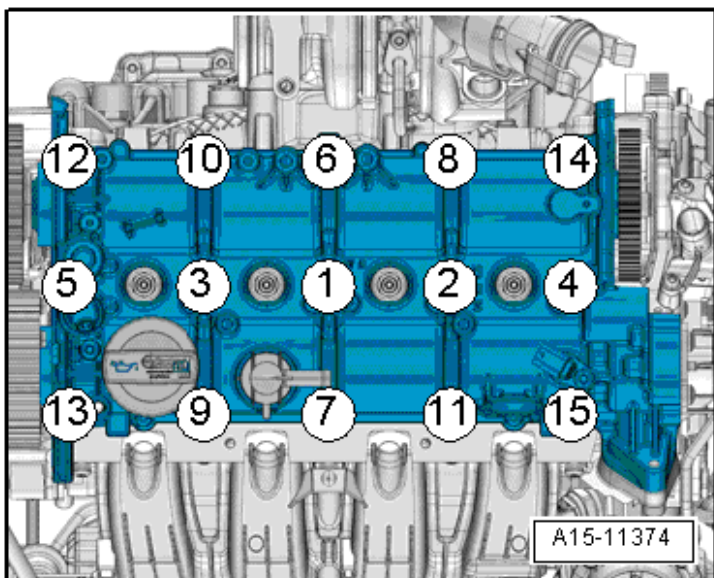
Piston ring to groove clearance Dimensions in mm	New	Wear limit
1st Compression rings	0.05 to 0.09	0.5
2nd Compression rings	0.03 to 0.07	0.15
Oil scraping ring	Cannot be measured	

## *Cylinder Head, Valvetrain – 1.4L CNLA*

### Fastener Tightening Specifications

Component	Nm
Bolt for "TDC" hole in the cylinder block	30
Camshaft toothed gear	50 Nm plus an additional 135° turn
Idler roller	45
Spark plugs	22
Tensioning roller	25
Toothed belt guard bolts	8

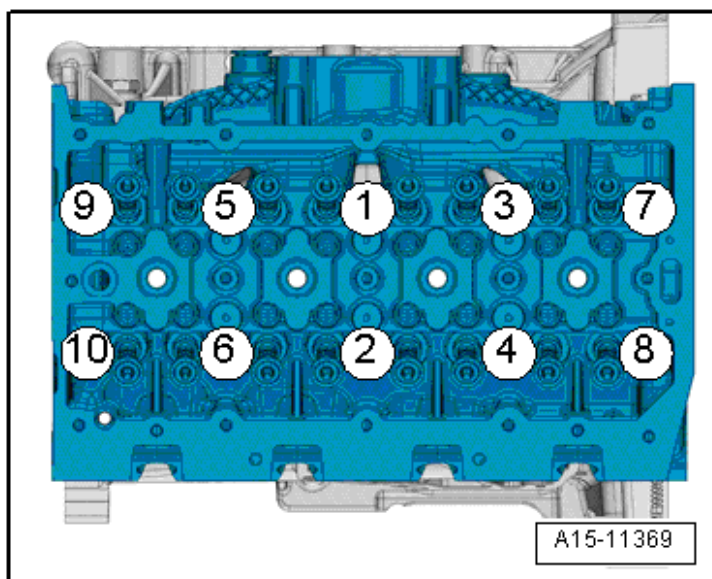
## Camshaft Housing Tightening Specification and Sequence



Replace the bolts that have been tightened to additional torque.

Stage	Bolts	Tightening specification/additional turn
1	1 to 15	10 Nm
2	1 to 15	Tighten 180° additional turn

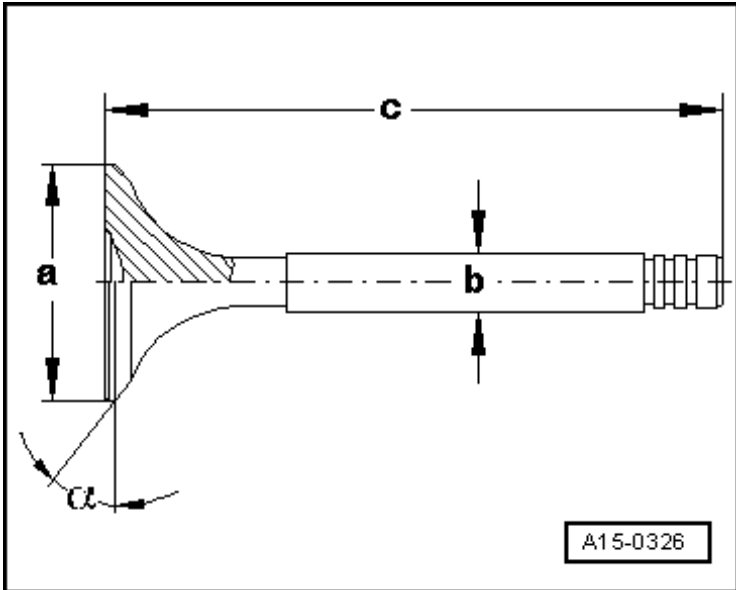
## Cylinder Head Tightening Specification and Sequence



Replace the bolts that have been tightened to additional torque.

Stage	Bolts	Tightening specification/additional turn
1	1 to 10	40
2	1 to 10	Tighten an additional 90° (¼ turn)
3	1 to 10	Tighten an additional 90° (¼ turn)
4	1 to 10	Tighten an additional 90° (¼ turn)

## Valve Dimensions



Intake and exhaust valves must not be re-faced by grinding. Only lapping is permitted.

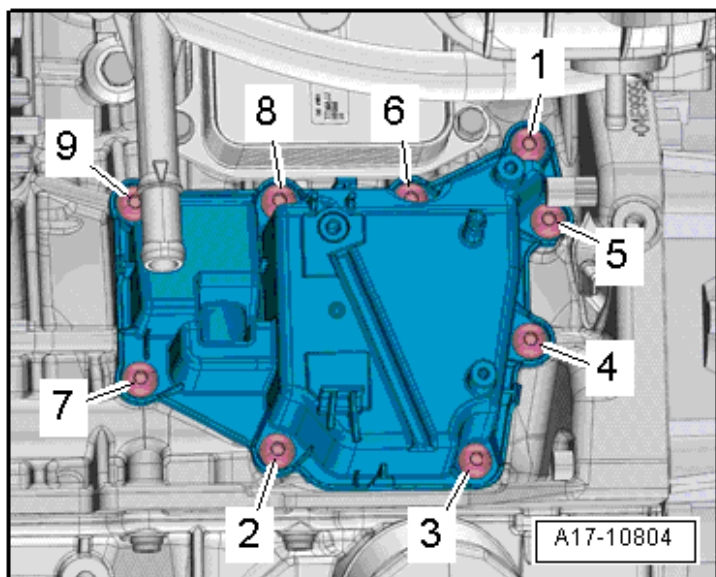
Dimension		Intake Valve	Exhaust Valve
Diameter a	mm	28.5	25.0
Diameter b	mm	4.973	4.963
c	mm	110.25	110.09
$\alpha$	$\angle^\circ$	45	45

## Lubrication – 1.4L CNLA

### Fastener Tightening Specifications

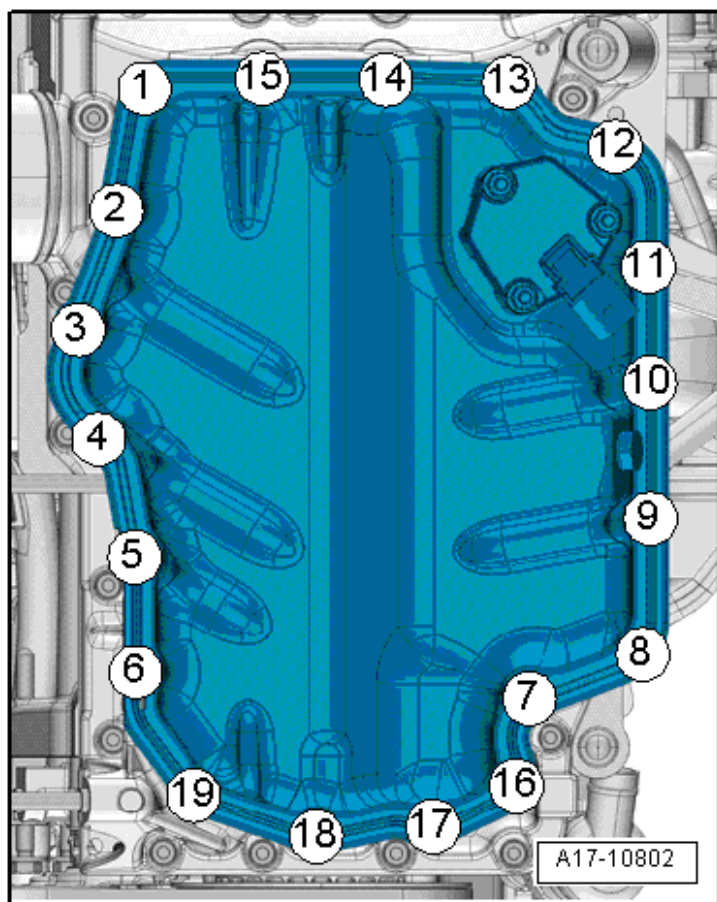
Component	Nm
Engine Oil Cooler	8 plus an additional 90° (¼ turn)
Oil Filter	20
Oil Drain Plug to Oil Pan	30
Oil Intake Pipe	5 plus an additional 90° (¼ turn)
Oil Level Thermal Sensor	9
Oil Pressure Regulation Valve	8
Oil Pressure Switch	20
Oil Pump	10

## Oil Separator Tightening Specification and Sequence



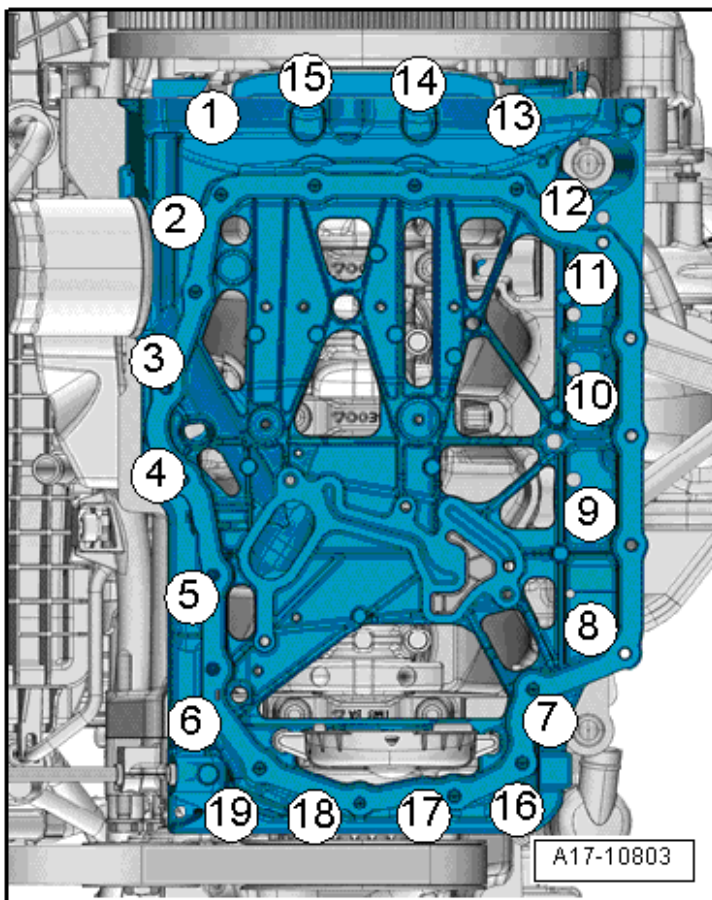
Tighten the bolts to 9 Nm in the following sequence: -1 to 9-.

## Lower Section of Oil Pan, Tightening Specifications and Sequence



Stage	Bolts	Tightening specification
1	1 to 19	Install all the way in by hand.
2	1 to 19	12 Nm

## Upper Section of Oil Pan Tightening Specifications and Sequence



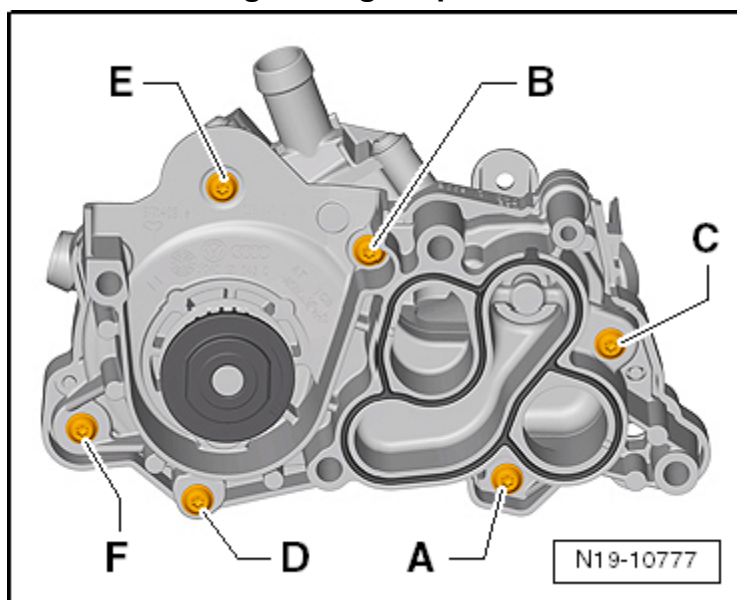
Stage	Bolts	Tightening specification/additional turn
1	1 to 19	Install all the way in by hand.
2	1 to 19	8 Nm
3	1 to 19	Tighten an additional 90° (¼ turn)

## Cooling System – 1.4L CNLA

### Fastener Tightening Specifications

Component	Nm
Coolant pipe to block	8
Coolant thermostat cover	8
Coolant thermostat housing, version 1	8
Coolant thermostat housing, version 2	12
Engine coolant temperature sensor	8
Fan shroud to radiator	5
Low temperature circuit coolant pump to pump bracket	10
Low temperature circuit coolant pump bracket to engine	20
Radiator mounting bolt	5
Radiator mounting to lock carrier bolt	5
Toothed belt sprocket	20

### Coolant Thermostat Housing To Coolant Pump Tightening Sequence



Tighten the bolts to 8 Nm in the following sequence: -A to F-.



## Fuel Supply – 1.4L CNLA

### Fastener Tightening Specifications

Component	Fastener Size	Nm
Accelerator pedal bolt	-	10
Air filter, leak detection pump, to bracket bolt	-	2
Evaporative Emission (EVAP) canister bolt	-	8
Fuel filler neck bolt	-	10
Fuel tank mounting bolts <sup>1</sup> , 2	-	23
Fuel tank strap nuts	-	17
Leak detection pump bracket nut	-	6
Leak detection pump to bracket bolt	-	3
Leak detection pump bracket to wheel housing liner	-	9
Locking ring, fuel pump control module	-	110

<sup>1)</sup> Replace bolt

<sup>2)</sup> For clarification, refer to *Chapter "Fuel Tank Overview"* and see items -11 and 14-

## Turbocharger – 1.4L CNLA

### Fastener Tightening Specifications

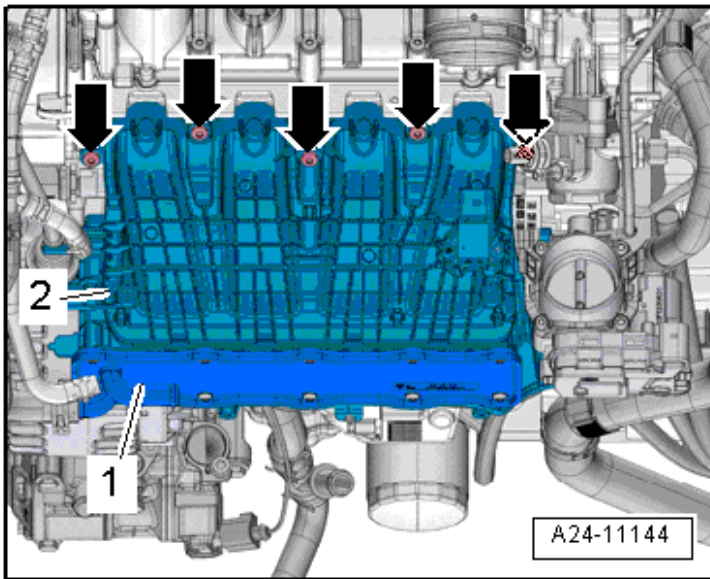
Component	Fastener Size	Nm
Actuator lock nut	-	10
Bracket for engine cover	-	8
Charge air cooler	-	15
Charge pressure actuator	-	9
Intake pipe connection	-	8
Throttle valve control module	-	7
Turbo charger heat shield	-	20
Turbocharger nut	-	25
Turbocharger oil return line	-	9
Turbocharger oil supply line	-	9
Turbocharger crankcase ventilation hose	-	8

# Multiport Fuel Injection – 1.4L CNLA

## Fastener Tightening Specifications

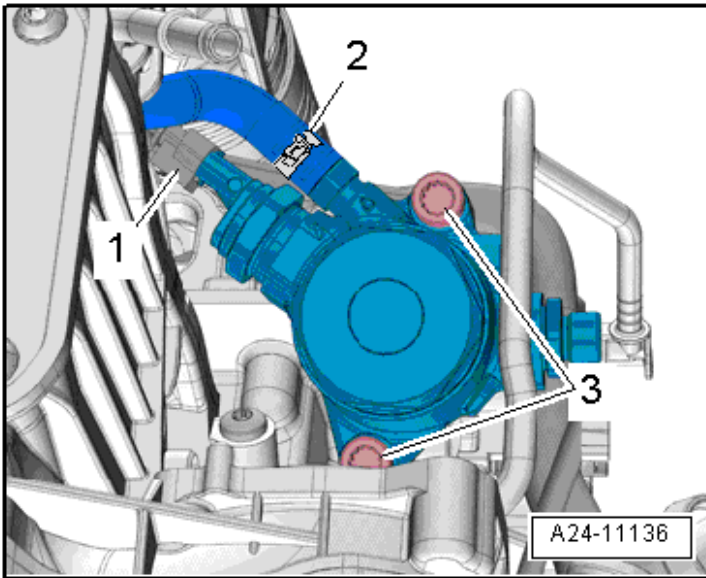
Component	Nm
Air guide section	2
Air filter housing lower section	1.5
Fuel pressure sensor	22
Fuel rail	9
High pressure pipe	25
Locking ring, fuel pump control module	7
Oxygen sensor	55

## Intake Manifold Tightening Specifications



Stage	Bolts	Tightening specification
1	Arrows	Starting in the center and alternating from side to side, install by hand all the way in.
2	Arrows	Starting from the center and alternating from side to side 8 Nm.

## High Pressure Pump Tightening Specification and Sequence



Stage	Bolts	Tightening specification
1	3	Install all the way in by hand.
2	3	Tighten 1 turn from side to side until the flange on the high pressure pump touches the camshaft housing
3	3	20 Nm
4	3	Tighten 90° additional turn

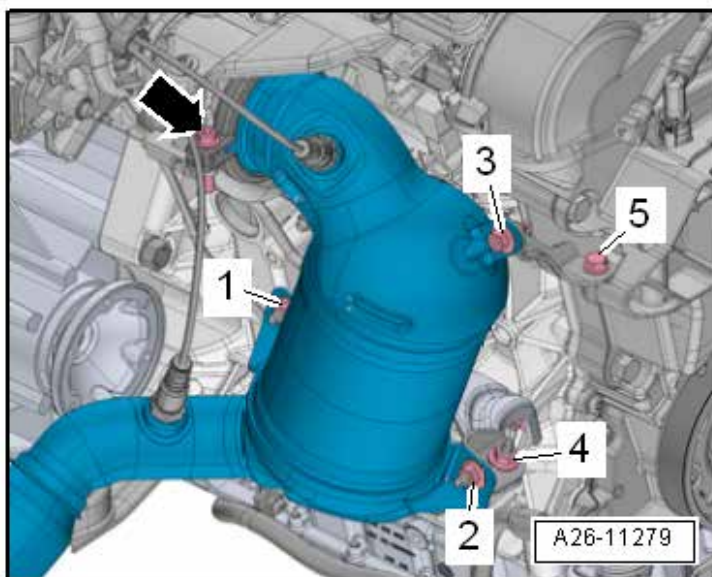
## Exhaust System, Emission Controls – 1.4L CNLA

### Fastener Tightening Specifications

Component	Nm
Catalytic converter hanger brackets	20
Exhaust clamping sleeve, front	30
Exhaust clamping sleeve, rear	25
Muffler hanger brackets	25
Secondary air pump	10
Secondary air pump heat shield	5
Secondary air injection solenoid valve	8

Engine --  
1.4L CNLA

## Intake Manifold Tightening Specifications



Stage		
1	Mount the catalytic converter on the turbocharger and install the screw-type clamp -arrow- loose.	
2	Install the bolts -3 and 5- and the nuts -1, 2 and 4- by hand, loose.	It must be possible to slide the catalytic converter and bracket back and forth.
3	Tighten the screw-type clamp -arrow-.	15 Nm
4	Tighten the bolts and nuts in the following sequence: -1 to 5-.	20 Nm

# Ignition – 1.4L CNLA

## Technical Data

Engine data	1.4L TFSI engine
Idle speed Idle speed cannot be adjusted, it is regulated by idle stabilization	640 to 800 RPM
RPM limited by switching off fuel injectors and closing throttle valve	Approximately 6500 RPM
Ignition timing is regulated by control module. It is not possible to adjust the ignition timing.	
Ignition System	Single coil ignition system with 4 ignition coils (output stages integrated) that are connected directly to spark plugs via the ignition cables.
Ignition sequence	1-3-4-2

## Fastener Tightening Specifications

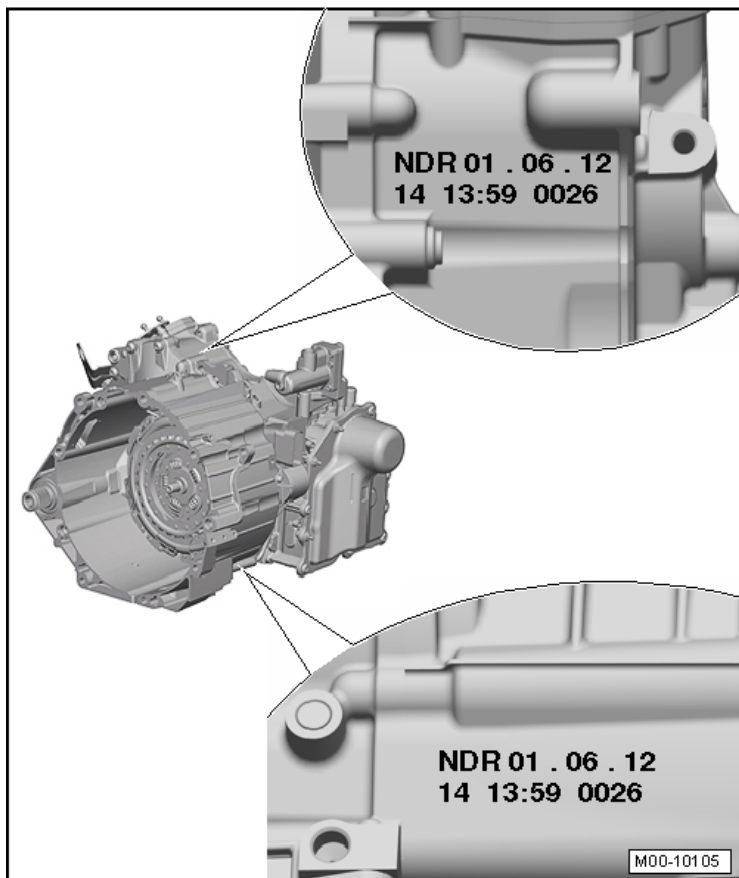
Component	Nm
Camshaft Position (CMP) sensors	8
Engine Speed (RPM) Sensor	4.5
Ignition Coils	8
Knock Sensor <sup>1)</sup>	20

<sup>1)</sup> Tightening specifications affect the function of the Knock Sensor (KS).

# DIRECT SHIFT GEARBOX (DSG) TRANSMISSION – 0CG

## General Information

### Transmission Code Letters, Reading



Transmission code letters and build date.

<b>Example:</b>	<b>NDR</b>	<b>01</b>	<b>06</b>	<b>12</b>
	Identification code	Day	Month	Year (2012) of manufacture
	<b>Plant Code</b>	<b>Time</b>		<b>Serial Number</b>
	14	13:59		0026

## Transmission Allocation Codes

Direct Shift Gearbox (DSG) 0CG		
Transmission	Code letters	NDR
Allocation	Type	Jetta from MY 11
	Engine	1.4L TSI - 110 kW
Gear Ratios	Final drive I for 1st to 4th gear	71 : 16 = 4.438
Ratio: $Z_2 : Z_1$	Final drive II for 5th gear and 6th gear	71 : 22 = 3.227
Ratio: $Z_2 : Z_1$	Final drive III for 7th gear and reverse gear	71 : 17 = 4.176
Use the transmission code when ordering replacement parts for a repair. Refer to the Parts Catalog.		

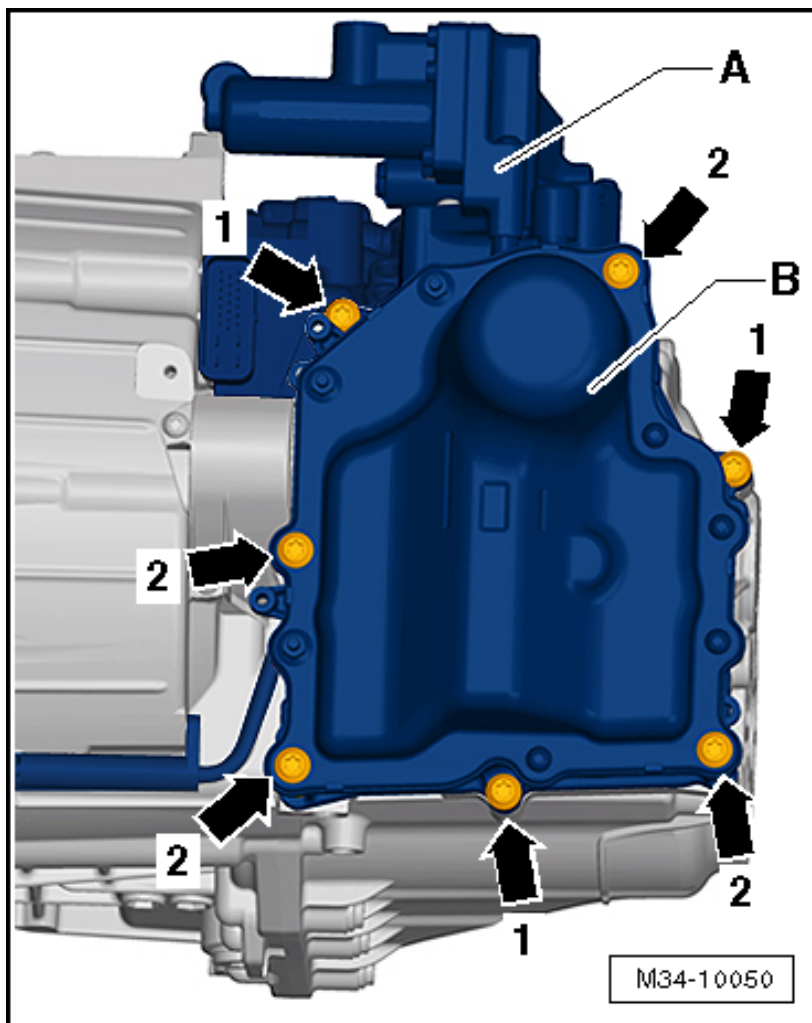
## Controls, Housing (DSG) – 0CG

### Fastener Tightening Specifications

Component	Nm
Cable bracket to transmission <sup>1)</sup>	8 plus an additional 90° (¼ turn)
Engaging levers cover	8
Selector lever cable adjusting screw	13
Selector housing to body	8
Selector mechanism to the selector housing	4
Transmission bracket <sup>1)</sup>	40 plus an additional 90° (¼ turn)
Transmission shift lever <sup>1)</sup>	10 plus an additional 90° (¼ turn)

<sup>1)</sup> Replace

## Direct Shift Gearbox (DSG) Mechatronic -J743- Tightening Specification and Sequence

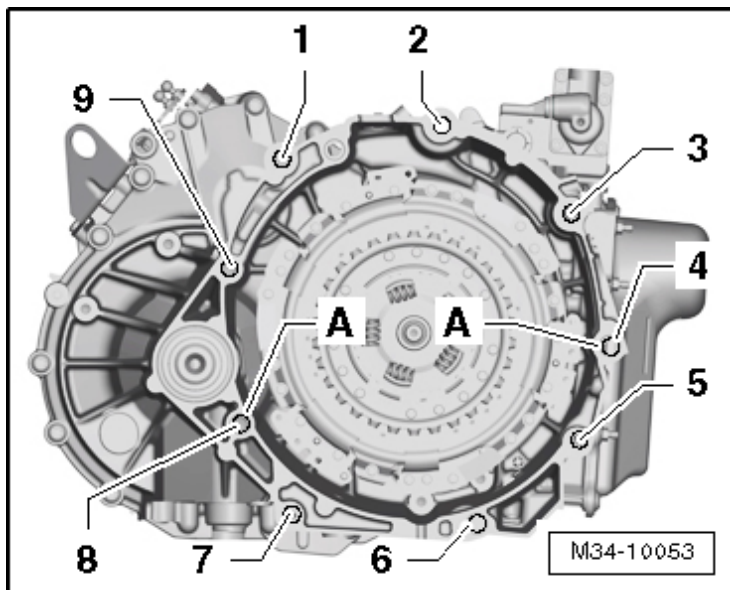


Replace the bolts -arrows 1- and -arrows 2-.

Stage	Bolts	Tightening specification
1	-Arrows 1-	Tighten the bolt hand-tight.
2	Remove the guide pin -T10406-	
3	-Arrows 2-	Tighten the bolt hand-tight.
4	-Arrows 1 and 2-	10 Nm diagonally



## Transmission Tightening Specifications



Direct Shift Trans.,  
(DSG) – 0CG

Item	Bolt	Nm
1, 2	M12 x 50	80
3, 4	M12 x 105	80
5, 6, 7	M10 x 50	40
8, 9 <sup>1)</sup>	M12 x 70	80
A	Alignment sleeve for centering	

<sup>1)</sup> Attach from the engine side.

# BRAKE SYSTEM

## General Information

### Front Brakes

Engine Version	PR number	Front Wheel Brake
1.4l 110 kW	1ZA/1ZB/1LV	FN 3 (16")
2.0L 85 kW	1ZM/1ZQ	FS III (15")
2.5L 125 kW	1ZP/1ZE	FN 3 (15")
2.0L 103 kW TDI	1ZP/1ZE	FN 3 (15")
2.0L 147 kW	1ZA/1ZB/1LV	FN 3 (16")

### Rear Brakes, Torsion Beam Rear Suspension

Engine Version	PR number	Rear Wheel Brake
2.5L 125 kW	1KS/1KT	Bosch
2.0 103 kW TDI		
2.5l 125 kW <sup>1)</sup>	1KG	TB 230 x 32
2.0L 85 kW	1KG	TB 230 x 32

<sup>1)</sup> SE version only

### Rear Brakes, Multi-link Rear Axle

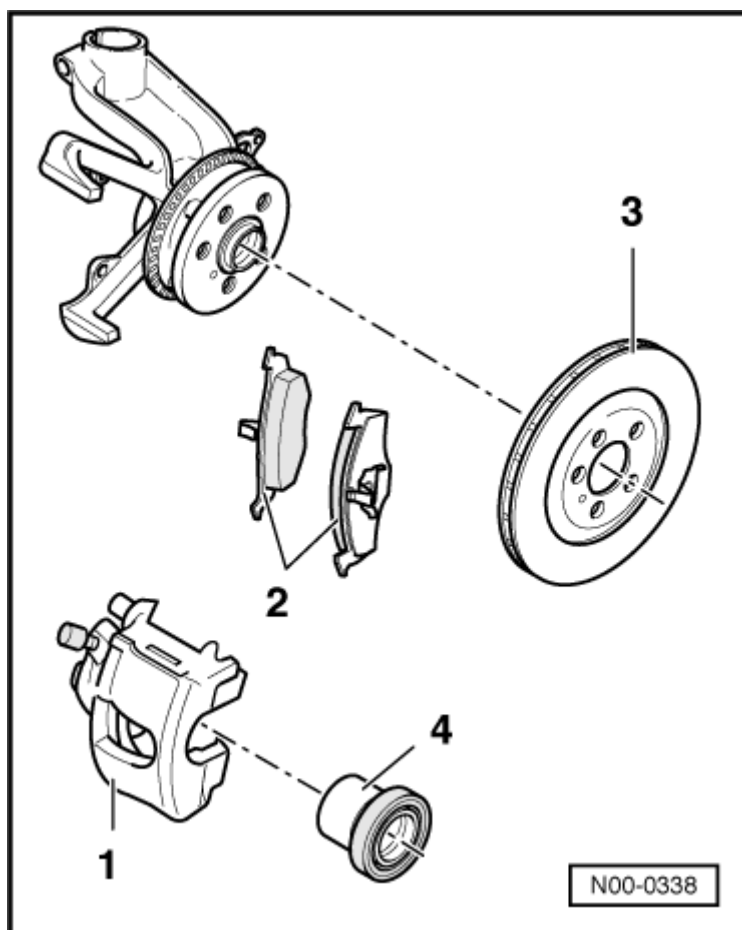
Engine Version	PR number	Rear Wheel Brake
1.4l 110 kW	1KS/1KT	Bosch
2.0L 147 kW	1KS/1KT	Bosch

### Master Cylinder and Brake Booster

Brake master cylinder <sup>1)</sup>	Diameter in mm	22.2
Brake master cylinder <sup>1)</sup>	Diameter in mm	23.81
Brake booster	Diameter in inches	10

<sup>1)</sup> Allocation, refer to Electronic Parts Catalog (ETKA).

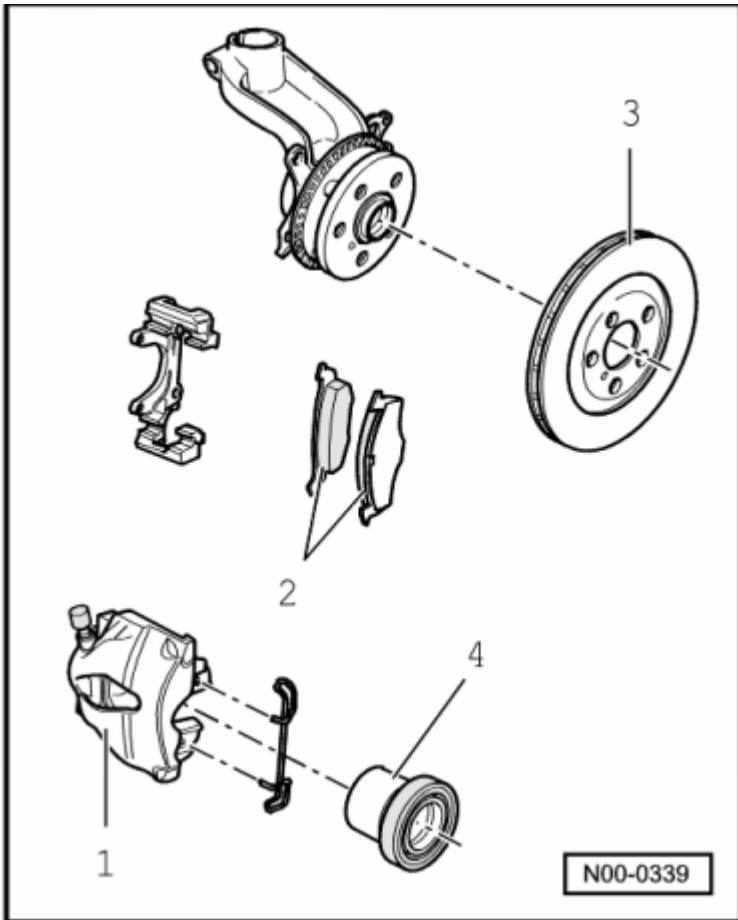
## Front Brakes, FS III



Brake System

Item	PR Number		1ZM/1ZQ
1	Brake caliper		FS III (15")
2	Brake pad, thickness without backing plate	mm	14
3	Brake rotor	Diameter in mm	280
	Brake rotor, thickness	mm	22
4	Brake caliper, piston	Diameter in mm	54

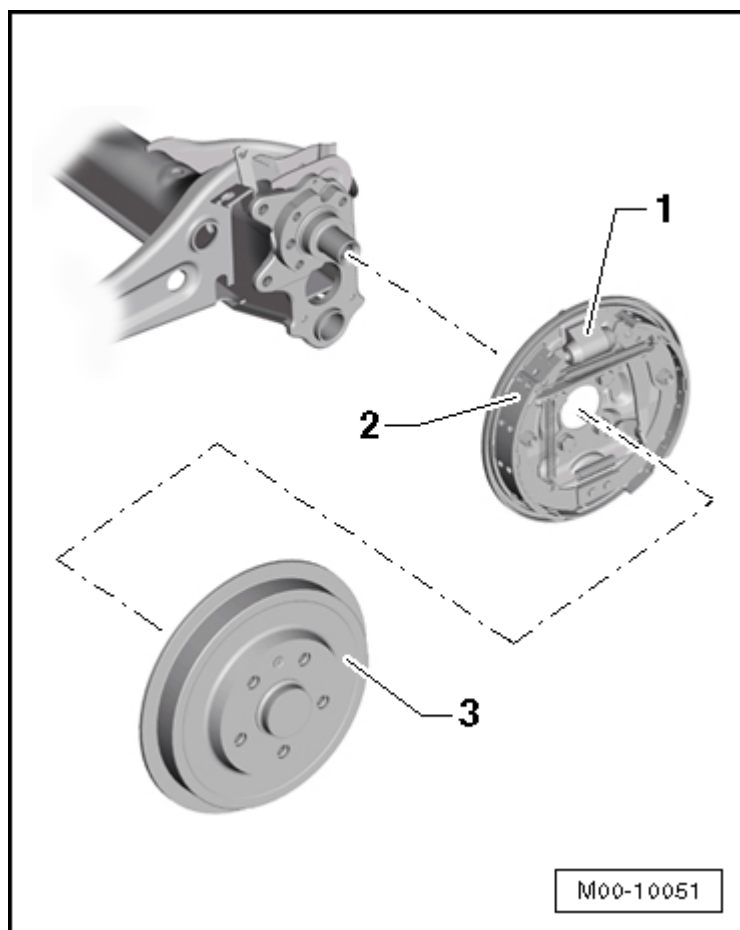
## Front Brakes, FN 3



Item	PR number	1ZE/1ZP	
1	Brake caliper	FN 3 (15")	
2	Brake pad, thickness without backing plate	mm	14
3	Brake rotor	Diameter in mm	288
	Brake rotor, thickness	mm	25
4	Brake caliper, piston	Diameter in mm	54

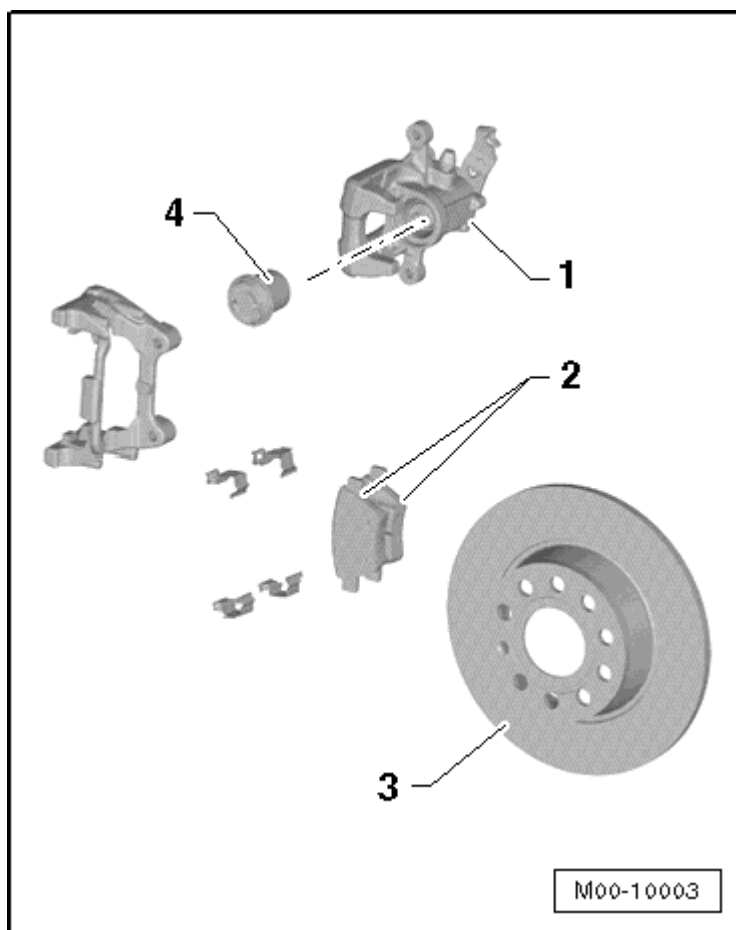
<b>Item</b>	<b>PR number</b>		<b>1LV/1ZA/1ZB</b>
1	Brake caliper		FN 3 (16")
2	Brake pad, thickness	mm	14
	Brake pad, wear limit without back plate	mm	2
3	Brake rotor	Diameter in mm	312
	Brake rotor thickness	mm	25
	Brake rotor, wear limit	mm	22
4	Brake caliper, piston	Diameter in mm	54

## Rear Drum Brakes



Item	PR number		1KG
1	Wheel brake cylinder	mm	20
2	Brake pad, width	mm	32
	Brake pad, thickness	mm	5
	Brake pad, minimum thickness	mm	2.5
3	Brake drum	Diameter in mm	230
	Brake drum, wear limit	Diameter in mm	231.5

## Rear Disc Brakes



Item	PR number		1KS/1KT
1	Brake caliper		Bosch
2	Brake pad, thickness without backing plate	mm	12
3	Brake rotor	Diameter in mm	272
	Brake rotor, thickness	mm	10
4	Brake caliper, piston	Diameter in mm	38

# Anti-lock Brake System (ABS)

## Fastener Tightening Specifications

Component	Nm
<b>ABS control module-to-ABS hydraulic unit bolt (always replace)</b>	
ABS Mark 70 (ABS/ASR)	5.5
ABS Mark 60 EC (ABS/EDL/ASR/ESP) (always replace)	2+/- 0.8
ABS hydraulic unit bracket bolt/nut	8
Brake line	14
Steering angle sensor-to-steering column bolt	1.5
Steering wheel-to-steering column bolt (always replace)	30 plus an additional 90° (¼ turn)
Wheel speed sensor bolt	8

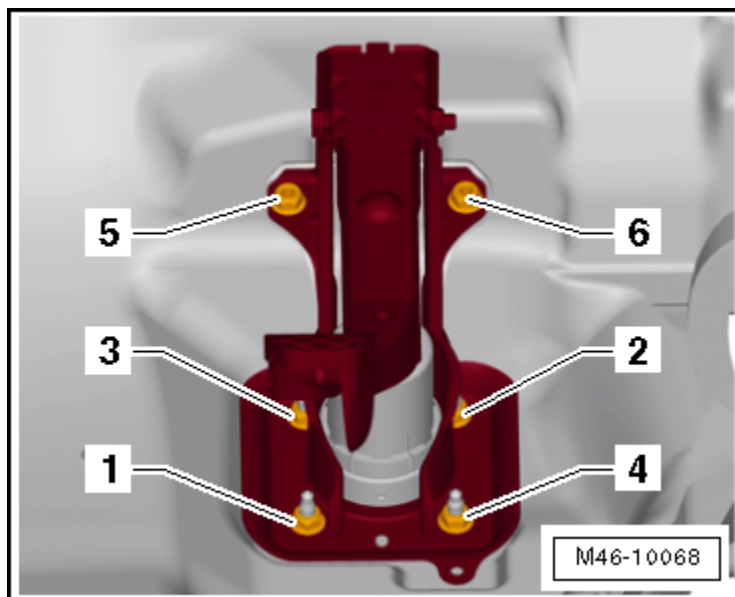


# Mechanical Components

## Fastener Tightening Specifications

Component	Fastener size	Nm
Brake booster and mounting bracket nut (always replace)		25
<b>Brake disc-to-wheel hub bolt</b>		
FS III		5
FN 3		4
Brake hose-to-brake caliper		35
Brake pedal-to-mounting bracket nut (always replace)		25
Front brake carrier-to-wheel bearing housing bolt, FN 3		124
Front cover plate-to-wheel bearing housing bolt		12
Front brake caliper guide pin		30
Front wheel bearing unit-to-wheel bearing housing bolt (always replace)		70 plus an additional 90° (¼ turn)
Parking brake lever nut		20
Rear brake caliper-to-guide pin bolt (always replace)		35
Rear brake carrier-to-wheel bearing housing bolt, disc brakes (always replace)		90 plus an additional 90° (¼ turn)
Rear drum brake carrier/disc brake cover plate (torsion beam) and stub axle-to-axle beam bolt (always replace)		30 plus an additional 90° (¼ turn)
Rear disc brake cover plate (multi-link)-to-axle beam bolt	M6 x 12	12
Rear brake disc/drum-to-wheel hub bolt		8
Rear wheel bearing unit-to-stub axle bolt (drum brake) (always replace)		180 plus an additional 180° (1/2 turn)
Rear wheel bearing unit-to-stub axle bolt (disc brake) (always replace)		180 plus an additional 90° (¼ turn)
Rear wheel brake cylinder-to-brake carrier bolt, drum brakes		8
Wheel speed sensor bolt		8

## Brake Pedal Mounting Bracket Tightening Specifications



Component	Nm
Install all new bolts and tighten 1 through 6 in sequence	25

## *Hydraulic Components*

### Fastener Tightening Specifications

Component	Nm
Brake caliper bleeder valve	10
Brake lamp switch-to-brake master cylinder nut	5
Brake line-to-master cylinder	14
Brake master cylinder-to-brake booster nut (always replace)	25
Front brake caliper guide pin	30
Pedal assembly mounting nut (always replace)	25
Rear brake caliper-to-guide pin bolt (always replace)	35

# SUSPENSION, WHEELS, STEERING

## Front Suspension

### Fastener Tightening Specifications

Component	Fastener size	Nm
ABS wheel speed sensor-to-wheel bearing housing bolt	-	8
Ball joint to control arm nut	-	100
Ball joint-to-wheel bearing housing nut	-	60
Control arm-to-Subframe Bolt (always replace)	M12 x 1.5 x 80	70 plus an additional 90° (¼ turn)
Coupling rod-to-stabilizer bar nut	-	65
Coupling rod-to-strut nut	-	65
Cover plate-to-wheel bearing housing bolt	-	12
CV joint boot clamp	-	25
Drive axle heat shield bolt	-	25
<b>Drive axle-to-transmission bolt (always replace) <sup>2)</sup></b>		
- CV joint VL 100	M8	40
- CV joint VL 100	M10	70
- CV joint VL 107	M10 x 52	70
- Triple roller joint AAR3300i	M10 x 23	70
<b>Drive axle to wheel hub bolt (always replace)</b>		
- Twelve-point bolt with ribs	-	70 plus an additional 90° (¼ turn)
- Twelve-point bolt without ribs	-	200 plus an additional 180° (½ turn)
Pendulum support to subframe bolt (always replace) <sup>1)</sup>	M14 x 1.5 x 70	100 plus an additional 90° (¼ turn)
Pendulum support to transmission bolt (always replace)	-	50 plus an additional 90° (¼ turn)

## Fastener Tightening Specifications (cont'd)

Component	Fastener size	Nm
Shock absorber to suspension strut bearing nut (always replace)	-	60
Subframe to body bolt (always replace)	-	70 plus an additional 90° (¼ turn)
Stabilizer bar to subframe bolt	-	20 plus an additional 90° (¼ turn)
Strut to body bolt (always replace)	-	15 plus an additional 90° (¼ turn)
Strut to wheel bearing housing nut (always replace)	-	70 plus an additional 90° (¼ turn)
Wheel hub-to-wheel bearing housing bolt (always replace) <sup>3)</sup>	-	70 plus an additional 90° (¼ turn)

<sup>1)</sup> Tighten only when the pendulum support is bolted to the transmission..

<sup>2)</sup> First tighten diagonally to 10 Nm, then tighten diagonally again to the tightening specification.

## Rear Suspension

### Fastener Tightening Specifications

Component	Fastener Size	Nm
ABS wheel speed sensor to wheel bearing housing bolt	-	8
Brake disc to wheel hub bolt	-	4
Coupling rod to stabilizer bar nut <sup>1)</sup>	-	45
Coupling rod to wheel bearing housing nut <sup>1)</sup>	-	45
Cover Plate to wheel bearing housing bolt	-	12
Left rear level control system sensor bolt	M5 x 20	5
Lower transverse link to subframe nut <sup>1) 2)</sup>	-	95
Lower transverse link to wheel bearing housing nut <sup>1) 2)</sup>	-	90 plus an additional 90° (¼ turn)
Shock absorber to body bolt <sup>1)</sup>	-	50 plus an additional 90° (¼ turn)

Component	Fastener Size	Nm
Shock absorber to shock absorber mounting nut 1	-	25
Shock absorber to wheel bearing housing bolt	-	180
Stabilizer bar to subframe bolt <sup>1) 2) 5)</sup>	-	25 plus an additional 90° (¼ turn)
Stone protection plate to lower transverse link bolt	-	8
Subframe to body bolt <sup>1) 3)</sup>	-	90 plus an additional 90° (¼ turn)
Tie rod to subframe nut <sup>1) 2)</sup>	-	90 plus an additional 90° (¼ turn)
Tie rod to wheel bearing housing nut <sup>1) 2)</sup>	-	130 plus an additional 90° (¼ turn)
Trailing arm mounting bracket to body bolt <sup>1)</sup>	-	50 plus an additional 90° (¼ turn)
Trailing arm to mounting bracket bolt <sup>1)</sup>	-	90 plus an additional 90° (¼ turn)
Trailing arm to wheel bearing housing bolt <sup>1) 4)</sup>	-	90 plus an additional 90° (¼ turn)
Upper transverse link to subframe nut <sup>1) 2)</sup>	-	95
Upper transverse link to wheel bearing housing nut <sup>1) 2)</sup>	-	130 plus an additional 90° (¼ turn)
Wheel hub to wheel bearing housing bolt <sup>1)</sup>	-	180 plus an additional 90° (¼ turn)

<sup>1)</sup> Tighten in the curb weight position, refer to ElsaWeb, Wheel Bearing Housing, Lifting to Curb Weight Position.

<sup>2)</sup> Always tighten threaded connections in curb weight position. Refer to → Chapter „Rear Axle, Lifting to Curb Weight Position“.

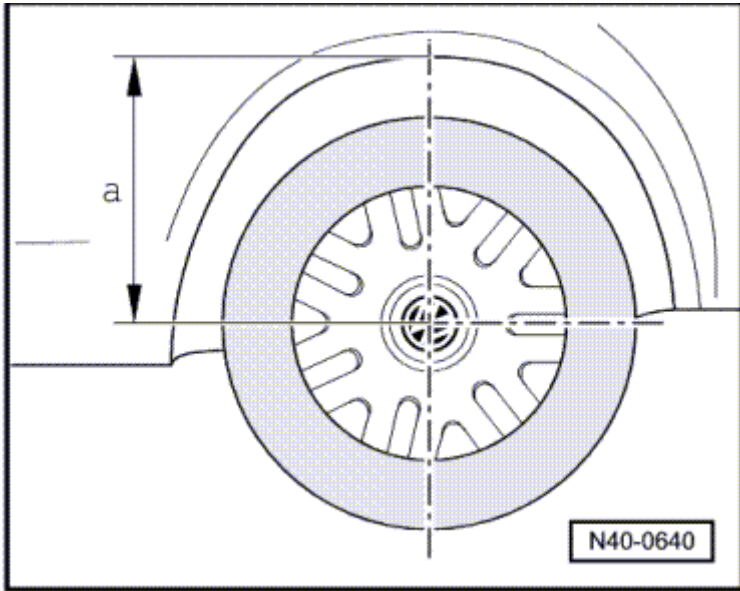
<sup>3)</sup> Tighten in the following sequence: Tighten to 90 + 90° turn, loosen one full turn (360°), then tighten to 90 + 90° turn..

<sup>4)</sup> Observe tightening sequence.

<sup>5)</sup> Tighten uniformly.

# Wheels, Tires, Wheel Alignment

## Alignment Specifications with Torsion Beam Rear Suspension



Front Suspension	Basic	Sport
PR numbers	2UA	2UC
Total toe (wheels not pressed)	10' ± 10'	10' ± 10'
Camber (wheels in straight ahead position)	-30' ± 30'	-40' ± 30'
Maximum permissible difference between both sides	Maximum 30'	Maximum 30'
Toe out angle <sup>1)</sup> with steering wheel turned 20° to left and right	1° 19' ± 20'	1° 31' ± 20'
Caster	7° 37' ± 30'	7° 53' ± 30'
Maximum permissible difference between both sides	Maximum 30'	Maximum 30'
Standing height	379 ± 10 mm	364 ± 10 mm

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

<b>Front Suspension</b>	<b>Comfort</b>	<b>Heavy Duty</b>
PR numbers	2UD	2UB
Total toe (wheels not pressed)	10' ± 10'	10' ± 10'
Camber (wheels in straight ahead position)	-22' ± 30'	-13' ± 30'
Maximum permissible difference between both sides	Maximum 30'	Maximum 30'
Toe out angle <sup>1)</sup> with steering wheel turned 20° to left and right	1° 12' ± 20'	1° 7' ± 20'
Caster	7° 27' ± 30'	7° 18' ± 30'
Maximum permissible difference between both sides	Maximum 30'	Maximum 30'
Standing height	389 ± 10 mm	399 ± 10 mm

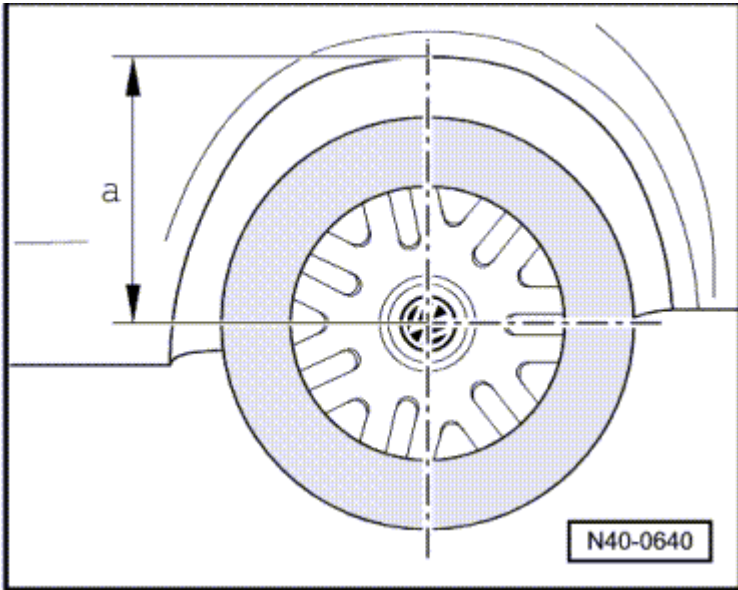
<sup>1)</sup> Depending on the manufacturer, the toe out angle difference can also be indicated negatively in the alignment computer.

Specified values valid for all engine versions.

<b>Rear Suspension</b>	<b>Basic</b>	<b>Sport</b>
Camber	-1° ± 30'	-1° ± 30'
Maximum permissible difference between both sides	Maximum 30'	Maximum 30'
Total toe (at prescribed camber)	+20' ± 10'	+20' ± 10'
Maximum permissible deviation from direction of rotation	Maximum 20'	Maximum 20'
Standing height	379 ± 10 mm	364 ± 10 mm

<b>Rear Suspension</b>	<b>Comfort</b>	<b>Heavy Duty</b>
Camber	-1° ± 30'	-1° ± 30'
Maximum permissible difference between both sides	Maximum 30'	Maximum 30'
Total toe (at prescribed camber)	+20' ± 10'	+20' ± 10'
Maximum permissible deviation from direction of rotation	Maximum 20'	Maximum 20'
Standing height	389 ± 10 mm	399 ± 10 mm

## Alignment Specifications, Multi-Link Rear Suspension



Front Suspension	Basic
PR numbers	2UA
Total toe (wheels not pressed)	10' ± 10'
Camber (wheels in straight ahead position)	-30' ± 30'
Maximum permissible difference between both sides	Maximum 30'
Toe out angle <sup>1)</sup> with steering wheel turned 20° to left and right	1° 19' ± 20'
Caster	7° 37' ± 30'
Maximum permissible difference between both sides	Maximum 30'
Standing height	379 ± 10 mm

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



<b>Front Suspension</b>	<b>Sport</b>	<b>Comfort</b>	<b>Heavy Duty</b>
PR numbers	2UC	2UD	2UB
Total toe (wheels not pressed)	10' ± 10'	10' ± 10'	10' ± 10'
Camber (wheels in straight ahead position)	-40' ± 30'	-22' ± 30'	-13' ± 30'
Maximum permissible difference between both sides	Maximum 30'	Maximum 30'	Maximum 30'
Toe out angle <sup>1)</sup> with steering wheel turned 20° to left and right	1°31' ± 20'	1°12' ± 20'	1°7' ± 20'
Caster	7° 53' ± 30'	7° 27' ± 30'	7° 18' ± 30'
Maximum permissible difference between both sides	Maximum 30'	Maximum 30'	Maximum 30'
Standing height	364 ± 10 mm	389 ± 10 mm	399 ± 10 mm

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

Specified values valid for all engine versions.

<b>Rear Suspension</b>	<b>Basic</b>
Camber	-1° ± 30'
Maximum permissible difference between both sides	maximum 30'
Total toe (at prescribed camber)	+20' ± 10'
Maximum permissible deviation from direction of rotation	Maximum 20'
Standing height	379 ± 10 mm

<b>Rear Suspension</b>	<b>Sport</b>	<b>Comfort</b>	<b>Heavy Duty</b>
Camber	-1° ± 30'	-1° ± 30'	-1° ± 30'
Maximum permissible difference between both sides	Maximum 30'	Maximum 30'	Maximum 30'
Total toe (at prescribed camber)	+20' ± 10'	+20' ± 10'	+20' ± 10'
Maximum permissible deviation from direction of rotation	Maximum 20'	Maximum 20'	Maximum 20'
Standing height	364 ± 10 mm	389 ± 10 mm	399 ± 10 mm

## Fastener Tightening Specifications

Component	Nm
Tire pressure sensor union nut	8
Front subframe to body bolt <sup>1)</sup>	70 plus an additional 180° (½ turn)
Front tie rod end to tie rod nut	70
Lower transverse link to rear subframe nut <sup>1) 2)</sup>	8
Upper transverse link to rear subframe nut <sup>1) 2)</sup>	95

<sup>1)</sup> Always replace after removal.

<sup>2)</sup> Always tighten threaded connections in curb weight position. Refer to Chapter *“Rear Axle, Lifting to Curb Weight Position”* (all except GLI) or to Chapter *“Rear Axle, Lifting to Curb Weight Position”* (GLI only).

# Steering

## Fastener Tightening Specifications

Component	Fastener size	Nm
Ball joint to control arm <sup>1)</sup>	-	100
Belt pulley-to-power steering pump bolt	-	22
Heat shield-to-steering gear bolt, hydraulic power steering	-	23
Pendulum support-to-transmission	M10 x 35	50 plus an additional 90° (¼ turn)
	M10 x 75	
Power steering pump-to-bracket bolt	-	22
Pressure line-to-power steering pump bolt	-	32
Shield-to-steering gear bolt/nut	-	6
Stabilizer bar to coupling rod nut <sup>1)2)</sup>	-	65
Steering column-to-assembly carrier bolt	-	20
Steering column-to-steering gear bolt <sup>1)</sup>	M8 x 35	30
Steering gear-to-subframe bolt <sup>1)</sup>	-	50 plus an additional 90° (¼ turn)
Steering wheel-to-steering column bolt <sup>1)</sup>	-	30 plus an additional 90° (¼ turn)
Subframe to body	-	70 plus an additional 90° (¼ turn)
Tie rod-to-steering gear	-	100
Tie rod end-to-tie rod nut	-	70
Tie rod end-to-wheel bearing housing nut <sup>1)</sup>	-	20 plus an additional 90° (¼ turn)
Universal joint to steering gear bolt <sup>1)</sup>	-	30

<sup>1)</sup> Always replace after removal.

<sup>2)</sup> Counterhold at joint pin inner multi-point fitting..

# ELECTRICAL SYSTEM

## *Communication*

### Fastener Tightening Specifications

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

# Battery, Starter, Generator, Cruise Control

## Fastener Tightening Specifications

Component	Fastener size	Nm
Subassembly bracket, collar bolts <sup>1)</sup>	-	52
Subassembly bracket, collar bolts <sup>2)</sup>	-	25
Subassembly bracket, collar bolts <sup>3)</sup>	-	45
Air filter housing-to-body screw	-	10
Battery hold down screw	-	20
Battery terminal clamp nut	-	6
Battery tray bolts	-	9
B+ wire-to-starter	-	20
B+ wire nut-to-generator	-	20
Generator cap, Phillips head screw	-	4.5
Generator cap, nut	-	15
Generator cap, nut	-	20
Generator bolts <sup>1)</sup>	-	23
Generator bolts <sup>2)</sup>	-	25
Generator bolts <sup>3) 4)</sup>	-	20
Hex bolt with washer and threaded piece for voltage regulator	-	2
Ribbed belt pulley without freewheel	-	65
Ribbed belt pulley with freewheel	-	80
Ribbed belt tensioner, collar bolts <sup>1) 3)</sup>	-	23
Starter mounting bolt	M10	40
	M12	75
Voltage regulator, Phillips head screw	-	2
Voltage Stabilizer J532	-	1.5
Wire clamp nut-to-the back of the generator	-	3.2
Wiring bracket nut at starter, manual transmission	-	20

<sup>1)</sup> Applies to 1.4L and 2.0L FSI

<sup>2)</sup> Applies to 2.5L

<sup>3)</sup> Applies to 2.0L TFSI

<sup>4)</sup> Applies to 2.0L TDI

# Instruments

## Fastener Tightening Specification

Component	Nm
Horn-to-bracket nut	10
Horn bracket-to-body bolt	20
Instrument cluster	1.5

# Windshield Wiper/Washer System

## Fastener Tightening Specifications

Component	Nm
Windshield wiper arm attaching nut	20
Windshield wiper frame-to-body <sup>1)</sup>	5
Windshield wiper frame-to-body <sup>2)</sup>	8
Windshield wiper motor-to-wiper frame bolts	8
Windshield wiper motor crank-to-windshield wiper motor shaft	18
Windshield/headlamp washer fluid reservoir-to-the body	8

<sup>1)</sup> For bolt tightening clarification, refer to Chapter "Windshield Wiper System Overview" and see item -4-

<sup>2)</sup> For bolt tightening clarification, refer to Chapter "Windshield Wiper System Overview" and see item -5-.

# Exterior Lights, Switches

## Fastener Tightening Specifications

Component	Nm
Carrier, front end <sup>1)</sup>	5
Carrier, front end <sup>2)</sup>	8
Fog Lamp Housing Screws	2
Headlamp	5
Headlamp Power Output Stage	1.4
HID Headlamp Control Module	1.4
High-mounted brake lamp	2
License plate lamp	2
Rear lid taillamps bulb holder	3.5
Steering column electronic systems control module	1.5
Taillamp in side panel bulb holder	2.5

<sup>1)</sup> For bolt tightening clarification, refer to ElsaWeb, *Headlamp Overview*, see item 7.

<sup>2)</sup> For bolt tightening clarification, refer to ElsaWeb, *Headlamp Overview*, see item 6.

# Interior Lights, Switches

## Fastener Tightening Specifications

Component	Nm
Alarm horn nut	10
Front interior lamp	2

## Wiring

### Left E-box in the Engine Compartment Tightening Specifications

Fasteners	Nm
Nuts (wire connections to the E-box)	9
Nuts	6

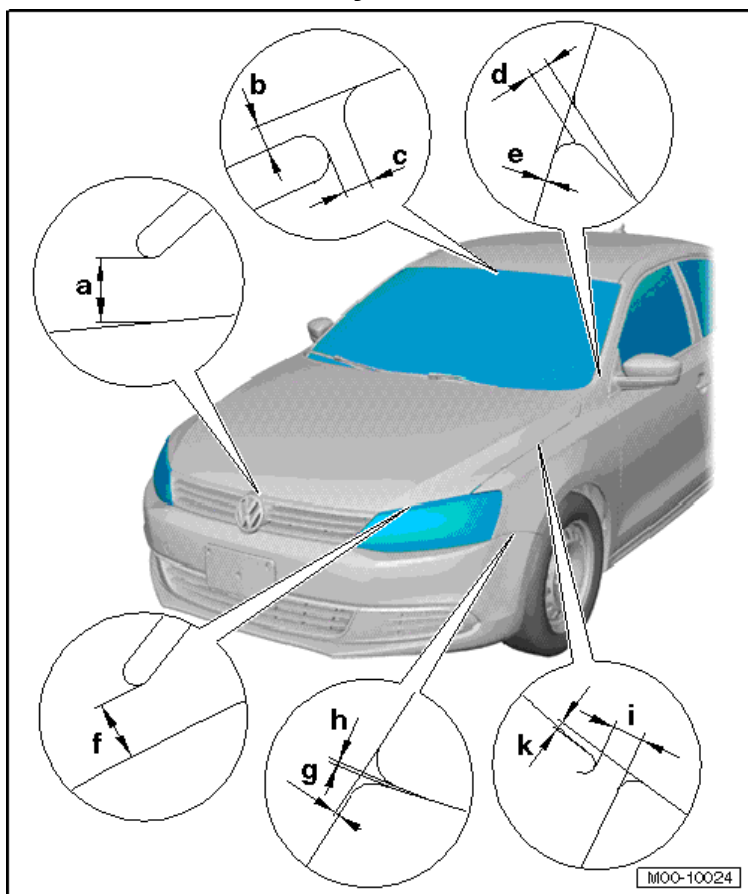
### Fastener Tightening Specification

Component	Nm
Driver footwell fuse panel	1.5
Fuse Panel Behind the Instrument Panel on the Driver Side	2.5

# BODY

## Body Dimensions

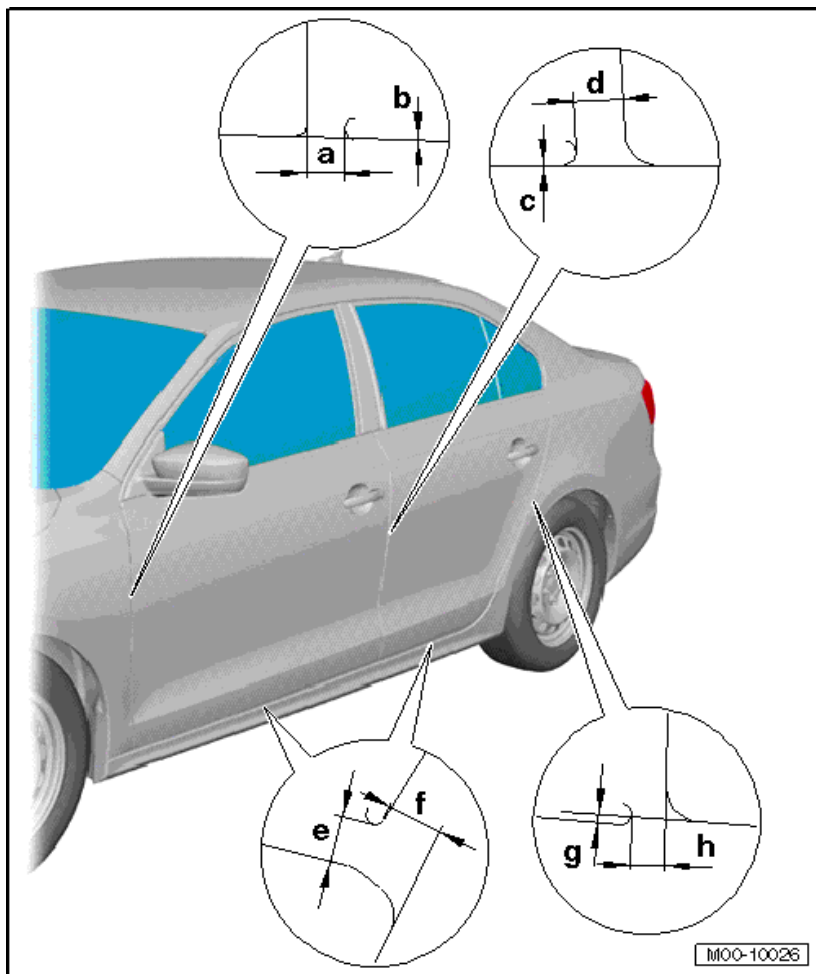
### Body, Front



Component	mm
a	$5.0 \pm 0.5$
b	$1.9 \pm 0.5$
c	$2.5 \pm 0.5$
d	$2.0 \pm 1.0$
e	$0.0 \pm 0.5$
f	$4.9 \pm 0.5$
g	$0.5 \pm 0.5$
h	$0.5 \pm 0.5$
i	$3.2 \pm 1.5$
k	$0.5 - 1.6 \pm 0.5$

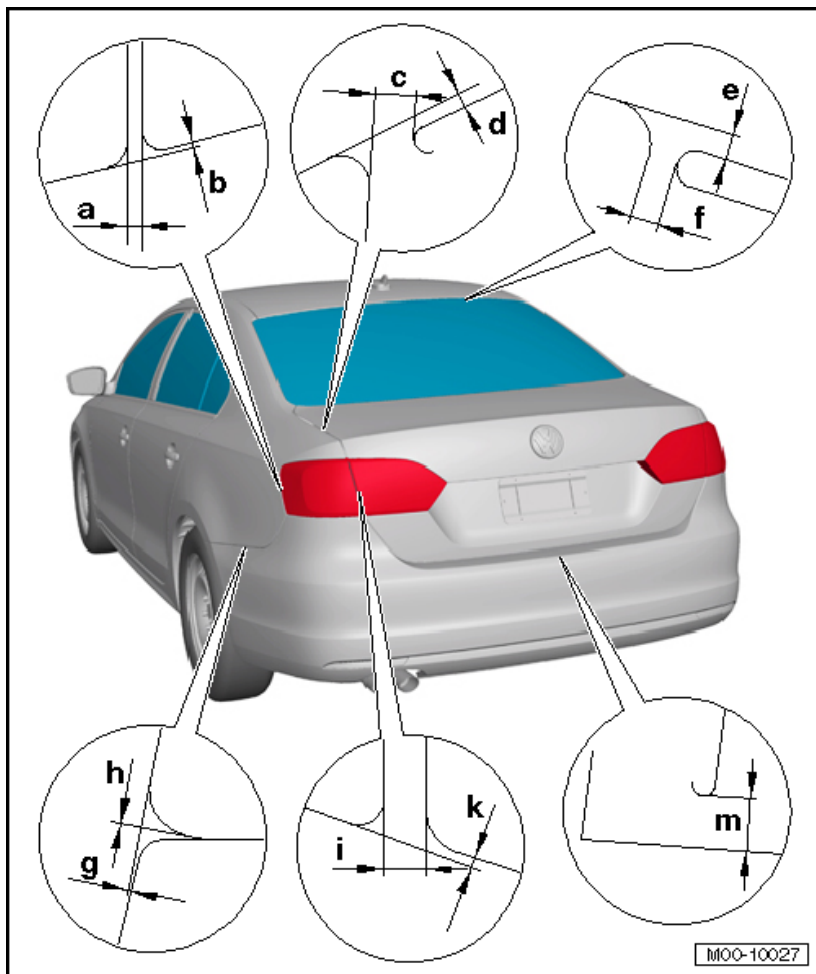


## Body, Center



Component	mm
a	$3.5 \pm 0.5$
b	$0.0 \pm 0.8$
c	$0.0 \pm 1.0$
d	$4.2 \pm 0.5$
e	$4.5 \pm 0.5$
f	$5.1 \pm 0.5$
g	$0.8 \pm 1.0$
h	$3.5 \pm 0.5$

## Body, Rear



M00-10027

Component	mm
a	$1.0 \pm 0.5$
b	$0.5 \pm 0.5$
c	$3.7 \pm 0.5$
d	$0.0 - 0.5 \pm 0.5$
e	$2.0 \pm 0.5$
f	$2.5 \pm 0.5$
g	$0.5 \pm 0.5$
h	$0.0 \pm 0.5$
i	$3.5 \pm 0.5$
k	$0.8 + 0.5$
m	$5.0 \pm 0.5$

# Body Exterior

## Lock Carrier Tightening Specifications

Component	Nm
Air guide channel bolts	2
Angle bracket bolts	8
Bumper carrier-to-the lock carrier bolts	8
Lock carrier bolts	60
Lock carrier support-to-bumper carrier nut	18
Front bumper enter guide bolts	8
Lock carrier support-to-lock carrier and hood latch bolts	12

## Front Fender and Underbody Trim Tightening Specifications

Component	Nm
Cross panel	25
Front fender bolts	6
Fender brace bolts	6
Right rear underbody trim panel bolt	2.7
Tunnel bridge	20
Underbody trim panel	2

## Front Hood and Rear Lid Tightening Specifications

Component	Nm
Hood hex nut-to-hood	22
Hood hinge bolts-to-body	22
Hood latch bolts	12
Hood release lever bracket bolts	1.5
Hood stricker nuts	10
Rear lid adjusting bolts	9
Rear lid handle bolts	6
Rear lid latch bolts	23
Rear license plate holder bolts	4
Rear lid striker bolts	18

## Front and Rear Door Tightening Specifications

Component	Nm
Door hinge bolts (always replace)	40
Door hinge bolts (upper section to lower section)	23
Striker pin bolts	20
Door lock-to-inner door part bolt	18
Door strap (pillar side) bolt	30
Door strap (door side) bolts	9
Lock cylinder bolts	4
Fuel fill door	1.5

## Sunroof Tightening Specifications

Component	Nm
Glass panel bolts	7
Sunshade bolts	1
Assembly unit bolts	8
Sunroof motor bolts	4
Joining piece bolts	1.5

## Front Bumper Tightening Specifications

Component	Nm
Bumper cover bolts	2
Slide guide bolts	2
Center guide bolts	8
Carrier assembly bolts (2 on each side)	8
Carrier assembly nuts	8
Carrier assembly (3 on left, 4 on right)	60

## Rear Bumper Tightening Specifications

Component	Nm
Bumper cover bolts	2.7
Bumper cover guide bolts	4
Bumper carrier bolts	20

## Front and Rear Door Window Tightening Specifications

Component	Nm
Window regulator motor nuts	8
Window regulator motor bolts	4
Fixed door window bolts	5.5

## Front and Rear Wheel Housing Liner Tightening Specification

Component	Nm
Front and rear wheel housing liner bolts	2

## Rear View Mirror Tightening Specifications

Component	Nm
Mirror base plate bolts	8
Adjusting unit with exterior rearview mirror motor bolts	2
Sill panel cover	2

## Sill Panel Cover Tightening Specification

Component	Nm
Sill panel cover bolts	2

# Body Interior

## Passenger Protection Tightening Specifications

Component	Nm
Seat belt-to-outer floor assembly anchor point	40
Belt anchor bolt	40
Front seat belt height adjuster bolt	40
Belt latch-to-seat bolt	20
Automatic belt retractor bolt	40
Rear center 3-point seat belt belt latch hex nut	40
Rear center lap belt bolt	40
Rear double belt latch bolt	40
Airbag control module J234 nuts	9
Passenger occupant detection system control module J706	1.5
Passenger side airbag unit bolts	9
Seat frame to floor bolts	40
Side airbag bolts	9
Side curtain airbag cap nuts	9
Side curtain airbag cap bolts	4.5
Front crash sensor bolts	9
Rear wheel housing crash sensor bolts	9

## Interior Trim Tightening Specifications

Component	Nm
Center console trim screw	1.5
Instrument panel bolts	1.5
Instrument panel screws	9
Deformation element screws	1.5
Instrument panel cross member bolts	20
Headliner bolts	2
Door trim panel bracket bolts	4
Door trim panel bolts	4
Door trim panel screws	2
Door mirror triangle cover bolt	2
Seat trim screw	3
Upper A-pillar and B-pillar trim airbag emblem bolt	4
B-pillar trim bolts	4

# HEATING, VENTILATION & AIR CONDITIONING

## *General Information*

### Refrigerant Oil Distribution

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

## Refrigerant R134a Vapor Pressure Table

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



# Heating, Ventilation

## Fastener Tightening Specifications

Component	Nm
Auxiliary heater heating element screw	1.4
Auxiliary heater heating element connector strip <sup>1)</sup>	9 ±1
Auxiliary heater heating element voltage supply nuts <sup>2)</sup>	6 ±1
Fresh air blower bolt	1

<sup>1)</sup> From 1K-7M 119 727

<sup>2)</sup> Through 1K-7M 119 726

# Air Conditioning

## Fastener Tightening Specifications

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

# DTC CHART

## Engine – 1.4 L CNLA

### Fuel and Air Mixture, Additional Emission Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	“A” Camshaft Position Slow Response (Bank 1)	<ul style="list-style-type: none"> <li>• Difference between target position vs. actual position &gt; 12.00 - 40.00°CRK</li> <li>• For time &gt; 3.0 Sec.</li> </ul> and <ul style="list-style-type: none"> <li>• Adjustment angle <math>\geq</math> 3.00°CRK</li> </ul>
P00AF	Turbocharger/Supercharger Boost Control “A” Module Performance	Stuck open <ul style="list-style-type: none"> <li>• Difference between target and actual position &lt; -12.00; &gt; 12.00%</li> </ul> Stuck close <ul style="list-style-type: none"> <li>• Difference between target and actual position &lt; -12.00; &gt; 12.00%</li> </ul>
P0A93	Inverter “A” Cooling System Performance	Gradient of inverter temperature > 14 - 30 K/min
P000B	“B” Camshaft Position Slow Response (Bank 1)	<ul style="list-style-type: none"> <li>• Difference between target position vs. actual position &gt; 8.00 - 22.00°CRK</li> <li>• For time &gt; 2.0 - 3.0 Sec.</li> </ul> and <ul style="list-style-type: none"> <li>• Adjustment angle <math>\geq</math> 2.50°CRK</li> </ul>
P006C	MAP - Turbocharger/ Supercharger Inlet Pressure Correlation	Difference manifold pressure to average value of pressure in front of throttle > 20.00 kPa
P006D	Barometric Pressure-Turbo/ Supercharger Inlet Pressure Correlation	<ul style="list-style-type: none"> <li>• Difference ambient vs. boost pressure signal (upper threshold) &gt; 15.00 - 250.00 kPa</li> </ul> or <ul style="list-style-type: none"> <li>• Difference ambient vs. boost pressure signal (lower threshold) &lt; 15.00 - 250.00 kPa</li> </ul>

DTC	Error Message	Malfunction Criteria and Threshold Value
P0010	"A" Camshaft Position Actuator Circuit/Open (Bank 1)	Signal voltage > 4.70 - 5.40 V
P0011	A Camshaft Position (Bank 1) Timing Over-Advanced or System Performance	<ul style="list-style-type: none"> <li>• Difference between target position vs. actual position &gt; 12.00 - 40.00°CRK</li> <li>• For time &gt; 3.0 Sec.</li> </ul> and <ul style="list-style-type: none"> <li>• Adjustment angle &lt; 3.00°CRK</li> </ul>
P0013	B Camshaft Position Actuator Circuit/Open (Bank 1)	Signal voltage 4.70 - 5.40 V
P0014	B Camshaft Position (Bank 1) Timing over-advanced or System Performance	<ul style="list-style-type: none"> <li>• Difference between target position vs. actual position &gt; 8.00 - 22.00°CRK</li> <li>• For time &gt; 2.0 - 3.0 Sec.</li> </ul> and <ul style="list-style-type: none"> <li>• Adjustment angle &lt; 2.50°CRK</li> </ul>
P0016	Crankshaft Position - Camshaft Position Correlation (Bank 1, Sensor A)	<ul style="list-style-type: none"> <li>• Permissible deviation &lt; -15.01°CRK</li> </ul> or <ul style="list-style-type: none"> <li>• Permissible deviation &gt; 15.01°CRK</li> </ul>
P0017	Crankshaft Position - Camshaft Position Correlation (Bank 1, Sensor B)	<ul style="list-style-type: none"> <li>• Permissible deviation &lt; -15.01°CRK</li> </ul> or <ul style="list-style-type: none"> <li>• Permissible deviation &gt; 15.01°CRK</li> </ul>
P0030	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 1)	Heater voltage 4.70 - 5.40 V
P0031	O2S Heater Control Circuit (Bank 1, Sensor 1) Low	Heater voltage 0.0 - 3.26 V
P0032	O2S Heater Control Circuit (Bank 1, Sensor 1) High	Signal current > 5.50 V
P0033	Turbo Charger Bypass Valve Control Circuit	<ul style="list-style-type: none"> <li>• Actuator diagnostic signal: electrical error failure</li> <li>• Actuator diagnostic signal: over load error failure</li> </ul>
P0034	Turbo Charger Bypass Valve Control Circuit Low	• Actuator diagnostic signal: electrical error failure
P0035	Turbo Charger Bypass Valve Control Circuit High	Actuator diagnostic signal: electrical error failure
P0036	O2S Heater Control Circuit (Bank 1, Sensor 2)	SULEV heater voltage 4.50 - 5.50 V

**DTC Chart**

<b>DTC</b>	<b>Error Message</b>	<b>Malfunction Criteria and Threshold Value</b>
P0037	O2S Heater Control Circuit (Bank 1, Sensor 2) Low	Heater voltage < 3.00 V
P0038	O2S Heater Control Circuit (Bank 1, Sensor 2) High	Heater current 2.70 - 5.50 A
P007B	Charge Air Cooler Temperature Sensor Circuit Range/Performance	<ul style="list-style-type: none"> <li>• Difference Intake Air Temperature Sensor 1 Bank 1 @ start vs. ECT @ start &gt; 24.8 K</li> <li>or</li> <li>• Difference Intake Air Temperature Sensor 1 Bank 1 @ start vs. Charge Air Cooler &gt; 24.8 K</li> <li>• Difference Intake Air Temperature Sensor 1 Bank 1 @ start vs. ECT @ start <math>\leq -24.8</math> K</li> <li>or</li> <li>• Difference Intake Air Temperature Sensor 1 Bank 1 @ start vs. Charge Air Cooler <math>\leq -24.8</math> K</li> </ul>
P007C	Charge Air Cooler Temperature Sensor Circuit Low (Bank 1)	Signal voltage < 0.22 V
P007D	Charge Air Cooler Temperature Sensor Circuit High (Bank 1)	Signal voltage > 4.85 V
P0070	Ambient Air Temperature Sensor Circuit	Ambient air temperature signal: short to battery / open circuit failure
P0071	Ambient Air Temperature Sensor Circuit Range/Performance	<ul style="list-style-type: none"> <li>• Difference ECT vs. IAT at engine start (depending on engine off time) &lt; 24.8 K and</li> <li>• Difference IAT vs. AAT at engine start (depending on engine off time) &gt; 24.8 K and</li> <li>• Difference AAT vs. ECT at engine start (depending on engine off time) &gt; 24.8 K</li> </ul>
P0072	Ambient Air Temperature Sensor Circuit Low	Ambient air temperature signal: short to ground failure

DTC	Error Message	Malfunction Criteria and Threshold Value
P0087	Fuel Rail/System Pressure - Too Low	<ul style="list-style-type: none"> <li>• Pressure control activity &gt; 1.80 mPa</li> <li>and</li> <li>• Fuel trim activity 0.90 - 15.99</li> <li>and</li> <li>• Difference between target pressure vs. actual pressure &gt; 1.50 mPa</li> </ul>
P0106	Manifold Absolute Pressure/ BARO Sensor Range/ Performance	<ul style="list-style-type: none"> <li>• Difference manifold pressure to average value of all pressure sensors @ start &lt; -3.70 kPa</li> <li>• Difference manifold pressure to average value of all pressure sensors @ start &gt; 3.70 kPa</li> <li>• Manifold pressure signal: variation between state 1 and 2 &lt; 10.00 kPa</li> <li>• Difference manifold pressure - lower threshold model &lt; 0 kPa</li> <li>• Model range 0.05 - 188 kPa</li> <li>• Difference manifold pressure - higher threshold model &lt; 0 kPa</li> <li>• Model range 98 - 255 kPa</li> </ul>
P0107	Manifold Absolute Pressure or BARO Pressure Low Input	<ul style="list-style-type: none"> <li>• Signal voltage &lt; 0.20 V</li> <li>• Manifold pressure signal &lt; 10.00 kPa</li> </ul>
P0108	Manifold Absolute Pressure or BARO Pressure High Input	<ul style="list-style-type: none"> <li>• Signal voltage &gt; 4.80 V</li> <li>• Manifold pressure signal &gt; 370.00 kPa</li> </ul>
P0111	Intake Air Temperature (Sensor 1 Bank 1) Circuit Range/Performance	<ul style="list-style-type: none"> <li>• Difference ECT vs. IAT at engine start (depending on engine off time) &gt; 24.8 K</li> <li>and</li> <li>• Difference IAT vs. AAT at engine start (depending on engine off time) &gt; 24.8 K</li> <li>and</li> <li>• Difference AAT vs. ECT at engine start (depending on engine off time) &lt; 24.8 K</li> </ul>
P0112	Intake Air Temperature (Sensor 1 Bank 1) Circuit Low	Signal voltage < 0.12 V

**DTC Chart**

DTC	Error Message	Malfunction Criteria and Threshold Value
P0113	Intake Air Temperature (Sensor 1 Bank 1) Circuit High	Signal voltage > 4.50 V
P0116	Engine Coolant Temperature (Sensor 1) Circuit Range/Performance	Stuck high • Difference in value between ECT and AAT at engine start (depending on engine off time) > 24.8 K and • Difference in value between IAT and AAT at engine start (depending on engine off time) > 24.8 K and • Difference in value between AAT and ECT at engine start (depending on engine off time) > 24.8 K • Difference max engine coolant temperature vs. min engine coolant temperature < 1.5 K • Engine coolant temperature @ start ≥ 80°C and • Engine coolant temperature @ start ≤ 137°C
P0117	Engine Coolant Temperature Sensor 1 Circuit Low	Engine coolant temperature > 135°C
P0118	Engine Coolant Temperature Sensor 1 Circuit High	Engine coolant temperature < -38°C
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	• TPS 1 - TPS 2 > 6.30% and • Actual TPS 1 calculated value > actual TPS 2 calculated value or • TPS 1 calculated value > 9.00%
P0122	Throttle/Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.20 V
P0123	Throttle/Pedal Position Sensor A Circuit High Input	Signal voltage > 4.81 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P013A	O2 Sensor Bank 1 Sensor 2 Slow Response - Rich to Lean	<ul style="list-style-type: none"> <li>• Arithmetic filtered max differential transient time at fuel cut off <math>\geq 0.75</math></li> <li>or</li> <li>• EWMA filtered max differential transient time at fuel cut off n.a.</li> <li>and</li> <li>• Number of checks <math>\geq 1.00</math></li> </ul>
P013B	O2 Sensor Bank1-Sensor2 Slow Response - Lean to Rich	<ul style="list-style-type: none"> <li>• Arithmetic filtered max differential transient time at fuel feed restart <math>\geq 1.50</math></li> <li>or</li> <li>• EWMA filtered max differential transient time at fuel feed restart n.a.</li> <li>and</li> <li>• Number of checks <math>\geq 1.00</math></li> </ul>
P013E	O2 Sensor Bank 1 Sensor 2 Delayed Response - Rich to Lean	<ul style="list-style-type: none"> <li>• Arithmetic filtered max differential delay time at rich to lean transition <math>&gt; 1.00</math></li> <li>or</li> <li>• EWMA filtered max differential delay time at rich to lean transition n.a.</li> <li>and</li> <li>• Number of checks <math>\geq 3.00</math></li> </ul>
P013F	O2 Sensor Bank 1 Sensor 2 Delayed Response - Lean to Rich	<ul style="list-style-type: none"> <li>• Arithmetic filtered max differential delay time at lean to rich transition <math>&gt; 1.00</math></li> <li>or</li> <li>• EWMA filtered max differential delay time at lean to rich transition n.a.</li> <li>and</li> <li>• Number of checks <math>\geq 3.00</math></li> </ul>
P0131	O2 Sensor Circuit (Bank 1, Sensor 1) Low Voltage	Virtual mass $< 1.75$ V
		Nernst voltage $< 1.50$ V
		Adjustment voltage $< 0.30$ V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Virtual mass $> 3.25$ V
		Nernst voltage $> 4.40$ V
		Adjustment voltage $> 7$ V

**DTC Chart**

DTC	Error Message	Malfunction Criteria and Threshold Value
P0133	O2 Circuit (Bank 1, Sensor 1) Slow Response	<p>Symmetric fault:</p> <ul style="list-style-type: none"> <li>• Difference of R2L area ratio vs. L2R area ratio <math>-0.50 - 0.50</math></li> <li>• Max value of both counters for area ratio R2L and L2R <math>\geq 3</math> times</li> </ul> <p>Delay Time:</p> <ul style="list-style-type: none"> <li>• Gradient ratio <math>\geq 0.25</math></li> <li>• Lower value of both ratios R2L and L2R <math>&lt; 0.32</math></li> </ul> <p>Transient Time:</p> <ul style="list-style-type: none"> <li>• Gradient ratio <math>\geq 0.25</math></li> <li>• Gradient ratio <math>\leq 0.40</math></li> <li>• Lower value of both area ratios R2L and L2R <math>&lt; 0.32</math></li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• Lower value of both area ratios R2L and L2R <math>&lt; 0.25</math></li> </ul> <p>Asymmetric Fault:</p> <ul style="list-style-type: none"> <li>• Difference of R2L area ratio vs. L2R area ratio <math>&lt; -0.50 - 0.50</math></li> <li>• Values of both counters for area ratio R2L and L2R <math>\leq 0.40</math></li> </ul> <p>Transient Time:</p> <ul style="list-style-type: none"> <li>• Gradient ratio <math>\geq 0.25</math></li> <li>• Gradient ratio <math>\leq 0.40</math></li> <li>• Lower value of both area ratios R2L and L2R <math>&lt; 0.40</math></li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• Lower value of both gradient ratios R2L and L2R <math>&lt; 0.25</math></li> </ul>
P0135	O2 Sensor Heater Circuit (Bank 1, Sensor 1) Malfunction	<ul style="list-style-type: none"> <li>• O2S ceramic temperature <math>&lt; 720^{\circ}\text{C}</math></li> </ul> <p>and</p> <ul style="list-style-type: none"> <li>• Heater duty cycle <math>\geq 90\%</math></li> </ul> <ul style="list-style-type: none"> <li>• O2S ceramic temperature <math>&lt; 720^{\circ}\text{C}</math></li> </ul> <p>and</p> <ul style="list-style-type: none"> <li>• Time after O2S heater on <math>\geq 70</math> Sec.</li> </ul> <ul style="list-style-type: none"> <li>• O2S ceramic temperature <math>&lt; 640^{\circ}\text{C}</math></li> </ul>



DTC	Error Message	Malfunction Criteria and Threshold Value
P0136	O2 Circuit (Bank 1, Sensor 2)	<ul style="list-style-type: none"> <li>• Delta voltage one step at heater switching &gt; 2.00 V and</li> <li>• Number of heater coupling <math>\geq</math> 6 times</li> </ul>
P0137	O2 Circuit (Bank 1, Sensor 2) Low Voltage	<ul style="list-style-type: none"> <li>• Signal voltage &lt; 0.06 V for time &gt; 3 Sec. and</li> <li>• Difference of sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) &lt; 0.01 V</li> </ul>
P0138	O2 Circuit (Bank 1, Sensor 2) High Voltage	Signal voltage > 1.90 V for > 0.1 Sec.
P0139	O2 Circuit Slow Response (Bank 1 Sensor 2)	<ul style="list-style-type: none"> <li>• EWMA filtered transient time at fuel cut off &gt; 0.7 Sec.</li> <li>• In voltage range 201 - 347.7 mV</li> <li>• Number of checks (initial phase) &gt; 3</li> <li>• Number of checks (step function) &gt; 3</li> </ul>
P0140	O2 Sensor Circuit (Bank 1 Sensor 2) No Activity Detected	<ul style="list-style-type: none"> <li>• Signal voltage 1.30 - 1.90 V for &gt; 3 Sec and</li> <li>• Difference in sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) <math>\geq</math> 2.80 V</li> <li>• Internal resistance &gt; 40000.00 Ohm and</li> <li>• Exhaust temperature &gt; 600 °C</li> </ul>
P0141	O2 Heater Circuit (Bank 1, Sensor 2) Malfunction	Heater resistance > 500.00 - 1200 $\Omega$

**DTC Chart**

<b>DTC</b>	<b>Error Message</b>	<b>Malfunction Criteria and Threshold Value</b>
P0145	O2 Circuit Slow Response (Bank 1, Sensor 2)	<ul style="list-style-type: none"> <li>• EWMA filtered transient time at fuel cut off &gt; 0.4 Sec.</li> <li>• In voltage range 401.4 - 201.2 mV</li> <li>• Number of checks (initial phase) &gt; 3</li> <li>• Number of checks (step function) &gt; 3</li> </ul>
P0169	Incorrect Fuel Composition	ABS difference between predicted and real air mass > 10.50%
P0190	Fuel Rail Pressure Sensor "A" Circuit	Signal voltage > 4.70 V
P0191	Fuel Rail Pressure Sensor "A" Circuit Range/Performance	Out of range high <ul style="list-style-type: none"> <li>• Actual pressure &gt; 26.62 mPa</li> </ul> Out of range low <ul style="list-style-type: none"> <li>• Actual pressure &lt; 0.005 mPa</li> </ul>
P0192	Fuel Rail Pressure Sensor "A" Circuit Low Input	Signal voltage < 0.30 V
P0201	Cylinder 1- Injector Circuit	<ul style="list-style-type: none"> <li>• Open circuit signal current &lt; 2.10 A</li> <li>• Internal logic failure</li> </ul>
P0202	Cylinder 2- Injector Circuit	<ul style="list-style-type: none"> <li>• Open circuit signal current &lt; 2.10 A</li> <li>• Internal logic failure</li> </ul>
P0203	Cylinder 3- Injector Circuit	<ul style="list-style-type: none"> <li>• Open circuit signal current &lt; 2.10 A</li> <li>• Internal logic failure</li> </ul>
P0204	Cylinder 4- Injector Circuit	<ul style="list-style-type: none"> <li>• Open circuit signal current &lt; 2.10 A</li> <li>• Internal logic failure</li> </ul>
P0221	Throttle/Pedal Position Sensor/Switch B Circuit Range/Performance	<ul style="list-style-type: none"> <li>• TPS 1 - TPS 2 &gt; 6.30% and</li> <li>• Actual TPS 2 calculated value &gt; actual TPS 1 calculated value</li> </ul> or <ul style="list-style-type: none"> <li>• TPS 2 calculated value &gt; 9.00%</li> </ul>
P0222	Throttle/Pedal Position Sensor/Switch B Circuit Low Input	Signal voltage < 0.20 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0223	Throttle/Pedal Position Sensor/Switch B Circuit High Input	Signal voltage > 4.81 V
P023A	Charge Air Cooler Coolant Pump Control Circuit/Open	Signal voltage 4.8 - 5.3 V
P023C	Charge Air Cooler Coolant Pump Control Circuit High	Signal current > 2.2 - 4.0 A
P0234	Turbocharger/Supercharger Overboost Condition Rationality Check	<ul style="list-style-type: none"> <li>• Difference of set value boost pressure vs. actual boost pressure value &gt; 200 - 1280 kPa</li> <li>• Difference between set point and actual boost pressure &gt; - 30 kPa</li> </ul>
P0236	Turbocharger Boost Sensor (A) Circuit Range/Performance	<ul style="list-style-type: none"> <li>• Difference boost pressure to average value of all pressure sensors @ start &lt; -3.70 kPa or</li> <li>• Difference boost pressure to average value of all pressure sensors @ start &gt; 3.70 kPa</li> <li>• Difference manifold pressure to average value of pressure in front of throttle &gt; 20.00 kPa</li> </ul>
P0237	Turbocharger Boost Sensor (A) Circuit Low Input	<ul style="list-style-type: none"> <li>• Signal voltage &lt; 0.20 V</li> <li>• Boost pressure &lt; 30.00 kPa</li> <li>• Difference boost pressure signal vs. barometric sensor signal &lt; -14.00 kPa</li> </ul>
P0238	Turbocharger Boost Sensor (A) Circuit High Input	<ul style="list-style-type: none"> <li>• Signal voltage &gt; 4.80 V</li> <li>• Boost pressure &gt; 306.50 kPa</li> <li>• Difference boost pressure signal vs. barometric sensor signal &gt; 14.00 kPa</li> </ul>
P025A	Fuel Pump Module Control Circuit/Open	Signal voltage 4.8 - 5.3 V
P025D	Fuel Pump Module Control Circuit High	Signal current > 0.6 mA
P0246	Turbocharger/Supercharger Wastegate Solenoid A High	Signal current > 2.2 A
P0261	Cylinder 1 Injector Circuit Low	Signal current < 2.10 A
P0262	Cylinder 1 Injector Circuit High	Signal current > 14.70 A
P0264	Cylinder 2 Injector Circuit Low	Signal current < 2.10 A

**DTC Chart**

DTC	Error Message	Malfunction Criteria and Threshold Value
P0265	Cylinder 2 Injector Circuit High	Signal current > 14.70 A
P0267	Cylinder 3 Injector Circuit Low	Signal current < 2.10 A
P0268	Cylinder 3 Injector Circuit High	Signal current > 14.70 A
P0270	Cylinder 4 Injector Circuit Low	Low side signal current < 2.10 A
P0271	Cylinder 4 Injector Circuit High	Signal current > 14.70 A
P0299	Turbo/Super Charger Underboost	Difference between set point and actual boost pressure < 30 - 35 kPa
P2088	"A" Camshaft Position Actuator Control Circuit Low (Bank 1)	Signal voltage 0.0 - 3.25 V
P2089	"A" Camshaft Position Actuator Control Circuit High (Bank 1)	Signal current > 2.20 A
P2090	B Camshaft Position Actuator Control Circuit (Bank1) Low	Signal voltage 0.0 - 3.25 V
P2091	B Camshaft Position Actuator Control Circuit (Bank1) High	Signal current > 2.20 A
P2096	Post Catalyst Fuel Trim System (Bank 1) Too Lean	I-portion of 2nd lambda control loop < -0.030
P2097	Post Catalyst Fuel Trim System (Bank 1) Too Rich	I-portion of 2nd lambda control loop > 0.030
P3081	Engine Temperature Too Low	Difference reference model temperature vs. ECT > 10.5 K

## Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	<ul style="list-style-type: none"> <li>• Emission threshold misfire rate (MR) &gt; 2.5%</li> <li>• Catalyst damage misfire rate (MR) &gt; 5.75 - 22.25%</li> </ul>
P0301	Cylinder 1 Misfire Detected	<ul style="list-style-type: none"> <li>• Emission threshold misfire rate (MR) &gt; 2.5%</li> <li>• Catalyst damage misfire rate (MR) &gt; 5.75 - 22.25%</li> </ul>
P0302	Cylinder 2 Misfire Detected	<ul style="list-style-type: none"> <li>• Emission threshold misfire rate (MR) &gt; 2.5%</li> <li>• Catalyst damage misfire rate (MR) &gt; 5.75 - 22.25%</li> </ul>

DTC	Error Message	Malfunction Criteria and Threshold Value
P0303	Cylinder 3 Misfire Detected	<ul style="list-style-type: none"> <li>Emission threshold misfire rate (MR) &gt; 2.5%</li> <li>Catalyst damage misfire rate (MR) &gt; 5.75 - 22.25%</li> </ul>
P0304	Cylinder 4 Misfire Detected	<ul style="list-style-type: none"> <li>Emission threshold misfire rate (MR) &gt; 2.5%</li> <li>Catalyst damage misfire rate (MR) &gt; 5.75 - 22.25%</li> </ul>
P0321	Ignition/Distributor Engine Speed Input Circuit Range/Performance	<ul style="list-style-type: none"> <li>Counted teeth vs. reference = incorrect or</li> <li>Monitoring reference gap failure</li> </ul>
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	<ul style="list-style-type: none"> <li>Camshaft signal &gt; 3.00</li> <li>Engine speed = no signal</li> </ul>
P0324	Knock Control System Error	<ul style="list-style-type: none"> <li>Signal fault counter (combustion) &gt; 24 or</li> <li>Signal fault counter (measuring window) &gt; 2.00</li> </ul>
P0327	Knock Sensor 1 Circuit Low Input	<ul style="list-style-type: none"> <li>Short to ground Port B</li> <li>Lower threshold &lt; -0.70 V</li> <li>Short to ground Port A</li> <li>Lower threshold &lt; -0.70 V</li> <li>Signal range check</li> <li>Lower threshold &lt; 1.03 - 2.07 V</li> </ul>
P0328	Knock Sensor 1 Circuit High Input	<ul style="list-style-type: none"> <li>Short to ground Port B</li> <li>Upper threshold &gt; 1.00 V</li> <li>Short to ground Port A</li> <li>Upper threshold &gt; 1.00 V</li> <li>Signal range check</li> <li>Upper threshold &gt; 50.14 - 140.38 V</li> </ul>
P0341	Camshaft Position Sensor Circuit Range/Performance	<ul style="list-style-type: none"> <li>Signal pattern incorrect</li> <li>Defect counter 12.00</li> </ul>
P0342	Camshaft Position Sensor Circuit Low Input	<ul style="list-style-type: none"> <li>Signal voltage permanently low and</li> <li>Crankshaft signals 12.00</li> </ul>
P0343	Camshaft Position Sensor Circuit High Input	<ul style="list-style-type: none"> <li>Signal voltage permanently high</li> <li>Crankshaft signals 12.00</li> </ul>

**DTC Chart**

<b>DTC</b>	<b>Error Message</b>	<b>Malfunction Criteria and Threshold Value</b>
P0351	Ignition Coil A Primary/ Secondary Circuit	<ul style="list-style-type: none"> <li>• Signal current 0.25 to -2.0 mA</li> <li>• Internal check failed</li> </ul>
P0352	Ignition Coil B Primary/ Secondary Circuit	<ul style="list-style-type: none"> <li>• Signal current 0.25 to -2.0 mA</li> <li>• Internal check failed</li> </ul>
P0353	Ignition Coil C Primary/ Secondary Circuit	<ul style="list-style-type: none"> <li>• Signal current 0.25 to -2.0 mA</li> <li>• Internal check failed</li> </ul>
P0354	Ignition Coil D Primary/ Secondary Circuit	<ul style="list-style-type: none"> <li>• Signal current 0.25 to -2.0 mA</li> <li>• Internal check failed</li> </ul>
P0366	Camshaft Position Sensor "B" Circuit (Bank 1) Range/ Performance	<ul style="list-style-type: none"> <li>• Signal pattern incorrect</li> <li>• Defect counter 12.00</li> </ul>
P0367	Camshaft Position Sensor "B" Circuit (Bank 1) Low Input	<ul style="list-style-type: none"> <li>• Signal voltage permanently low and Crankshaft signals 12.00</li> </ul>
P0368	Camshaft Position Sensor "B" Circuit (Bank 1) High Input	<ul style="list-style-type: none"> <li>• Signal voltage permanently high and Crankshaft signals 12.00</li> </ul>

### **Additional Exhaust Regulation**

<b>DTC</b>	<b>Error Message</b>	<b>Malfunction Criteria and Threshold Value</b>
P0410	Secondary Air Injection System Malfunction	Difference in ambient pressure vs. AIR pressure measured with AIR pressure sensor > 50.0 kPa
P0413	Secondary Air Injection System Switching Valve A Circuit Open	Signal voltage 4.70 - 5.40 V
P0414	Secondary Air Injection System Switching Valve A Circuit Shorted	Signal voltage 0.0 - .25 V Signal current > 2.20 A
P0415	Short to B+ (PZEV)	Signal current 2.20 - 4.20 A
P0418	Secondary Air Injection System Relay A Circuit	Signal voltage 4.70 - 5.40 V
P0420	Catalyst System, (Bank 1) Efficiency Below Threshold	Measured OSC/OSC of borderline catalyst. < 1.00

DTC	Error Message	Malfunction Criteria and Threshold Value
P043E	Evaporative Emission System Leak Detection Reference Orifice Low Flow	During engine off: • EVAP pump current during reference measurement > 40.0 mA During engine on: • EVAP pump current during reference measurement > 40.0 mA
P043F		During engine off: • EVAP pump current during reference measurement < 15.0 mA During engine on: • EVAP pump current during reference measurement < 15.0 mA
P0441	Evaporative Emission Control System Incorrect Purge Flow	• Drop of evap pump current < 0.75...1.20 • Within time 5.0 Sec.
P0442	Evaporative Emission Control System (Small Leak) Leak Detected	Modeled pressure from pump current < 0.90 kPa
P04ED	Evaporative Emission System Large Leak Detected - Fresh Air Side	Modeled pressure from pump current < 0.90 kPa
P04EF	Evaporative Emission System Very Small Leak Detected - Fresh Air Side	EVAP system leakage area calculated from pump current curve > 0.12 [mm <sup>2</sup> ]
P0444	Evaporativ Emission System Purge Control Valve Circuit Open	Signal voltage 4.70 - 5.40 V
P0447	Evaporative Emission System Vent Control Circuit Open	Signal voltage > 4.7 - 5.4 V
P0448	Evaporative Emission System Vent Control Circuit Shorted	• Signal current > 2.2 - 4.0 A • Signal voltage < 2.74 - 3.26 V
P0449	Evaporativ Emission System Vent Valve/Solenoid Circuit	Short to battery positive • Signal current 220 - 980 $\mu$ A Short to ground • Signal voltage 2.8 - 3.2 V Open circuit • Signal voltage 4.8 - 5.3 V

**DTC Chart**

DTC	Error Message	Malfunction Criteria and Threshold Value
P0450	Evaporative Emission System Pressure Sensor/Switch	Passive monitoring <ul style="list-style-type: none"> <li>• Evaporative system vapor pressure after tank ventilation (differential pressure sensor) &gt;   2.00   kPa</li> </ul> Active monitoring <ul style="list-style-type: none"> <li>• Evaporative system vapor pressure after tank ventilation (differential pressure sensor) &gt;   2.00   kPa</li> </ul>
P0451	Evaporative Emission System Pressure Sensor/Switch Range/Performance	Difference between max. and min. evaporative system vapor pressure < 0.05 kPa within time 300. Sec.
P0452	EVAP Emission Control Sysytem Pressure Sensor Low Input	Signal voltage < 0.20 V
P0453	EVAP Emission Control Sysytem Pressure Sensor High Input	Signal voltage > 4.80 V
P0456	Evaporative Emission Control System (Very Small Leak) Leak Detected	EVAP-system leakage area calculateted from pump current curve > 0.17 [mm <sup>2</sup> ]
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage 0.0 - 3.26 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.20 A



DTC	Error Message	Malfunction Criteria and Threshold Value
P0491	Secondary Air System System (Bank 1) Insufficient Flow	<ul style="list-style-type: none"> <li>• Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled &lt; 0.55</li> <li>• Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled &lt; 0.32 and</li> <li>• Relative AIR pressure measured <math>\leq</math> 0.50 kPa</li> <li>or</li> <li>• Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled &lt; 0.95</li> <li>• Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled &lt; 0.36 and</li> <li>• Relative AIR pressure measured <math>\leq</math> 0.50 kPa</li> <li>or</li> <li>• Average pressure difference between absolute value and filtered &lt; 0.15 - 0.90 kPa and</li> <li>• Relative AIR pressure measured <math>\leq</math> 0.50 kPa</li> </ul>
P0496	EVAP System High Purge Flow	Actual evap pump current difference between reference measurement to idle divided by pump current difference from the last leak detection phase during engine off > 1.40
P04F0	Evaporative Emission System Purge Line Performance	<ul style="list-style-type: none"> <li>• Drop of EVAP pump current &lt; 0.70...1.10</li> <li>• Within time 2.5 Sec.</li> </ul>

**DTC Chart**

## Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P050A	Cold Start Idle Air Control System Performance	Out of range low • Engine speed deviation > 100 RPM and • RPM controller torque value $\geq$ calculated max value Out of range high • Engine speed deviation < -100 RPM and • RPM controller torque value $\leq$ calculated max value or • Integrated number of fuel cut off transitions n.a.
P050B	Cold Start Ignition Timing Performance	Difference between commanded spark timing vs. actual value > 25.00%
P0506	Idle Control System RPM Lower than Expected	• Engine speed deviation > 100 RPM and • RPM controller torque value $\geq$ calculated max value
P0507	Idle Control System RPM Higher than Expected	• Engine speed deviation < -100 RPM and • RPM controller torque value $\leq$ calculated min. value or • Integrated number of fuel cut off transitions n.a.
P050B	Cold Start Idle Air Control System Performance	Difference between commanded spark timing vs. actual value > 0.25%
P052A	Cold Start "A" Camshaft Position Timing Over-Advanced	Difference between target position and actual position > 12.0 - 40.00°CRK
P054A	Cold Start "B" Camshaft Position Timing Over-Advanced	Difference between target position and actual position > 10.0 - 22.00°CRK
P0555	Brake Booster Pressure Sensor Circuit	Sensor voltage > 4.90 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P056E	Cold Start Turbocharger/ Supercharger Boost Control "A" Performance	Stuck open • Difference between target and actual position < -12.00; > 12.00% Stuck close • Difference between target and actual position < -12.00; > 12.00%
P0556	Brake Booster Pressure Sensor Circuit Range/ Performance	• Difference brake booster pressure vs. ambient pressure > 10.00 kPa or • Gradient brake booster pressure > 1.5 kPa • Brake booster pressure difference between measurement 1 and 2 < 0.30- 4.00 kPa
P0557	Brake Booster Pressure Sensor Circuit Low	Sensor voltage < 0.19 V
P0571	Cruise/Brake Switch (A) Circuit Malfunction	• Brake light switch not active • "Driver brakes" via CAN from BSCM active
P057B	Brake Pedal Position Sensor Circuit Range/Performance	Check of duty cycle • Duty cycle > 92.00% Check of duty cycle • Duty cycle < 8.00% Check of period of time • Period of time > 5 ms Check of period of time • Period of time < 4 ms Signal activity check • Position sensor signal no signal Rationality check high • Offset adaption value > 92.00% Rationality check high • Offset adaption value < 60.00%

**DTC Chart**

## Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	ECM/PCM Processor	<ul style="list-style-type: none"> <li>• Difference barometric sensor signal vs. boost pressure signal &gt; 9.25 kPa</li> <li>and</li> <li>• Difference barometric sensor vs. last driving cycle n.a.</li> <li>• Difference barometric sensor signal vs. boost pressure signal &lt; -9.25 kPa</li> <li>and</li> <li>• Difference barometric sensor vs. last driving cycle n.a.</li> <li>Short to battery / open circuit</li> <li>• Signal voltage &gt; 4.84 V</li> <li>Short to ground</li> <li>• Signal voltage &lt; 0.25 V</li> <li>Out of range high</li> <li>• Measured ambient pressure &gt; 120.00 kPa</li> <li>Out of range low</li> <li>• Measured ambient pressure &lt; 45.00 kPa</li> <li>• Actuator diagnostic signal: under voltage error failure</li> </ul>
P062B	Internal Control Module Fuel Injector Control Performance	SPI communications check Identifier failure
P0634	PCM/ECM/TCM Internal Temperature Too High	Power stage temperature > 170°C Internal check failed
P0638	Throttle Actuator Control Range/Performance (Bank 1)	Rationality check: <ul style="list-style-type: none"> <li>• Time to close to reference point &gt; 0.6 Sec.</li> <li>and</li> <li>• Reference point 2.88%</li> </ul> <ul style="list-style-type: none"> <li>• TPS 1 signal voltage &lt; 0.40; &gt; 0.80 V</li> <li>or</li> <li>• TPS 2 signal voltage &lt; 4.20; &gt; 4.60 V</li> </ul>
P0641	Sensor Reference Voltage A Circuit/Open	Signal voltage deviation > ± 0.3 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0651	Sensor Reference Voltage "B" Circuit Open	Signal voltage deviation > $\pm 0.3$ 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 - 5.0 V
P0699	Sensor Reference Voltage C Circuit High	5V supply voltage > 4.99 - 5.41 V
P062B	Injection Valves Communication	Internal logic failure
U0001	High Speed CAN Communication Bus	CAN message, no feedback
U0002	High Speed CAN Communication Bus Performance	Global time out receiving no message
U0028	Vehicle Communication Bus A	CAN message, no feedback
U0029	Vehicle Communication Bus A Performance	Global time out receiving no message
U0101	Lost Communication with TCM	Received CAN message no message
U0110	Lost Communication With Drive Motor Control Module "A"	Received CAN message no message
U0112	Lost Communication With Battery Energy Control Module "B"	Received CAN message no message
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	Received CAN message no message
U0402	Invalid Data Received From Transmission Control Module	Received data implausible message
U0411	Invalid Data Received From Drive Motor Control Module "A"	Received data implausible message
U0413	Invalid Data Received From Battery Energy Control Module "B"	Received data implausible message

**DTC Chart**

DTC	Error Message	Malfunction Criteria and Threshold Value
U0415	Invalid Data Received From Anti-Lock Brake System Control Module	<ul style="list-style-type: none"> <li>• Speed sensor signal: out of range 326.39 km/h</li> <li>• Speed sensor signal: initialisation error 327.08 km/h</li> <li>• Speed sensor signal: low voltage error 327.25 km/h</li> <li>• Speed sensor signal: sensor error 327.42 km/h</li> <li>• Difference between vehicle speed and single wheel speed signals &lt; -10; &gt; 10 km/h</li> <li>• Received data implausible message</li> </ul>
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	<ul style="list-style-type: none"> <li>• Received CAN message, implausible message</li> <li>• Ambient temperatur value (initialization) 00h</li> </ul>
U1103	Production mode active	Production mode active
U1106	Customer service mode active	HEV service mode active

### Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P1114	Internal Resistance Too Large (Bank 1, Sensor 2)	Heater resistance, (128-648)*(8-40)1.02-25.9 k $\Omega$ (dep. on mod. exhaust temp. and heater power)
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	<ul style="list-style-type: none"> <li>• Pressure control activity &gt; 0.40 mPa</li> <li>and</li> <li>• Fuel trim activity &lt; 0.90</li> <li>and</li> <li>• Difference between target pressure vs. actual pressure -16.00 - 16.38 mPa</li> </ul>
P12A2	Fuel Rail Pressure Sensor Inappropriately High	<ul style="list-style-type: none"> <li>• Pressure control activity &lt; -0.40 mPa</li> <li>and</li> <li>• Fuel trim activity &gt; 1.15</li> <li>and</li> <li>• Difference between target pressure vs. actual pressure -16.00 - 16.38 mPa</li> </ul>

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A4	Fuel Rail Pump Control Valve Stuck Closed	<ul style="list-style-type: none"> <li>• Pressure control activity &lt; -4.00 mPa and Fuel trim activity 0.80 - 1.15 and</li> <li>• Difference between target pressure vs. actual pressure &lt; -1.50 mPa</li> </ul>
P13EA	Ignition Timing Monitor	Difference between commanded spark timing and actual value > 0.60%
P1388	Control module faulty	<ul style="list-style-type: none"> <li>• Internal calculated torque incorrect</li> <li>• Operation mode incorrect</li> </ul>
P1427	Brake vacuum pump activation Short circuit to B+	Signal current > 2.2 A
P1428	Brake vacuum pump activation Short circuit to ground	Signal voltage < 2.15 V
P1429	Brake vacuum pump activation Open circuit	Signal voltage 4.4 - 5.6 V
P169A	Loading mode active	Transport mode active
P2097	Post Catalyst Fuel Trim System (Bank 1) Too Rich	l-portion of 2nd lambda control loop > 0.030
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	<ul style="list-style-type: none"> <li>• Duty cycle &gt;80% and</li> <li>• ECM power stage, no failure</li> <li>• Deviation throttle valve angles vs. calculated value 4.0 - 50.0%</li> </ul>
P2106	Throttle Actuator Control System Forced Limited Power	Short to battery plus/ short to ground <ul style="list-style-type: none"> <li>• Internal check failed Open circuit</li> <li>• Internal check failed Temperature / current monitoring</li> <li>• Internal check failed Functional check</li> <li>• Internal check failed</li> </ul>
P2122	Throttle/Pedal Position Sensor/Switch D Circuit Low Input	Signal voltage < 0.61 V

**DTC Chart**

<b>DTC</b>	<b>Error Message</b>	<b>Malfunction Criteria and Threshold Value</b>
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High Input	Signal voltage > 4.79 V
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low Input	Signal voltage < 0.27 V
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.43 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage sensor 1 vs. 2 > 0.17 - 0.70 V
P2146	Fuel Injector Group "A" Supply Voltage Circuit Open	Short to ground (high side) • Signal current > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A Core connection (high side - low side) • Signal current < 2.60 A
P2149	Fuel Injector Group "B" Supply Voltage Circuit Open	Short to ground (high side) • Signal current > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A Core connection (high side - low side) • Signal current < 2.60 A
P2177	System Too Lean Off Idle, (Bank 1)	• Adaptive value > 28.00%
P2178	System Too Rich Off Idle, (Bank 1)	• Adaptive value < -20.00%
P2184	Engine Coolant Temperature Sensor 2 Circuit Low	Signal voltage < 0.10 V
P2185	Engine Coolant Temperature Sensor 2 Circuit High	Signal voltage > 4.94 V
P2187	System Too Lean at Idle, (Bank 1)	• Adaptive value > 5.02%
P2188	System Too Rich at Idle, (Bank 1)	• Adaptive value < 6.19%
P2195	O2 Sensor Signal Biased/ Stuck Lean (Bank 1, Sensor 1)	Delta lambda of 2nd lambda control loop > 0.070



DTC	Error Message	Malfunction Criteria and Threshold Value
P2196	O2 Sensor Signal Biased/ Stuck Rich (Bank 1, Sensor 1)	Delta lambda of 2nd lambda control loop < -0.070
P2237	O2 Sensor Positive Current Control Circuit (Bank 1, Sensor 1) Open	<ul style="list-style-type: none"> <li>• O2S voltage signal front 1.49 - 1.51</li> <li>and</li> <li>• Difference between maximum and minimum value of O2S voltage signal front n.a.</li> <li>• Delta lambda controller &gt; 0.10</li> <li>or</li> <li>• Lambda control at min or max limit</li> <li>and</li> <li>• No reaction on commanded stepwise change of lambda-setpoint &lt;&gt; 1</li> </ul>
P2243	O2 Sensor Reference Voltage Circuit (Bank 1, Sensor 1) Open	<ul style="list-style-type: none"> <li>• O2S signal front &gt; 4.70 V</li> <li>and</li> <li>• Internal resistance &gt; 950 Ohms</li> <li>• O2S signal front &lt; 0.20 V</li> <li>and</li> <li>• Internal resistance &gt; 950 Ohms</li> </ul>
P2251	O2 Sensor Negative Current Control Circuit (Bank 1 Sensor 1) open	<ul style="list-style-type: none"> <li>• O2S voltage signal front 1.47 - 1.53 V</li> <li>and</li> <li>• Internal resistance &gt; 950 Ohms</li> </ul>
P2257	Secondary Air Injection System Control "A" Circuit Low	Signal voltage 0.00 - 3.00 V
P2258	Secondary Air Injection System Control "A" Circuit High	Signal current 0.60 - 2.40 A
P2270	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 2)	Sensor voltage ≤ 0.86 V
P2271	O2 Sensor Signal Stuck Rich (Bank 1, Sensor 2)	Sensor voltage ≥ 0.22 V

**DTC Chart**

DTC	Error Message	Malfunction Criteria and Threshold Value
P2279	Intake Air System Leak	<ul style="list-style-type: none"> <li>• Boost pressure and intake manifold pressure within a range around the actual -7.00 - 15.00 kPa</li> <li>and</li> <li>• Modeled turbocharger rotation &gt; 255000 rpm</li> </ul>
P2293	Fuel Pressure Regulator 2 Performance	<ul style="list-style-type: none"> <li>• Difference between target pressure vs. actual pressure &lt; -1.50 mPa</li> <li>or</li> <li>• Difference between target pressure vs. actual pressure &gt; 1.50 mPa</li> </ul>
P2294	Fuel Pressure Regulator 2 Control Circuit	<ul style="list-style-type: none"> <li>• Signal voltage 1.40 - 3.20 V (Open Circuit)</li> <li>• Signal pattern incorrect (Rationality Check)</li> </ul>
P2295	Fuel Pressure Regulator 2 Control Circuit Low	Signal voltage < 1.40 - 3.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.20 V

### Ignition System

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

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

### Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P240A	Evaporative Emission System Leak Detection Pump Heater Control Circuit/Open	Signal voltage > 4.7 - 5.4 V
P240B	Evaporative Emission System Leak Detection Pump Heater Control Circuit Low	Signal voltage > 2.74 - 3.26 V
P240C	Evaporative Emission System Leak Detection Pump Heater Control Circuit High	Signal current > 2.2 - 4.0 A
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.7 - 5.4 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.74 to 3.26 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	signal voltage at evap pump current measuring resistor > 4.00 - 1.80 V
P2407	Evaporative Emission System Leak Detection Pump Sense Circuit Intermittent/Erratic	<p>During engine off:</p> <ul style="list-style-type: none"> <li>• Fluctuation of evap pump current during reference measurement &gt; 3.0 mA</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• Drop of evap pump current during pump phase &gt; 6.0 mA for time <math>\geq</math> 3.0 Sec.</li> </ul> <p>During engine on:</p> <ul style="list-style-type: none"> <li>• Fluctuation of evap pump current during reference measurement &gt; 3.0 mA</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• Drop of evap pump current during pump phase &gt; 6.0 mA for time <math>\geq</math> 3.0 Sec.</li> </ul>

DTC	Error Message	Malfunction Criteria and Threshold Value
P2414	O2 Sensor Exhaust Sample Error, (Bank 1 Sensor 1)	<ul style="list-style-type: none"> <li>• Threshold 1 - Signal voltage 3.1 - 4.81 V</li> <li>• Threshold 2 - Signal voltage 2.5 to 3.10 V. Depending on gain factor, that actual is used for sensor characteristic, the threshold is switched.</li> </ul>
P2421	Evaporative Emission System Vent Valve Stuck Open	<ul style="list-style-type: none"> <li>• Change of EVAP pump current <math>\leq 1.8</math> mA</li> <li>and</li> <li>• Ratio of actual EVAP pump current gradient to EVAP pump current gradient with fuel tank isolation valve commanded open <math>\leq 2.00</math></li> <li>or</li> <li>• Change of EVAP pump current <math>\leq 1.5</math> mA</li> <li>• Within time <math>\geq 5.0</math> Sec.</li> </ul>
P2422	Evaporative Emission System Vent Valve Stuck Closed	<p>Fuel tank isolation valve - commanded on</p> <ul style="list-style-type: none"> <li>• Change of EVAP pump current <math>&gt; 2.0</math> mA</li> <li>• Within time <math>\geq 5.0</math> Sec.</li> </ul> <p>Fuel tank isolation valve - commanded off</p> <ul style="list-style-type: none"> <li>• Change of EVAP pump current <math>&gt; 1.8</math> mA</li> </ul> <p>and</p> <ul style="list-style-type: none"> <li>• Change of EVAP pump current <math>\leq 1.5</math> mA</li> </ul> <p>or</p> <ul style="list-style-type: none"> <li>• Ratio of actual EVAP pump current gradient to EVAP pump current gradient with fuel tank isolation valve commanded open <math>\leq 2.00</math></li> <li>• Within time <math>\geq 5.0</math> Sec.</li> </ul>
P2431	Rationality Check	Difference between AIR pressure and ambient pressure $< -6.00$ ; $> 6.00$ kPa
P2432	Signal Range Check	Signal voltage $< 0.50$ V
P2433	Signal Range Check	Signal voltage $> 4.50$ V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2440	Secondary Air Injection System Switching Valve Stuck Open (Bank 1)	<ul style="list-style-type: none"> <li>• Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled <math>\geq 0.59</math></li> <li>• Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled <math>\geq 0.36</math> and</li> <li>• Relative AIR pressure measured <math>\leq 0.50</math></li> <li>•and</li> <li>• AIR pressure measured with AIR pressure sensor vs. modeled while AIR valve closed <math>&lt; 0.65</math></li> </ul>
P2450	Evaporative Emission System Switching Valve Performance/ Stuck Open	<p>During engine off:</p> <ul style="list-style-type: none"> <li>• EVAP pump current difference between reference measurement to idle <math>\leq 3.0</math> mA</li> </ul> <p>During engine on:</p> <ul style="list-style-type: none"> <li>• EVAP pump current difference between reference measurement to idle <math>\leq 3.0</math> mA</li> </ul>
P2539	Low Pressure Fuel System Sensor Circuit	Signal voltage $> 4.9$ V
P254F	Engine Hood Switch Circuit	Engine hood switch failure
P2562	Turbocharger Boost Control Position Sensor "A" Circuit	Signal voltage $> 4745$ mV
P2563	Turbocharger Boost Control Position Sensor Circuit Range/Performance	Signal voltage $> 4500$ mV
P2564	Turbocharger Boost Control Position Sensor Circuit Low	Signal voltage $< 255$ mV
P261A	Coolant Pump "B" Control Circuit/Open	Signal voltage 4.8 - 5.3 V
P261C	Coolant Pump "B" Control Circuit Low	Signal voltage $< 2.8 - 3.2$ V
P261D	Coolant Pump "B" Control Circuit High	Signal current $< 2.2 - 4.0$ A
P2600	Coolant Pump Control Circuit Open	Signal voltage $< 4.8 - 5.3$ V
P2602	Coolant Pump Control Circuit Low	Signal voltage $< 2.8 - 3.2$ V

**DTC Chart**

<b>DTC</b>	<b>Error Message</b>	<b>Malfunction Criteria and Threshold Value</b>
P2603	Coolant Pump Control Circuit High	Signal current > 5.5 - 10.0 A
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1, Sensor 1)	O2S signal front > 4.81 V
P2705	Transmission Friction Element "F" Apply Time Range/Performance	Decoupler status incorrect
P30A2	Brake pedal range sensor; brake light switch Implausible signal	Plausibility check of brake pedal position sensor with brake light switch <ul style="list-style-type: none"> <li>• Brake light switch not active and</li> <li>• Brake pedal position &gt; 25.00%</li> <li>• Brake light switch active and</li> <li>• Brake pedal position &lt; 1.00%</li> </ul>
P30DC	Pressure Release for Refuel(ing Gas Tank Not Possible	<ul style="list-style-type: none"> <li>• Evaporative system vapor pressure <math>\geq</math> 2.00 kPa and</li> <li>• Time after refueling request <math>\geq</math> 30.0 Sec.</li> </ul>
P309D	Clutch disengagement actuator insufficient slip with disengaged clutch	Combustion engine speed is detected while electronic clutch is open > 0 RPM
P309F	Clutch disengagement actuator slip when clutch engaged	Difference between combustion engine speed and drive motor speed (full torque) > 50 - 300 RPM

## Transmission

<b>DTC</b>	<b>Error Message</b>	<b>Malfunction Criteria and Threshold Value</b>
P0703	Torque Converter/Brake Switch B Circuit Malfunction	<ul style="list-style-type: none"> <li>• Sensed voltage &gt; 2430 mV</li> <li>• Sensed voltage &gt; 10 mV</li> </ul>

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