

FLUID CAPACITIES							
Fluid Type	Application		Standard	Metric	Fluid Spec	Note	S/H
Air Cond Refrigerant			1.20 LBS.	0.5 KG	R-134a		S
Automatic Transmission Fluid	Trans Mfr CD 02E	Initial Fill	7.40 QTS.	7 L		Part No. G 052 182 A2.	S
Automatic Transmission Fluid	Trans Mfr CD 02E	Refill	5.50 QTS.	5.2 L		Part No. G 052 182 A2.	S
Brake Fluid			1.30 QTS.	1.2 L		Part No. B 000 750.	S
Engine Coolant			8.50 QTS.	8 L		Part No. G 012 A8G or G 012 A8F.	S
Engine Oil			4.90 QTS.	4.6 L	SAE 5W-40 or SAE 5W-30. Synthetic based oils. Engine oil must conform to the exact specification in VW publication VW 502 00. See TSB No. 17 09-07	Use only a high-quality engine oil that expressly complies with the Volkswagen oil quality standard specified for your vehicle's engine. Using any other oil can cause serious engine damage that will not be covered by any Volkswagen Limited Warranty. DO NOT mix any lubricants or other additives into the engine oil. Doing so can cause engine	S

(2012855).

damage.
Damage caused by these kinds of additives are not covered by any Volkswagen Limited Warranty. Quantities are approximate. DO NOT overfill.

Fuel Tank			N/A	N/A		S
Manual Transmission Fluid	Trans Mfr CD 02Q	Initial Fill	2.40 QTS.	2.3 L	Part No. G 052 171 A2.	S
Windshield Washer Fluid		w/Headlamp Washer	5.20 QTS.	4.9 L	Part No. G 052 164.	S
Windshield Washer Fluid		w/o Headlamp Washer	3.80 QTS.	3.6 L	Part No. G 052 164.	S

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > GENERAL REPAIR INFORMATION >

For more information on the Direct Shift Gearbox (DSG R):

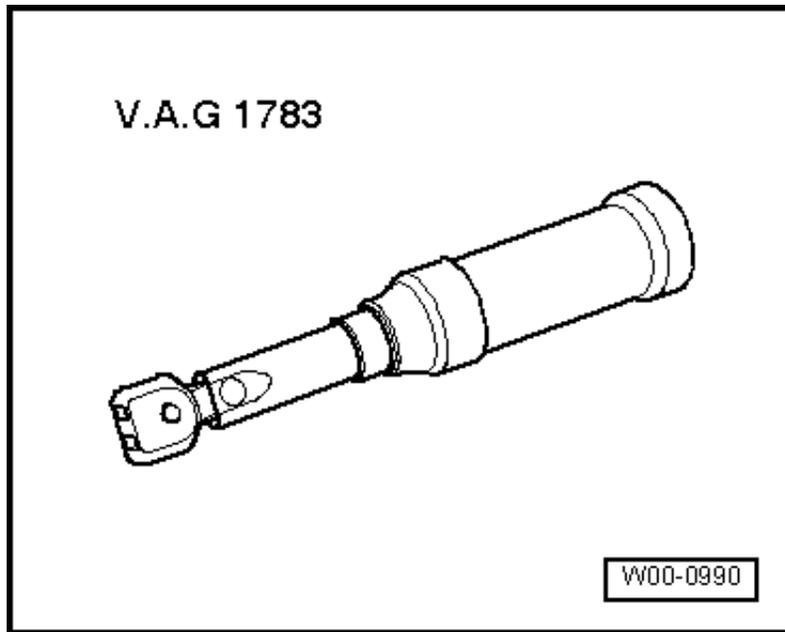
For more information regarding the DSG R, refer to the Self Study Program, "The 02E Direct Shift Gearbox Design and Function" course number 851403.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > GENERAL REPAIR INFORMATION > TOOLS >

A complete list of special tools and workshop equipment used in the repair information can be found at the beginning of each repair procedure and at the end of each repair group.

For small fasteners with a minimal tightening specification, uncertainties often exist. Use the torque wrench - V.A.G 1783- for these fasteners.

Fig 1: Identifying Torque Wrench V.A.G 1783



Courtesy of VOLKSWAGEN UNITED STATES, INC.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > GENERAL REPAIR INFORMATION > TRANSMISSION >

Always make sure no dirt can get into an open transmission. Dirt entering an open transmission, can cause a malfunction especially with a open DSG transmission Mechatronic -J743- and/or oil pump.

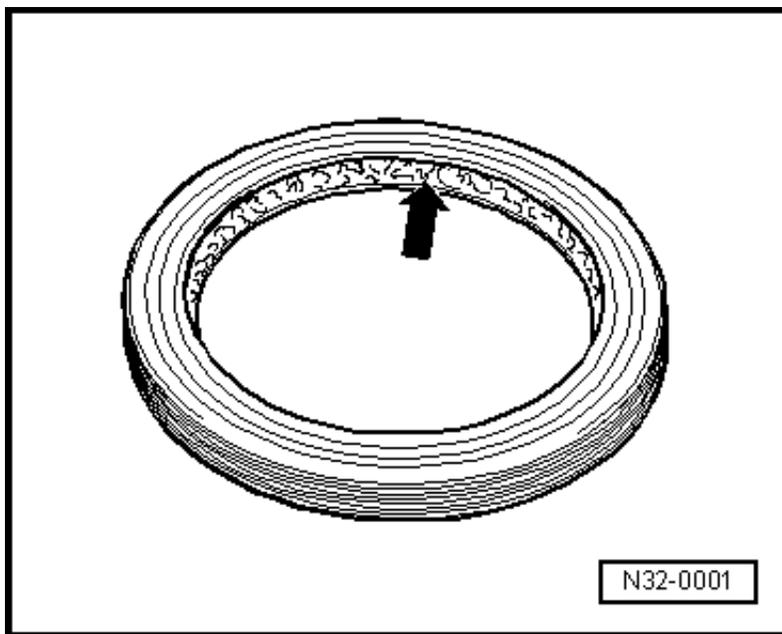
- Do not run the engine and do not tow the vehicle if the transmission cover is removed or if there is no DSG R oil inside the transmission.
- Always clean the connection points and the surrounding areas first, and then loosen them.

- When installing the transmission, make sure the alignment sleeves are correctly installed between the engine and transmission.
- Place removed parts on a clean surface and cover them so that they do not get dirty. Use foil, paper or a lint free cloth.
- Only install clean components: Only unpack replacement parts immediately prior to installation.
- Carefully cover or seal unpacked components if repairs cannot be performed immediately.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > GENERAL REPAIR INFORMATION > SEALS >

- No matter what kind of seals they are, they must always be replaced.
- Before installing a radial shaft seal, coat the sealing lips and the space between them with sealing grease for seal -G 052 128 A1- and the outer circumference with DSG R oil.

Fig 1: Identifying Oil Seals Sealing Lips

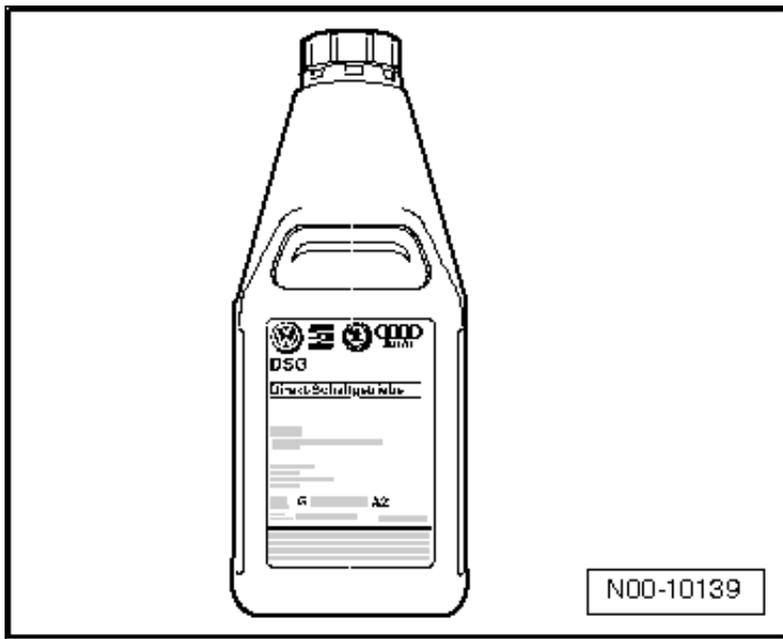


Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Use DSG R oil only. Other lubricants cause malfunctions.
- The open side of the radial shaft seal faces towards the oil.
- After installing, check the oil level and fill, if necessary. Refer to MODIFYING THE Adapter for Oil Filling VAS 6262 A .

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > GENERAL REPAIR INFORMATION > DSG R OIL >

Fig 1: Identifying DSG Transmission Oil



Courtesy of VOLKSWAGEN UNITED STATES, INC.

Shake before opening.

The DSG R oil is obtainable as a replacement part.

The oil quality is of vital importance for transmission function.

Do not mix additives into the oil. Do not fill with a different oil.

The drained oil must not be used again.



CAUTION:

Be cautious when dealing with DSG R oil. Dispose of the drained oil properly. Bear in mind that: One drop of oil can make 600 liters of drinking water unusable.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > GENERAL REPAIR INFORMATION > WHEN TO CHANGE THE OIL FILTER >

The oil filter does not need to be changed in every case.

DO NOT replace the filter if:

- The oil cooler or its O-rings were replaced and no coolant has gotten into the oil.
- The selector shaft seal was replaced.
- The flange or stub shaft seal was replaced.
- Leaking Mechatronic covers, Direct Shift Gearbox (DSG R) clutch or oil pump were replaced.
- The transmission input speed sensor -G182- and the clutch oil temperature sensor -G509- were

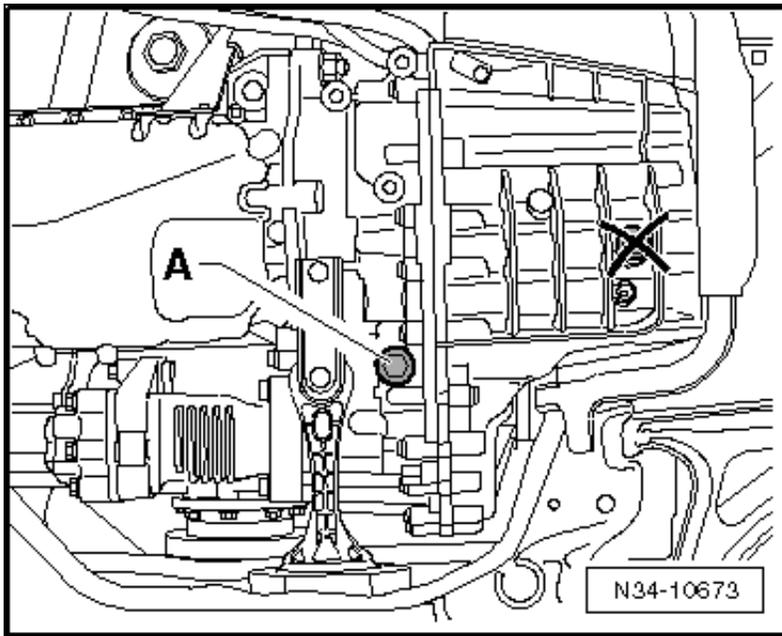
replaced

The filter MUST be replaced if:

- The 60, 000 km maintenance interval was reached.
- Coolant has entered the oil.
- Metal shavings were found in the oil.
- The clutch is burned or has a mechanical fault.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > GENERAL REPAIR INFORMATION > OIL DRAIN AND INSPECTION PLUGS >

Fig 1: Identifying Oil Drain And Inspection Plug



Courtesy of VOLKSWAGEN UNITED STATES, INC.

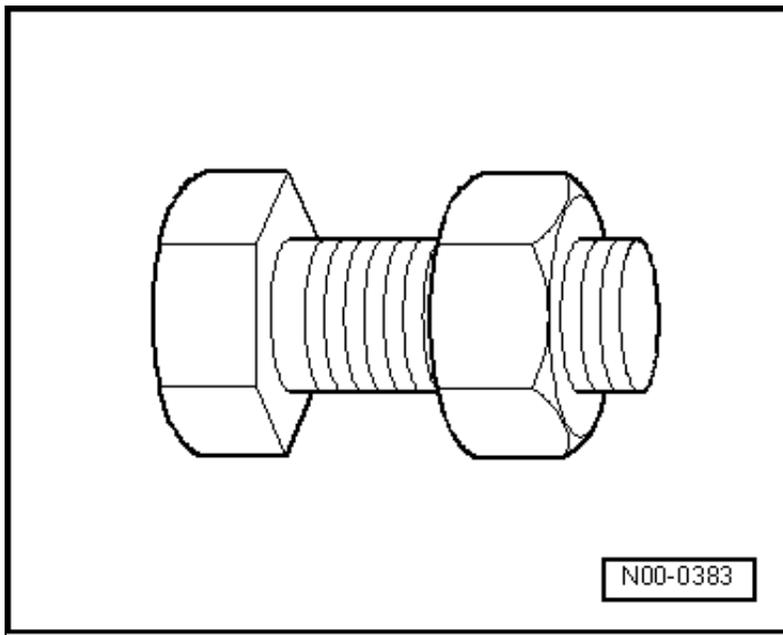
Up to transmission production date "September 20, 2004", transmissions with two plugs were installed.

Then, the second plug was eliminated so that oil draining and level adjusting is done using only one plug -A-.

A plastic overflow tube is located behind this plug (with a 8 mm hex socket head, tightening specification: 3 Nm). Its length determines the oil level in the transmission.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > GENERAL REPAIR INFORMATION > BOLTS AND NUTS >

Fig 1: Identifying Nut And Bolt



Courtesy of VOLKSWAGEN UNITED STATES, INC.

- Loosen or tighten bolts and nuts for the covers or housings diagonally.
- The tightening specification stated apply to non-lubricated nuts and bolts.
- Use a wire brush to clean the threads of bolts that were installed using locking fluid. Install the bolts using AMV 185 100 A1 liquid locking fluid.
- Use a thread tap to clean all threaded holes containing self-locking bolts to remove any locking fluid residue. Otherwise the bolts could shear the next time they are removed.
- Always replace self-locking nuts and bolts.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > GENERAL REPAIR INFORMATION > ELECTRICAL COMPONENTS >

You have probably received a electrical shock at one time, when touching a metal item. The reason behind this is the electrostatic charge to the human body. This charge can damage the electrical components on the transmission and the selector mechanism.

-- Touch a grounded object before working on electric components. Do not touch connectors or open electronic components directly.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > TROUBLESHOOTING >

Before beginning any repair work, the cause of damage should be pinpointed using "Guided Fault Finding".

Perform Guided Fault Finding using the vehicle diagnostic tester.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > TROUBLESHOOTING > CONTROL MODULE BEHAVIOR WHEN THERE IS A MALFUNCTION, INFORMATION >

The control module works with developed software. This software has the ability to execute electrical functions, monitor and control within milliseconds. Everything modern transmission electronics have going for

them i located in thi control module Thi hould al o be con idered during trouble hooting

However, no electronics can do what they were not designed to do. Likewise, it is not possible to detect electronically, for example, where the transmission housing is leaking and oil is escaping. However, it is possible to detect the effects of low oil. A failure in gear monitoring would be recognized causing the control module to respond that both clutches are open (no traction).

You should know this during troubleshooting and also when working with the tester. It is possible that the cause for the malfunction might not be found during Guided Fault Finding

In addition to updating the software, much has been done to protect the transmission should there be a malfunction (safety features). And so, when necessary, malfunctions are saved and a replacement program is started.

Control Module Behavior During a Malfunction

If a component in the transmission malfunctions, the control module reacts with a replacement function. In order to protect the transmission, there are 4 different kinds of malfunctions:

1. The malfunction is so minor that it is possible to continue driving with a replacement program while maintaining driving safety. The driver is not notified of this via the selector lever transmission range display -Y5-. The display shows the selector lever position normally. When can changes in driving behavior actually be detected.
2. Individual lever positions blink in the selector lever transmission range display. The driver is shown that a desired gear selection is currently not possible. An example: Reverse, lever in "R" and vehicle drives backward. If "D" is engaged in this situation, the letter "D" blinks in the selector lever transmission range display. In this case, the control module prevents 1st gear from being engaged to avoid damaging the transmission. The gear is only engaged when the vehicle is stopped.
3. The selector lever transmission range display is completely lit up and blinks. The selector lever position is indicated. An example of this: Transmission oil temperature is too high. Reasons can be, among other things: Towing a trailer with too heavy of a load, installing accessories on front of the vehicle, lack of cooling air.
4. The selector lever position cannot be recognized. The selector lever transmission range display blinks. Differences in the driving and shifting can definitely be felt. It is not possible to shift into reverse. There is a serious malfunction, a sub-transmission is switched off, transmission repair is necessary.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > TROUBLESHOOTING > TROUBLESHOOTING, SPECIAL INFORMATION >

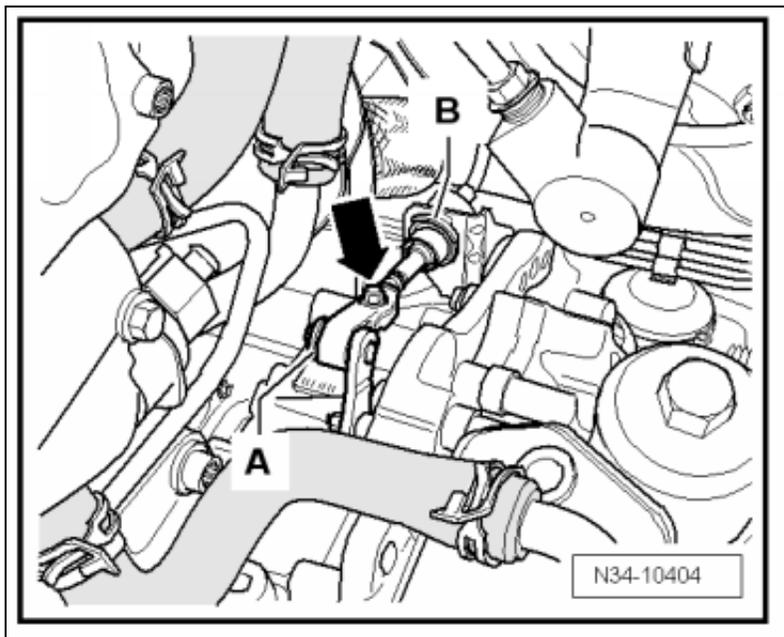
Selector Lever Position Display, No "R":

Simultaneous lighting of all segments of the transmission range selector lever display indicates the transmission is in emergency running mode. The vehicle does not drive in reverse.

Tip Function Malfunction, No Gear Selection:

Check the lock washers on the selector lever cable bracket at the top of the transmission. Washer -B- especially must never be used twice.

Fig 1: Identifying Adjustment Screw & Lock Washers



Courtesy of VOLKSWAGEN UNITED STATES, INC.

The lock washer -B- can get lost if it loses its residual stress. The -arrow- points to the cable adjustment bolt.

Drive Faulty - Insufficient Oil Suspected:

First, go to DSG R OIL .

Only add oil if you have definitely seen: oil is leaking. Under any other circumstances it is just a needless expense that does not help.

No Faults are Stored:

This especially depends on you. Experience shows that often a fault that is attributed to the transmission was caused by other components or units.

Poor shifting behavior is a result of insufficient engine air supply. Do not make mistakes like this.

If such faults are to be eliminated, you can work sensibly with the Volkswagen tester.

Faults are Stored:

Find out which faults have been stored. Volkswagen testers offer Guided Fault Finding . Using Guided Fault Finding can determine the cause of many malfunctions.

Malfunctions Outside the Transmission:

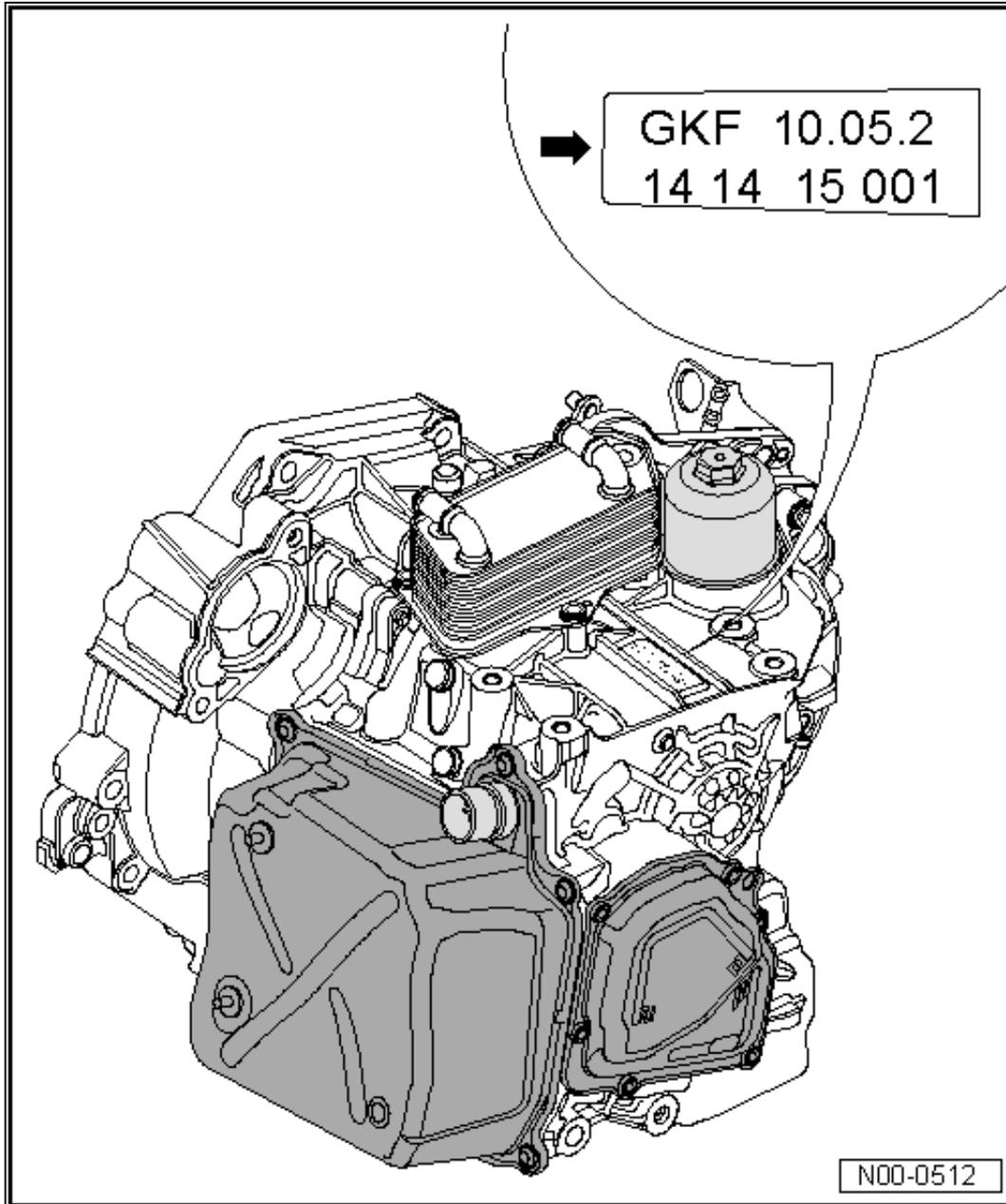
If, for example, there is a malfunction in the transmission: "ABS signal missing" is stored in the transmission and perhaps another control module also says: "ABS signal missing": Then do not continue to suspect the transmission control module is faulty.

The entry simply means: The transmission (and possibly other control modules) is waiting for a signal via the BUS but is not receiving it. In this case, the Anti-lock Brake System (ABS) has a problem. Under no circumstances should you remove the DSG transmission Mechatronic -J743-. In this example, the fault points to problems with the ABS.

IDENTIFICATION >

Example -arrow-:

Fig 1: Locating Transmission Identification

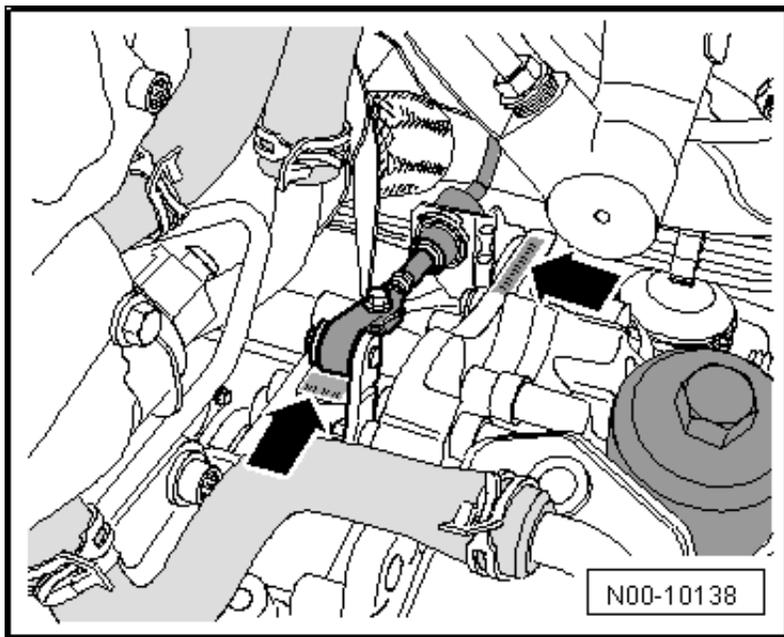


Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. GKF - Transmission Code
2. 10.05.2 - May 10, 2002
3. 14 - Plant Code
4. 14 15 - Time
5. 001 - Serial Number

On some transmissions, additional code letters are applied at the top of the transmission in the vicinity of the selector lever cable -arrows-.

Fig 2: Location Of Additional Code Letters (Some Transmissions)



Courtesy of VOLKSWAGEN UNITED STATES, INC.

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

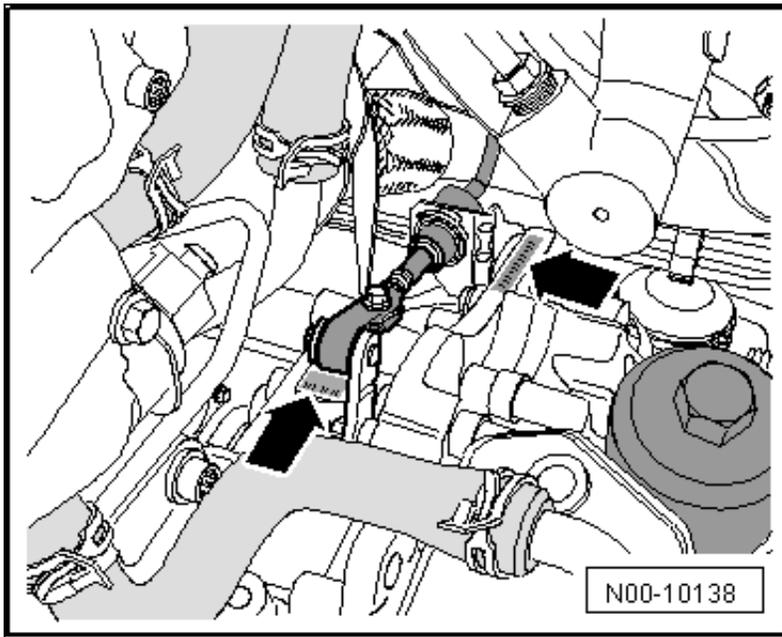
If the vehicle data label is not available, a different transmission was accidentally installed or there is no definite way to identify the installed transmission, read the transmission code letters directly from the transmission. Refer to TRANSMISSION CODE LETTERS, READING .

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > TRANSMISSION IDENTIFICATION > TRANSMISSION CODE LETTERS, READING >

The transmission code letters are on the transmission in at least in two different locations.

On the transmission near the selector lever cable -two arrows-.

Fig 1: Location Of Additional Code Letters (Some Transmissions)

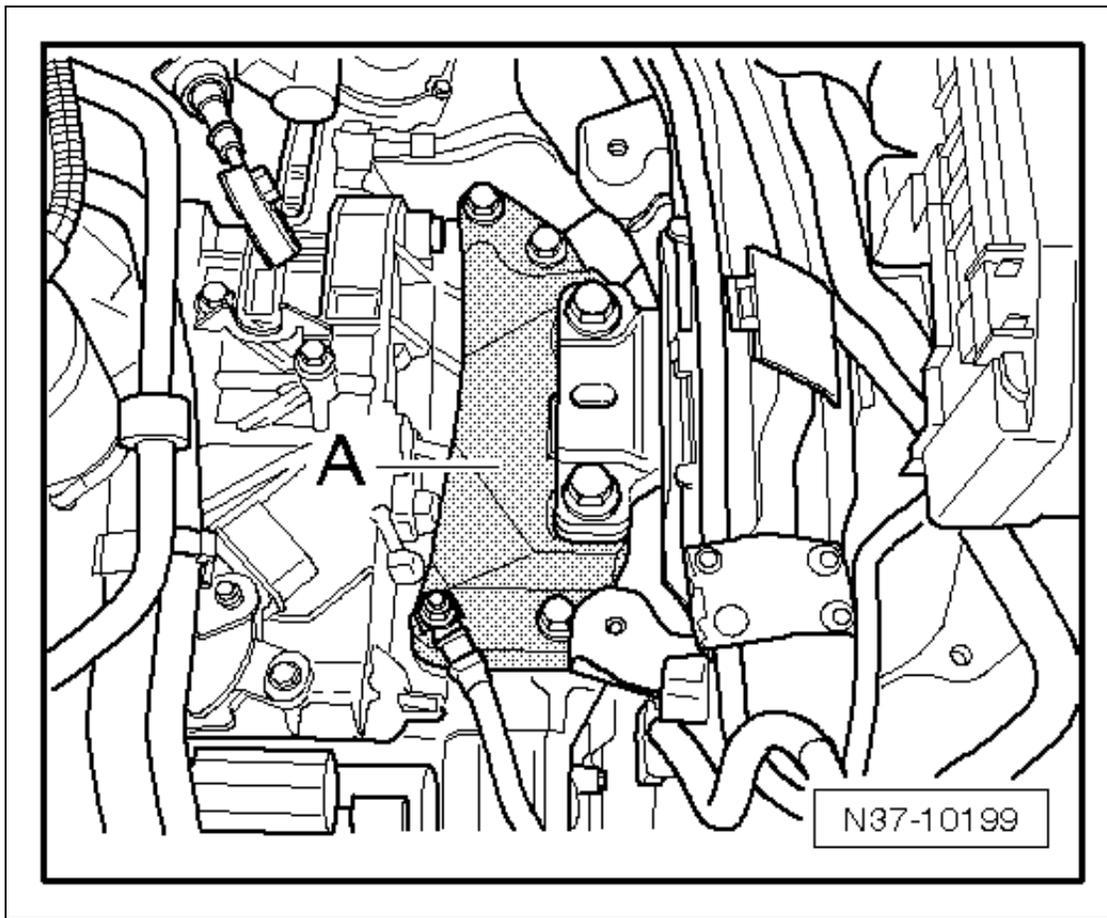


Courtesy of VOLKSWAGEN UNITED STATES, INC.

If these cannot be read, then transmission code letters can also be read under the transmission mount bracket.

To read the transmission code letters under the bracket directly from the transmission, the engine and transmission must be supported. The transmission mount bracket -A- must be removed. Lower the engine/transmission just enough until it is possible to slide the bracket toward the rear. If lowered further, the pendulum support could be damaged. After being assembled, the selector lever cable must be adjusted. Refer to SELECTOR LEVER CABLE, ADJUSTING .

Fig 2: Identifying Left Assembly Mounting Console



Courtesy of VOLKSWAGEN UNITED STATES, INC.

A detailed description of how to remove the bracket is not needed here. Refer to "Transmission, Removing".

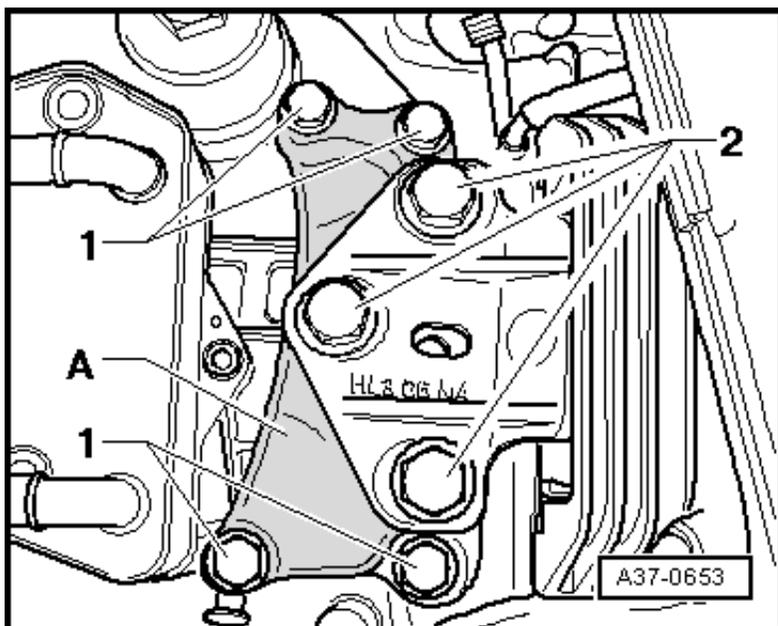
Short Description:

Remove the air filter housing and battery.

Install the engine support bridge 10-222 A and support the engine/transmission. Do not lift it up yet.

-- Remove the engine mount to engine mount bracket bolts -2- and the engine mount bracket to transmission bolts -1-.

Fig 3: Identifying Transmission Support Plate And Bolts

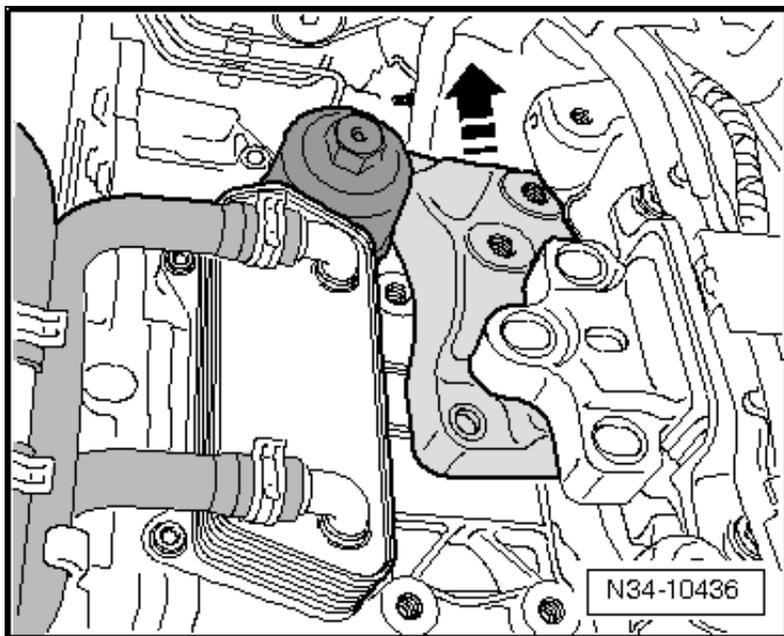


Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- Then, lower the engine/transmission slightly using the engine support bridge 10-222 A spindles until the bracket -A- can be removed.

In most cases, 2 turns on the spindle are enough to remove the bracket -arrow-.

Fig 4: Identifying Transmission Support Plate

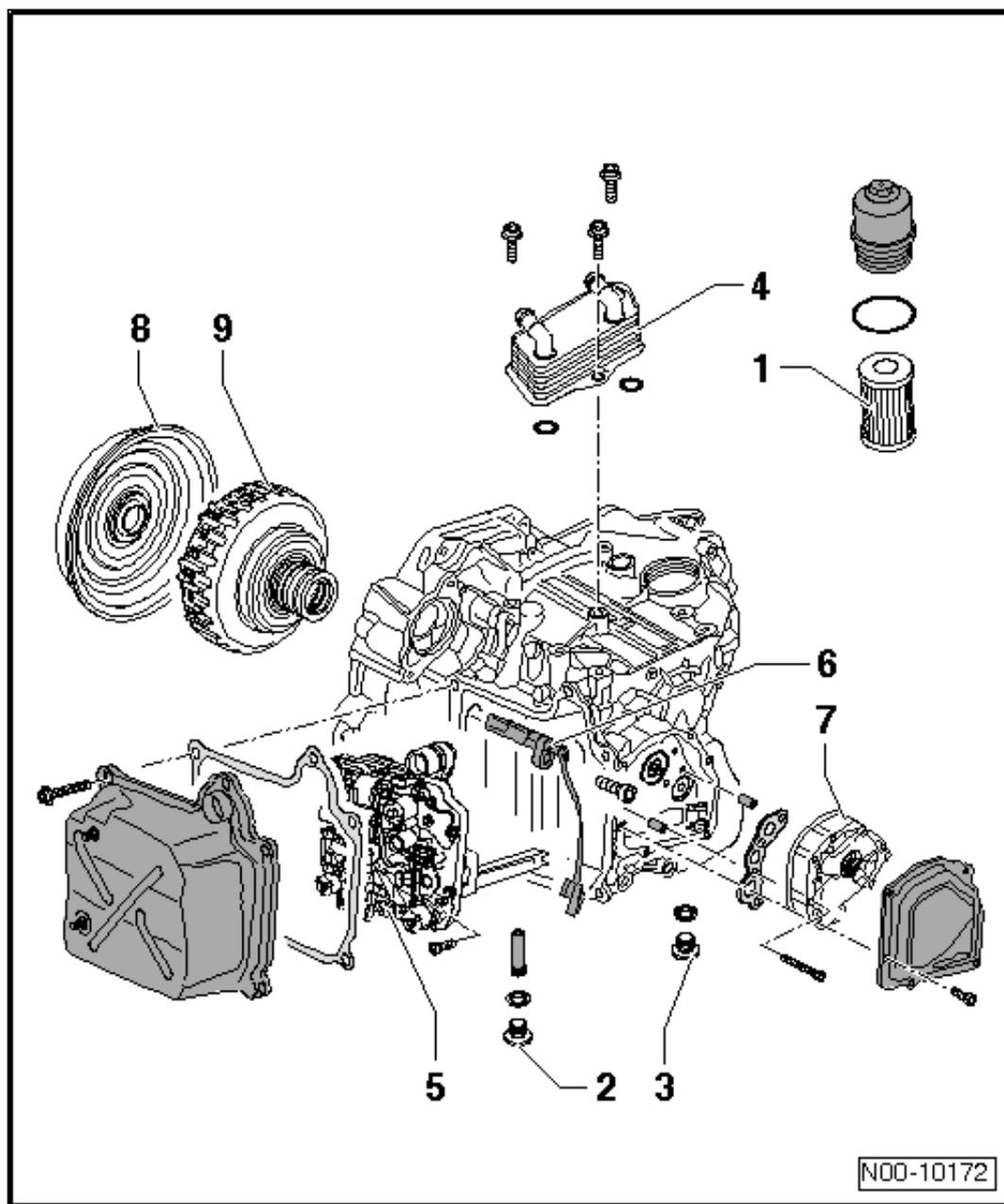


Courtesy of VOLKSWAGEN UNITED STATES, INC.

-- After installing the bracket, always adjust the selector lever cable. Refer to SELECTOR LEVER CABLE, ADJUSTING .

00 GENERAL, TECHNICAL DATA > DESCRIPTION AND OPERATION > TRANSMISSION COMPONENT OVERVIEW >

Fig 1: Identifying Assembly Overview: DSG Transmission



Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. Filter, refer to OIL FILTER

1. For information on changing the filter, refer to WHEN TO CHANGE THE OIL FILTER .

2. Inspection Plug, refer to OIL DRAIN AND INSPECTION PLUGS

1. Near the pendulum support.

3. Oil Drain Plug

1. Refer to DSG R OIL .

2. This plug is no longer installed as of September 2004. The oil can be drained through the inspection plug.

4. Transmission Oil Cooler, refer to TRANSMISSION OIL COOLER

5. DSG Transmission Mechatronic -J743-, refer to DSG R ELECTRIC/ELECTRONIC

COMPONENTS AND LOCATIONS

- 6. Transmission Input Speed Sensor -G182- and Clutch Oil Temperature Sensor -G509-, refer to DSG R ELECTRIC/ELECTRONIC COMPONENTS AND LOCATIONS
- 7. Oil Pump, refer to OIL PUMP
- 8. Dual Clutch Cover (End Cover)
- 9. Dual Clutch, refer to DIRECT SHIFT GEARBOX OVERVIEW

00 GENERAL, TECHNICAL DATA > SPECIFICATIONS > CAPACITIES >

Capacity	DSG R Transmission 02E
Initial fill in factory	Refer to Fluid Capacity Tables
Replacement capacity	Refer to Fluid Capacity Tables
Replacement capacity, Mechatronic only, removing and installing (transmission installed)	Refer to Fluid Capacity Tables
Lubricant:	DSG R oil

For more details, refer to the part number on the container.

Capacity	Front Bevel Box
Initial Fill	Refer to Fluid Capacity Tables
Change	Permanent fill, no change
Lubricant	Axle oil -G 052 145-

For more details, refer to the part number on the container.

00 GENERAL, TECHNICAL DATA > SPECIFICATIONS > TRANSMISSION ALLOCATION CODES >

If original replacement parts are needed for a repair, always pay attention to the transmission codes.

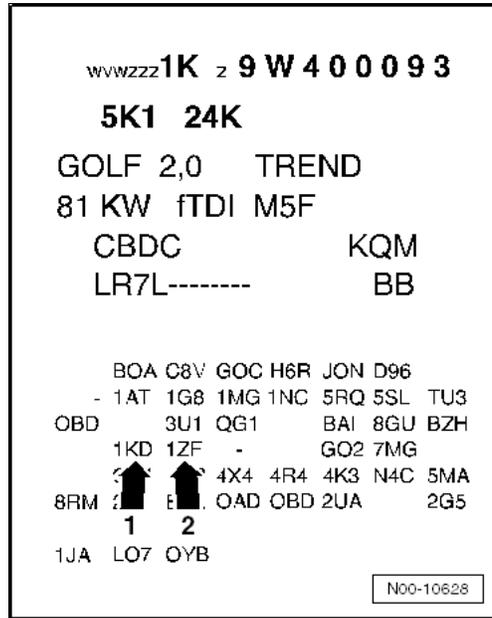
DSG R Transmission 02E (Front Wheel Drive (FWD))	
MSV, LQV, LTE, NJK and NLP	MSY, LQZ, LTL, NJL, NLR, and MMA
2.0L - 125 kW TDI	2.0L - 147 kW FSI- Turbo

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > BRAKE PR NUMBER, ALLOCATING >

The PR number on the vehicle data label describes which brake system is installed in the vehicle.

Example of a Vehicle Data Sticker

Fig 1: Example of a Vehicle Data Sticker



Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

In this example the vehicle is equipped with the following brakes:

- -Arrow 1- - Rear brakes - 1KD
- -Arrow 2- - Front brakes - 1ZF

There is a vehicle data label in the spare wheel well and also one in the customer Maintenance booklet.

- The following tables explain the production control number. These are important for the combination brake caliper/brake disc and brake pad.

Front Brakes

Engine version
2.0L - 103 kW TDI
2.5L - 125 kW
2.0L - 147 kW T- FSI

Rear Brakes

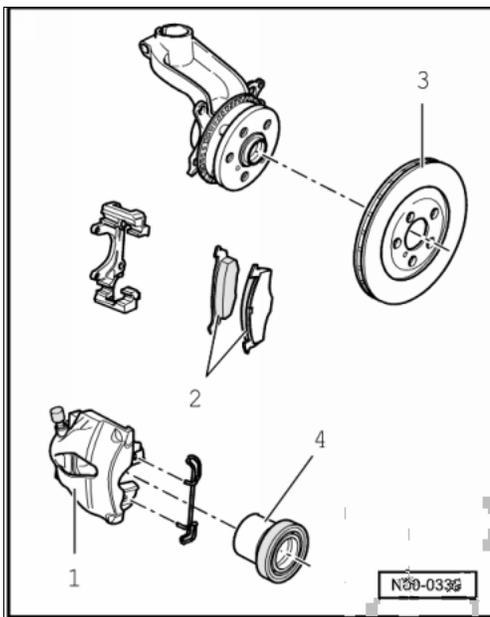
Engine version
2.0L - 103 kW TDI
2.0L - 147 kW T- FSI
2.5L - 125 kW

00 GENERAL, TECHNICAL DATA > SPECIFICATIONS > BRAKE MASTER CYLINDER AND BRAKE BOOSTER >

Brake Master Cylinder	Diameter in mm	23.81
Brake booster	Diameter in inches	10

00 GENERAL, TECHNICAL DATA > SPECIFICATIONS > FRONT BRAKES >

Fig 1: Exploded View Of Front Brake Calipers (FN3)



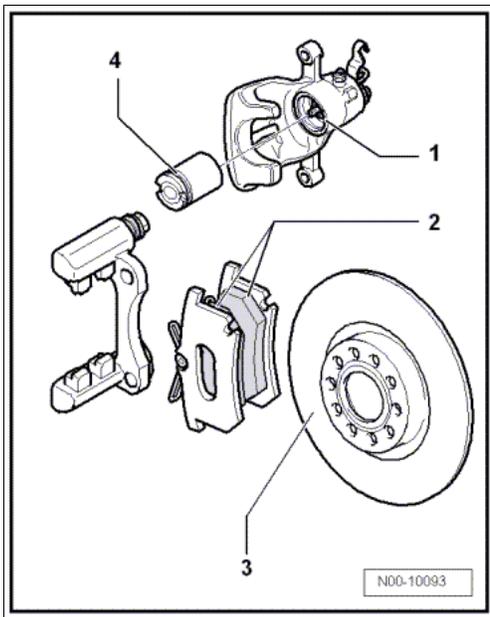
Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

Item	PR Number		1ZE/1ZP
1	Brake caliper		FN3 (15")
2	Brake pad, thickness	mm	14
	Brake pad, wear limit without back plate	mm	2
3	Brake disc	Diameter in mm	288
	Brake disc, thickness	mm	25
	Brake disc, wear limit	mm	22
4	Brake caliper, piston	Diameter in mm	54

Item	PR Number		1LJ / 1ZD / 1LL / 1LV / 1ZA / 1ZB
1	Brake caliper		FN3 (16")
2	Brake pad, thickness	mm	14
	Brake pad, wear limit without back plate	mm	2
3	Brake disc	Diameter in mm	312
	Brake disc, thickness	mm	25
	Brake disc, wear limit	mm	22
4	Brake caliper, piston	Diameter in mm	54

00 GENERAL, TECHNICAL DATA > SPECIFICATIONS > REAR BRAKES, C 38 >

Fig 1: Exploded View Of Rear Brake C 38



Courtesy of VOLKSWAGEN GROUP OF AMERICA, INC.

Item	PR Number	1KD
1	Brake caliper	C 38 (15")
2	Brake pad, thickness	mm 11
	Brake pad, wear limit without back plate	mm 2
3	Brake disc	Diameter in mm 253
	Brake disc, thickness	mm 10
	Brake disc, wear limit	8
4	Brake caliper, piston	Diameter in mm 38

00 GENERAL, TECHNICAL DATA > DIAGNOSIS AND TESTING > BRAKES, TESTING >

General Information

- The testing takes place on a test stand.
- During testing, manual transmission vehicles must in idle and automatic transmission vehicles must be in >>N<<.
- Always follow the instructions provided by the test stand manufacturer.



NOTE:

The brake systems do not work when the ignition is off.

Testing

The brake test is to be performed on a one-axle roller test stand.

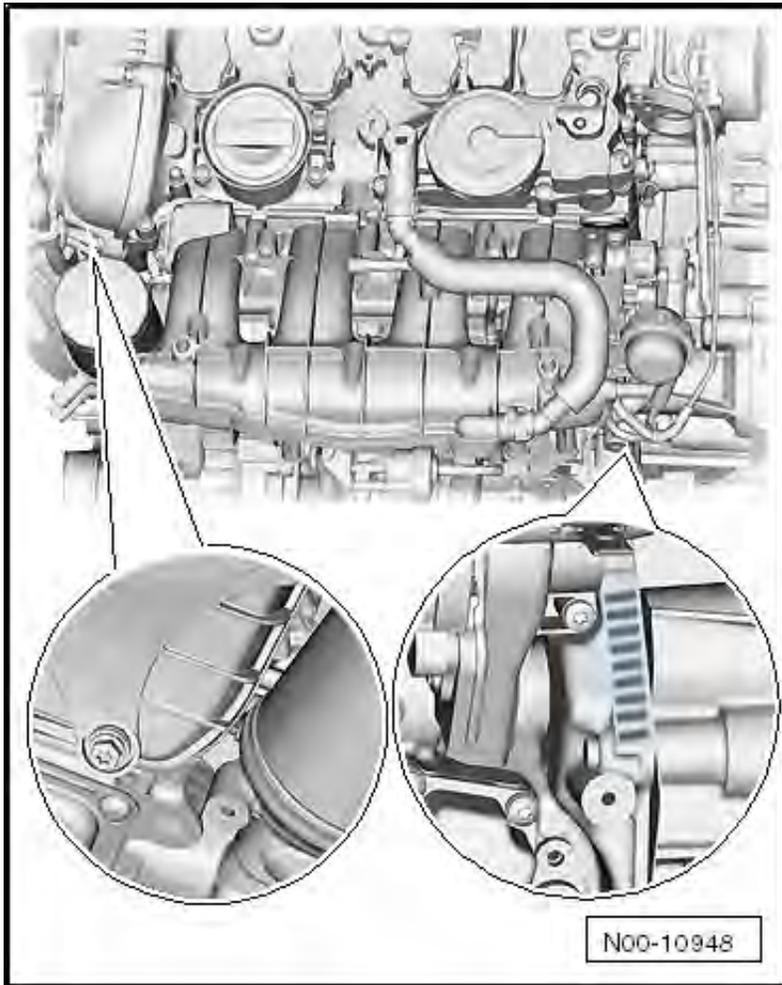
Do not exceed a test speed of 6 km/h.

Volkswagen approved test stands meet these requirements.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > ENGINE NUMBER >

The engine number ("engine code" and "serial number") are located at the engine to transmission joint.

Fig 1: Locating Engine Number ("Engine Code" And "Serial Number")



Courtesy of VOLKSWAGEN UNITED STATES, INC.

The engine code is also stamped on the cylinder block behind the oil filter.

Vehicles with Four Digit Engine Codes

Four digit engine codes beginning with the letter "C" are used. The first three digits describe the mechanical structure of the engine and are still stamped on the engine, as before. The fourth digit describes the engine output and torque and depends on the Engine Control Module (ECM). Four digit engine codes are found on the type plate and vehicle data label. It can also be read via the ECM.

NOTE:

For the vehicle data label location, refer to relevant Maintenance Procedures.

00 GENERAL, TECHNICAL DATA > SPECIFICATIONS > ENGINE DATA >

Code Letters		CBFA	CCTA
Manufactured from			
GTI (2008 through 2009)		from 03.08	from 03.08
Eos		from 05.08	from 05.08
Tiguan		---	from 01.08
Passat		from 03.08	from 03.08
CC		from 10.09	from 06.08
GTI (from MY 2010)		from 07.09	from 07.09
Emissions values		SULEV ⁽¹⁾	ULEV 2 ⁽²⁾
Displacement	Liter	2.0	2.0
Output	kW at RPM	147 at 5100	147 at 5100
Torque	Nm at RPM	280 at 1700	280 at 1700
Bore	diameter mm	82.5	82.5
Stroke	mm	92.8	92.8
Compression ratio		9.6:1	9.6:1
Research Octane Number (RON)		95	95
Injection system/ignition system		FSI	FSI
Ignition sequence		1-3-4-2	1-3-4-2
Turbocharger, Supercharger		Turbocharger	Turbocharger
Variable valve timing		yes	yes
Secondary Air Injection (AIR)		yes	no
Valves per cylinder		4	4
Oil pressure control		no	no
⁽¹⁾ SULEV = Super Ultra Low Emissions Vehicle			
⁽²⁾ ULEV = Ultra Low Emissions Vehicle			

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > A/C SYSTEM AND REFRIGERANT R134A, SAFETY PRECAUTIONS >



WARNING:

- It is recommended to have an eye-flushing bottle available.
- If liquid refrigerant has come in contact with your skin and eyes, immediately flush with cool water for 15 minutes. Afterwards instill eye drops and consult a doctor immediately, even when the eyes are not hurting.
- The doctor must be informed that the injury was caused by refrigerant R134a. Should refrigerant come into contact with other parts of the body despite compliance with safety regulations, these must likewise be rinsed immediately for at least 15 minutes with cold water.
- Work on refrigerant system should only be performed in ventilated areas (workshops). Turn on the exhaust gas ventilation system
- Refrigerant must not be stored in low-lying areas such as cellars or in their entry ways or windowsills.

- Do not attempt repair on filled air conditioning systems by soldering, brazing or welding. This applies also for welding and soldering work on the vehicle, in the event that parts of the A/C system may heat up. When performing paint work repairs, the temperature in the drying booth or preheating zone must not exceed 80°C (176°F).

Reason

Exposure to heat increases the pressure in the system, which could cause the pressure relief valve to open.

Corrective action

-- Discharge refrigerant circuit using service station.



NOTE:

Always replace damaged or leaking A/C system components. Do not attempt to repair them by

soldering, brazing or welding.

Refrigerant vessels (such as, charging cylinders of A/C service station) must never be subjected to excessive heat or exposed to direct sunlight.

Corrective action

-- Vessels must never be completely filled with liquid refrigerant. Without sufficient room for expansion (gas cushion), vessels will rupture with devastating effect in the event of an increase in temperature. Refer to REFRIGERANT R134A CHARACTERISTICS .

Refrigerant is never to be transferred to systems or vessels in which air is present.

Corrective action

-- Evacuate systems and vessels before charging with refrigerant.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > A/C SYSTEM, REPAIR INFORMATION >



WARNING:

When performing work on refrigerant circuit, observe all generally applicable safety precautions and pressure vessel regulations.



CAUTION:

Non-approved tools or materials such as leak sealing additives can cause damage or malfunctions in the system.

Only use tools and materials approved by the manufacturer.

The warranty is voided if non-approved tools or materials are used.

- An A/C system made for refrigerant R12 must not be filled with refrigerant R134a without making modifications to the refrigerant circuit. Refer to REFRIGERANT CIRCUIT, CONVERTING R12 TO R134A AND SERVICING .
- The refrigerant oils specifically developed for R134a and R12 refrigerant circuits are never to be mixed.
- Service stations which come in contact with the refrigerant are only to be used for the intended refrigerant.
- Components of R134a refrigerant circuits can be identified by their markings, green labels or design (such as different threads) to prevent interchanging with components designed for

refrigerant R12.

- A label indicating the refrigerant used is provided in the engine compartment on the lock carrier or in the plenum chamber.
- Different refrigerants are never to be mixed.

 NOTE:

When working on the refrigerant circuit, always heed the information given in, see A/C SYSTEM AND REFRIGERANT R134A, SAFETY PRECAUTIONS and REFRIGERANT CIRCUIT, GENERAL PRECAUTIONS .

Special Tools and Accessories

The performance of proper workmanlike repairs on an air conditioning system:

- Requires the use of special tools and materials as listed in, see SPECIAL TOOLS .
- Requires compliance with the basic instructions for use of leak detectors. Refer to REFRIGERANT CIRCUIT, FINDING LEAKS WITH ELECTRONIC LEAK DETECTOR VAG 1796 .
- Requires expert knowledge.

 NOTE:

Releasing refrigerant into the environment is not permitted (punishable by law). Refer to LAWS AND REGULATIONS .

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > A/C SERVICE AND RECYCLING UNITS >

At this time, A/C service units for extracting, cleaning and filling refrigerant for motor vehicle A/C systems are available from various manufacturers.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > COMPONENT REPLACEMENT >

 CAUTION:

- For instructions on how to handle refrigerant oil, refer to Volkswagen-Service Net, Handbook, Handbook Service Germany; 15. Environment Protection; further with Environmental Protection; 7 emission protection; refrigerant oil.

- All components of the refrigerant circuit submitted for quality observation are always to be sealed (use original sealing caps of original part).
- To date, the original parts (compressor, reservoir, receiver, evaporator and condenser) have been filled with nitrogen gas. This charging stops gradually or the charging pressure is so low that gas does not escape noticeably when opening.
- On vehicles installed with a compressor with no A/C clutch, the engine is only to be started following complete assembly of the refrigerant circuit (compressor always in operation as well). Refer to REFRIGERANT CIRCUIT, GENERAL PRECAUTIONS .
- So that the compressor with A/C Compressor Regulator Valve -N280- (without A/C clutch) is not damaged when the refrigerant circuit is empty, it is equipped with a secured oil supply. This means that approximately 40 to 50 cm³ of refrigerant oil remains in the A/C compressor. Refer to REFRIGERANT CIRCUIT, GENERAL PRECAUTIONS .

 NOTE:

As original parts are sometimes stored for lengthy periods and at different locations within the spare parts organization, it is entirely possible that gas will escape from some parts and not from others on initial opening (even in the case of identical original part numbers). Sealing caps at original part connections are therefore to be removed carefully and the nitrogen gas allowed to escape slowly.

The refrigerant circuit is equipped either with a restrictor and accumulator or with an expansion valve and receiver.

Seal open connections and pipes (to prevent absorption of moisture).

Always replace restrictor.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > NOT REPLACING RESERVOIR/FLUID RESERVOIR OR DRYER BAG/CARTRIDGE, CONDITIONS >

- After an accident when there is no damage on the reservoir/fluid reservoir.
- The repair was done quickly (not beyond the normal repair time) and no moisture has entered. The vehicle is not older than 5 years.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > REPLACING RESERVOIR/FLUID RESERVOIR OR DRYER CARTRIDGE, CONDITIONS >

- The refrigerant circuit was opened and the vehicle is older than 5 years.
- The refrigerant circuit has been opened for an indefinite period of time (slow leak).

- The repair exceeded the normal repair time and moisture has entered.
- Always replace the reservoir or dryer cartridge after flushing with compressed air, nitrogen or refrigerant R134a. Leave original parts in their packaging as long as possible to minimize the amount of moisture they absorb.
- The A/C compressor has locked up.
- The reservoir/fluid reservoir is damaged (accident).

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > COMPRESSOR REPLACEMENT >

-- After installing a new A/C compressor or fresh refrigerant oil has been filled into compressor (for example, after blowing through the A/C system), turn ribbed belt pulley of A/C compressor 10 rotations by hand before starting the engine. This prevents damage to the A/C compressor.

-- For 5 cylinder and 10 cylinder diesel engines, rotate A/C compressor 10 rotations by hand at overload protection. Then install A/C compressor. This prevents damage to the A/C compressor.

-- Start the engine with the A/C turned off (A/C clutch -N25- and A/C compressor regulator valve -N280- are not actuated).

-- Following engine idling speed stabilization, switch on A/C compressor and run it for at least 10 minutes at idling speed with maximum cooling output.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > EVAPORATOR, SPRAYING WITH PRESSURE CUP GUN AND SPRAY NOZZLE VAG 1538 >

Spray off the evaporator directly with Contra Sept using a spray nozzle (approximately 10 bar) Contra Sept neutralizes microbes and bacteria directly on the evaporator.

To make it possible to access the evaporator, some prework and different spray nozzles are needed, for example -V. A. G 1538/5-; -V. A. G 1538/6- or -V. A. G 1538/7-.

A vehicle-specific instruction booklet is included with the evaporator cleaning solution -D 600 100 A2-

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > EXTRACTION AND CHARGING SYSTEM SAFETY PRECAUTIONS >

- Make sure the shut-off valves are closed before connecting the charging system to the air conditioning system.
- Make sure the process is finished before disconnecting the charging system from the A/C system. This prevents any refrigerant from escaping into the atmosphere.
- Once the purified refrigerant from the charging system has been transferred to an external compressed-gas cylinder, close the hand shut-off valves at the cylinder and charging system.
- Do not expose charging system to moisture or use it in a wet environment.
- Disconnect from power supply before performing service work on the charging system.
- Never use an extension cable on account of the fire hazard. If the use of an extension cable is unavoidable, the minimum cross-section should be 2.5 mm².
- In case of fire, remove external cylinder.

- Entrained oil from the air conditioning system drawn by the suction unit into the measurement vessel supplied is subsequently to be transferred to a sealed container as it contains a small quantity of refrigerant. It must not be released into the environment.
- Following shutdown, service station is to be secured to stop it rolling away.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > HANDLING PRESSURE VESSELS >

- Secure vessels to prevent them falling over!

Secure upright cylinders to stop them falling over and cylinders lying flat to stop them rolling away.

- Do not throw vessels.

If dropped, the vessels could be so severely deformed that they rupture. The refrigerant evaporates immediately, liberating considerable force. Flying fragments of cylinders can cause severe injuries.

Valves may break off if cylinders are not properly transported. To protect the valves, cylinders are only to be transported with protective cap screwed on.

- Never store in the vicinity of radiators.

High temperatures may occur next to radiators. High temperatures are also accompanied by high pressures and the maximum permissible vessel pressure may be exceeded.

Temperature Warning

To avoid possible risk, pressure vessel regulations specify that vessels are not to be heated to in excess of 50°C (122°F).

Heating Warning

Do not heat with a naked flame under any circumstances. Localized overheating can cause structural changes in the vessel material, which then reduce its ability to withstand pressure. There is also a danger of refrigerant decomposition due to localized overheating.

Empty Containers

Empty refrigerant vessels must always be sealed to prevent the ingress of moisture. Moisture causes steel vessels to corrode. This weakens the vessel walls. In addition, rust particles entering into refrigeration systems from vessels will cause malfunctioning.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > HANDLING REFRIGERANT >

WARNING:

There is a danger of ice-up.

The refrigerant can then escape as a fluid or vapor.

Do not open containers, which store refrigerant.

Follow the instructions for the workplace. They should be displayed in the workplace.

If refrigerant vessels are opened, the contents may escape in liquid or vapor form. This process is intensified the higher the pressure in the vessel.

The pressure level is governed by two factors:

- The type of refrigerant in the vessel. The lower the boiling point, the higher the pressure.
- The temperature level. The higher the temperature, the higher the pressure.

Protective Eyewear

Put on protective goggles. They prevent refrigerant getting into the eyes, as this could cause severe injury from exposure to cold.

Protective Gloves and Clothing

Greases and oils dissolve readily in refrigerants. They would therefore destroy the protective layer of grease if allowed to come into contact with the skin. Degreased skin is however sensitive to the cold and germs.

Fluid Refrigerant and Skin Precaution

The refrigerant draws heat for evaporation from the surrounding area. Even if this is the skin. This may cause extremely low temperatures. Local frost bite may result (boiling point of R134a: -26.5°C (-15.7°F) at ambient pressure).

Do Not Breathe In Refrigerant Vapor



NOTE:

If highly concentrated refrigerant vapor escapes, it mixes with the surrounding air and displaces the oxygen necessary for breathing.

Smoking Hazard

A burning cigarette can cause refrigerant to decompose. The resultant substances are toxic and must not be inhaled.

Welding and Soldering on Refrigeration Systems

Before performing welding or soldering work on vehicles near the air conditioning system components, extract the refrigerant and remove the residue by flushing with compressed air and nitrogen.

The products of refrigerant decomposition due to the effect of heat are not only toxic, but may also have a highly corrosive effect on pipes and system components. They mainly take the form of hydrogen fluoride.

Pungent Odor

A pungent odor indicates that the products of decomposition mentioned above have already formed. Avoid inhaling these substances under all circumstances, as otherwise the respiratory system, lungs and other organs could be damaged.

First Aid

- Following contact with eyes or mucous membranes, immediately rinse with copious amounts of

running water and consult an eye specialist.

- Following contact with the skin, immediately remove affected clothing and rinse skin with copious amounts of water.
- Following inhalation of highly concentrated refrigerant vapors, immediately take the affected person into the open air. Call a doctor. Administer oxygen in the event of breathing difficulties. If the affected person has difficulty breathing or cannot breathe, tip head back and perform mouth to mouth respiration.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > REFRIGERANT R134A >

Vehicle air conditioning systems make use of the vaporization and condensation process. In this case, one works with a substance which boils easily, designated as refrigerant.

The refrigerant employed is tetrafluoroethane R134a, which boils at -26.5°C (-15.7°F) at a vapor pressure of 1 bar.

Refrigerant R134a Environmental Information

- R134a is a fluorocarbon and contains no chlorine.
- R134a has a shorter atmospheric life span than refrigerant R12.
- R134a does not damage the ozone layer. The ozone depletion potential is zero.
- The greenhouse potential of R134a (Global Warming Potential (GWP)) is approximately 1300 (the GWP of carbon dioxide is 1).
- The global warming effect of R134a is ten times less than that of refrigerant R12.

Vehicles manufactured after 1992 have air conditioning systems that use refrigerant R134a. This refrigerant does not contain chlorine and does not deplete the ozone layer.

Refrigerant R12 was used through 1992. Due to its chlorine atoms, this CFC has a high potential for depleting the ozone layer as well as a tendency to increase the greenhouse effect.

Conversions are offered for existing systems filled with the ozone-depleting substance R12.

Refer to Repair Information for A/C systems with refrigerant R12. This repair information is only available in hard copy.

For environmental protection reasons, refrigerants must not be released into the atmosphere. For laws and regulations, refer to LAWS AND REGULATIONS .

Refrigerant R134a Physical Data

Chemical formula	$\text{CH}_2\text{F}-\text{CF}_3$ or $\text{CF}_3-\text{CH}_2\text{F}$
Chemical designation	Tetrafluoroethane
Boiling point at 1 bar	-26.5°C (-15.7°F)
Solidification point	-101.6°C (-150.88°F)
Critical temperature	100.6°C (213°F)
Critical pressure	40.56 bar (absolute)

Critical Point

The critical point (critical temperature and critical pressure) is that above which there is no longer a boundary between liquid and gas.

A substance above its critical point is always in the gaseous state.

At temperatures below the critical point, all types of refrigerant in pressure vessels exhibit both a liquid and a gas phase, for example, there is a layer of gas above the liquid.

As long as there is still gas present in the container next to the fluid, pressure is dependent on ambient temperature. Refer to REFRIGERANT R134A VAPOR PRESSURE TABLE .



NOTE:

Different types of refrigerant are never to be mixed.
Only the refrigerant designated for the corresponding A/C system may be used.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM >
REFRIGERANT R134A CHARACTERISTICS >

The vapor pressure curves of R134a and other refrigerants are sometimes very similar, therefore it is not possible to make a certain distinction solely by pressure.

With R134a, the A/C compressor is lubricated with special synthetic refrigerant oils, for example, PAG oils (polyalkylene glycol oils).

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > TRADE
NAMES AND DESIGNATIONS >

Refrigerant R134a is currently available under the following trade names:

- H-FKW 134a
- SUVA 134a
- KLEA 134a



NOTE:

Different trade names may be used in other countries.

Of the wide range of refrigerants available, this is the only one which may be used for vehicles. The designations Frigen and Freon are trade names. They also apply to refrigerants which may not be used in automotive vehicles.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM >
PRODUCT CHARACTERISTICS >

Refrigerants used in motor vehicle air conditioning systems belong to the new generation of refrigerants based on chlorine-free, partially fluorinated hydrocarbons (H-FKW, R134a).

With regard to their physical properties, these are refrigerants which have been liquefied under pressure. They are subject to the regulations governing pressure vessels and use is only to be made of approved and appropriately marked containers.

Compliance with specific conditions is required to ensure safe and proper use.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > COLOR >

Like water, refrigerants are colorless in both vapor and liquid form. Gas is invisible. Only the boundary layer between gas and liquid is visible. (Liquid level in tube of charging cylinder or bubbles in sight glass). Refrigerant R134a fluid may appear colored (milky) in a sight glass. This cloudiness is caused by partially dissolved refrigerant oil and does not indicate a malfunction.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > VAPOR PRESSURE >

In a partially filled, closed vessel, the quantity of refrigerant evaporating from the surface equals the quantity returning to the liquid state as vapor particles condense. This state of equilibrium occurs under the influence of pressure and is often called vapor pressure. Vapor pressure is dependent on temperature. Refer to REFRIGERANT R134A VAPOR PRESSURE TABLE .

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > AFFECT ON METAL >

In its pure state, refrigerant R134a is chemically stable and does not corrode iron or aluminum.

Refrigerant impurities such as chlorine compounds however cause corrosion of certain metals and plastics. This can lead to blockage, leaks or deposits on the A/C compressor piston.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > CRITICAL TEMPERATURE/PRESSURE >

The refrigerant R134a remains chemically stable up to a gas pressure of 39.5 bar (corresponding to a temperature of 101°C (213°F). Above this temperature, the refrigerant decomposes (refer to Combustibility).

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > WATER CONTENT >

Only very small amounts of water are soluble in liquid refrigerant. On the other hand, refrigerant vapor and water vapor mix in any ratio.

Only a small drop of water may get into the refrigerant circuit. The dryer, dryer bag or dryer cartridge contained in the reservoir can absorb approximately 7 grams (0.25 oz.) of water. They are then saturated and cannot absorb any more water. If water is still present in the refrigerant circuit, it flows up to the expansion valve nozzle or restrictor and becomes ice.

The air conditioning system stops cooling.

Water destroys the air conditioner as it combines with other impurities at high pressures and temperatures to form acids.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM >

COMBUSTIBILITY >

Refrigerant is non-flammable. It actually has a fire resistant or fire extinguishing effect. Refrigerant decomposes when exposed to flames or red-hot surfaces. UV light (occurring for example during electric welding) also causes refrigerant decomposition. The resultant decomposition products are toxic and are not to be inhaled. However, irritation of the mucous membranes provides an adequate and timely warning.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > CHARGE FACTOR >

A vessel must have space for vapor as well as liquid. As the temperature rises, the liquid expands. The vapor-filled space becomes smaller. At a certain point, there will only be liquid in the vessel. Beyond this, even a slight increase in temperature causes great pressure to build up in the vessel as the liquid attempts to continue expanding despite the absence of the necessary space. The forces that result are strong enough to rupture the vessel. To prevent a vessel from being overfilled, the regulations regarding compressed gases specify how many kilograms of refrigerant that may be added to a vessel per liter of interior volume. Multiplying this filling factor with the interior volume gives the permitted filling capacity. The figure for refrigerant used in vehicles is 1.15 kg/liter.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > EVIDENCE OF LEAKS >

External damage, for example, can cause a leak in the refrigerant circuit. The small quantity of refrigerant escaping from minor leaks can be detected for example using an electronic leak detector or by introducing a leak detection additive into the refrigerant circuit. Electronic leak detectors are capable of registering leaks with refrigerant losses of less than 5 g per year. Use leak detectors designed for the type of refrigerant. For example, a leak detector for R12 refrigerant will not work with R134a because R134a refrigerant has no chlorine atoms so the leak detector will not respond to it.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > REFRIGERANT R134A VAPOR PRESSURE TABLE >

The vapor pressure table for every refrigerant is published in literature for refrigeration system engineers. This table makes it possible to determine the vapor pressure acting on the column of liquid in a vessel if the temperature of the vessel is known.

Because each refrigerant has its own characteristic vapor pressure table, refrigerant can be identified by measuring the pressure and temperature.



NOTE:

At absolute pressure, 0 bar corresponds to absolute vacuum. Normal ambient pressure (positive pressure) corresponds to 1 bar absolute pressure. 0 pressure corresponds to an absolute pressure of one bar on most pressure gauges (indicated by -1 bar below 0).

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

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM >
REFRIGERANT OIL >

Refrigerant oil mixes with the refrigerant (about 20 - 40%, depending on compressor type and amount of refrigerant) and circulates constantly in the system, lubricating the moving parts.

Special synthetic refrigerant oils, for example polyalkylene glycol (PAG) oil, are used in conjunction with R134a air conditioning systems. This is necessary as mineral oil, for example, does not mix with R134a. In addition, the materials of the R134a air conditioning system could be corroded as a result of mixture flowing through the refrigerant circuit under pressure at high temperatures or breakdown of the lubricating film in the compressor. Using non-approved oils can cause the HVAC system to malfunction. Only use approved oils.

 NOTE:

Do not store open containers of refrigerant oil because it attracts moisture.

Always keep oil containers sealed.

Do not use old refrigerant oil over again. Dispose of old oil. Ester-based oils are only intended for use in large systems, not in passenger vehicle systems.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > REFRIGERANT OIL CHARACTERISTICS >

The most important properties are a high degree of solubility with refrigerant, good lubricity, absence of acid and minimal water content. Only certain oils are permitted. For a list of approved refrigerant oils and capacities, refer to Maintenance, Diagnosis .

PAG oils, which are appropriate for refrigerant R134a, are highly hygroscopic and do not mix with other oils. Opened containers should therefore be closed again immediately to prevent ingress of moisture. Moisture and acids promote aging of refrigerant oil, causing it to become dark and viscous as well as corrosive towards metals.

 NOTE:

Only use oils approved for the A/C compressor in refrigerant circuits with refrigerant R134a. For capacities, refer to CAPACITIES .

Dispose of old oil.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM > SERVICING A/C SYSTEM >

 CAUTION:

Non-approved tools or materials such as leak sealing additives can cause damage or malfunctions in the system.

Only use tools and materials approved by the manufacturer.

The warranty is voided if non-approved tools or materials are used.

The purpose of this Repair Information is to provide foremen and mechanics with the basic knowledge needed to ensure expert working.



NOTE:

Expert knowledge is achieved by one who has taken part successfully in instructional training for example, AB160 or ST160, including trained experts.

This Repair Information also serves as instructional material.

It should also be available for presentation to the responsible supervisory agency on request.

Additional Information Sources

- Technical Service Handbook outlining action to be taken to rectify current problems.
- Repair Information for type-specific servicing work, refer to Air Conditioning .
- Sections of Self Study Program number 208 are no longer up-to-date. An example of this is the statement "The fluid reservoir is replaced each time the refrigerant circuit is opened". The following prerequisites apply. Refer to NOT REPLACING RESERVOIR/FLUID RESERVOIR OR DRYER BAG/CARTRIDGE, CONDITIONS .
- Video programs for in-dealership training.
- Special Tools and Workshop Equipment Information.
- Service Organization Volume 1 Additional Equipment.
- Repair information Air Conditioning with Refrigerant R12. Only hardcopies of this information are available for vehicles through MY 1993.
- The procedure for flushing the refrigerant circuit is selected in Volkswagen Service Net; Volkswagen TV; API Online; or Volkswagen TV Net; API/PKW under the book title Body and then the program from June 8, 2005 Refrigerant Circuit, Flushing, Golf Plus.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM >
ULTRASOUND A/C CLEANER -VAS 6189A- >

-- The Ultrasound A/C Cleaner -VAS 6189A- is placed in the front passenger footwell and sprays Aero-Clean. Aero-Clean neutralizes microbes and bacteria inside the heater and A/C unit.

The unit comes with Operating Instructions.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > LAWS AND
REGULATIONS > CHARGING SYSTEMS NOT REQUIRING A PERMIT >

Charging systems not requiring a permit are ones used for transferring compressed gases to mobile compressed-gas vessels for internal use only.

Note

Some A/C service units are charging systems not requiring a permit. When working with such equipment, the

refrigerant is not transferred to mobile compressed-gas vessels, but rather into a permanently installed charging cylinder with visible level gauge and float switch.

Recommendation

It is advisable to use a portable cylinder with visible level gauge and pressure relief valve for surplus refrigerant for internal use.

Attention must be paid to TRG 402 (technical regulations for compressed gases) when transferring compressed gases to other compressed-gas vessels.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > LAWS AND REGULATIONS > EXTRACTION SYSTEM GROUP CLASSIFICATIONS >

Group 3

Mobile extraction and charging systems for filling compressed-gas vessels permanently connected to the system.

The refrigerant or refrigerant/oil mixture is transferred to compressed gas vessels which are permanently connected to the mobile systems. In accordance with 3 Paragraph 5 No. 3 of pressure vessel regulations, compressed-gas vessels are classified as pressure vessels in this case.

The charging systems require:

- No permit
- No expert testing as the gas is transferred to compressed-gas vessels which are classed as being pressure vessels. (Systems used for transfer from these pressure vessels to compressed-gas vessels for supplying to third parties do require a permit and are subject to mandatory testing).



NOTE:

The A/C service and recycling units used in motor vehicle workshops are extraction and charging systems not requiring a permit (Group "3") but which are only to be operated by qualified personnel. Instructions for unit operation and maintenance can be found in the relevant manufacturer's documentation.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > LAWS AND REGULATIONS > LAWS AND REGULATIONS >



NOTE:

The laws and regulations listed below are applicable in Germany. Different or additional laws and regulations may apply in other countries.

Addresses in other countries can be obtained from the relevant authorities.

The effects of climate change can be seen worldwide. Protecting the climate is one of the most important responsibilities. However, this responsibility presents enormous challenges to all involved.

The Kyoto Protocol outlines worldwide goals regarding climate protection, among other things. In addition to target reductions of carbon dioxide, this protocol also outlines target reductions for fluorinated greenhouse gases such as refrigerant R134a due to their high potential of contributing to the greenhouse effect.

Numerous laws have been created for the automotive industry, for example at the European level. For example, chemical-climate protection regulations were put into effect on August 1, 2008 in Germany in order to define the European legislation in more detail.

- Provision (EU) no. 1005/2009
- Provision (EU) no. 842/2006
- Provision (EU) no. 706/2007
- Provision (EU) no. 307/2008
- Guideline 2006/40/EU
- Chemical-climate protection provision, recycling management and disposal regulations (for Germany)

Maintenance and repair work on the A/C system refrigerant circuit

All individuals performing maintenance and repair work on vehicle A/C systems must have completed a training program and be competent in the work required. Other regulations may apply in addition to those of the European Union.

The following general points apply

Operation, repair, decommissioning, take-back obligation

- When operating, repairing and decommissioning items that contain refrigerant, allowing the refrigerant to vent into the air is prohibited.
- Keep records about the quantities used during operation and maintenance so they can be presented to the authorities upon request. Other provisions may apply in countries that are not members of the EU.
- Distributors of the substances and preparations discussed above are obligated to accept these items back after use or to ensure they are accepted by a third party of their choosing.
- Maintenance and decommissioning of items containing refrigerant that are named in the legislation Substances and preparations named in this legislation may only be accepted by those with the necessary expertise and technical equipment.

Criminal offenses and infringements of the law

- Willfully or negligently venting refrigerant into the air when operating, repairing or decommissioning items that contain refrigerant constitutes a violation of the laws and legislation described above.

Technical Regulations For Compressed Gases (TRG) 400, 401, 402

Only excerpts concerning vehicle manufacturers and workshops are listed below.

TRG 400 (General Regulations For Charging Systems)

2. Definition of terms and explanations

2. 1 Charging systems

2.1.1 Charging systems are systems for filling mobile compressed-gas vessels. The charging system includes the premises and facilities concerned.

2. 4 Charging systems requiring a permit

Charging systems requiring a permit are ones used to transfer compressed gases to mobile compressed-gas vessels for supplying to third parties.

5 Charging systems not requiring a permit are ones used for transferring compressed gases to mobile compressed-gas vessels for internal use only.

TRG 401 (Installation Of Charging Systems)

Does not apply to vehicle manufacturers or workshops.

TRG 402 (Operation Of Charging Systems)

2. Employees and employee instruction

2. 1 Charging systems are only to be operated and maintained by personnel

- Who are 18 years of age and older
- Who possess the necessary technical knowledge
- Who can be relied upon to work diligently.

2. 2 Supervised work may also be performed by personnel that do not meet the requirements stipulated in item 2. 1, points 1 and 2.

2. 3 Employees are to be given instruction on the following topics before beginning work and at regular, appropriate intervals, however at least once a year:

- Hazards specifically associated with handling compressed gases
- Safety regulations, particularly the applicable TRG
- Procedures in the event of malfunction, damage and accidents
- The use of fire-extinguishing and protective equipment
- Operation and maintenance of the charging system according to the operating instructions.

Charging (a separate TRG applies to vessels from other countries and their charging)

A compressed-gas vessel is only to be filled with the compressed gas declared on it and the quantity must comply with the stipulated pressure, weight or volume data.

2. In the case of vessels approved for use with several types of compressed gas, the compressed gas with which it is to be filled and - if the compressed gas has a t_k greater than or equal to -10°C (14°F) (t_k = critical temperature) - the maximum permissible charging weight in line with TRG 104 No. 3. 3 must be marked on the vessel prior to connection for filling.

3. Compressed-gas vessels marked with the maximum permissible charge pressure in bar at 15°C (59°F) must be filled manometrically. If, at the time of filling, the temperature is not 15°C (59°F), the pressure corresponding to the prevailing temperature must be established; it must be ensured that the permissible

charge pressure at 15°C (59°F) is not exceeded in the compressed- gas vessel. The charged vessels are to be checked by way of random pressure measurements to determine possible overfilling.

4. Compressed-gas vessels on which the maximum permissible capacity is indicated by the net weight (filling weight, permissible weight of fill) in kilograms must be filled gravimetrically. The vessels are to be weighed during filling and subsequently subjected to a weight check on special scales to establish possible overfilling. Scales used for this purpose must be calibrated.

5. Under certain conditions, gases with a tk greater than or equal to 70°C (158°F) may be transferred volumetrically from compressed-gas vessels with a maximum volume of 150 l to compressed-gas vessels with a volume of maximum 1000 ccm. The stipulations of the TRG apply to the transfer of liquefied gas to cylinders used by workmen.

6. Vessels in vehicles for

(1) Gases with tk greater than or equal to +70°C (158°F)

(2) Industrial gas mixtures with tk greater than or equal to +70°C (158°F) or

Liquefied extremely low-temperature compressed gases may, contrary to item 4, be filled volumetrically if the charging system and/or the vessels is/are equipped with devices for measuring or limiting the volume of the charge and - with the exception of motor vehicle vessels as per item 3 - for measuring the temperature of the charge. When filling volumetrically, it must be ensured that the permissible charge weight indicated on the vessel is not exceeded. To determine possible overfilling, the filled containers are to be checked gravimetrically on a calibrated scale or - provided that the pressurized gases are not highly toxic - volumetrically. Volumetric checking requires the use of appropriate equipment with completely separate charging and checking devices.

7. Charging and check measurements are to be performed by different people. Check measurements must be performed immediately upon completion of the filling process.

8. Overfilled vessels must be drained immediately and in a safe manner until the permissible fill is attained. The compressed-gas fill is then to be determined again.

9. Items 4 to 7 do not apply to vessels for liquefied, extremely low-temperature compressed gases which are neither flammable nor toxic; this does not affect the provisions of road traffic legislation.

10. When filling compressed gas vessels with liquefied gases at charging temperatures less than or equal to -20°C (-4°F), the compressed gas vessel (if the vessel material has not been tested for temperatures less than or equal to -20°C (-4°F)) is not to be released from the charging system for transportation until the vessel wall temperature is greater than or equal to +20°C (68°F).

Recycling and Disposal Regulations

Specifications and rules for handling and disposing of refrigerants and refrigerant oils can be found in the chemical-climate protection provision and recycling and disposal regulations. These are valid in Germany. Different specifications and rules may apply in other countries.

Refrigerant, Keeping Records

The environmental statistics law requires records to be kept on the use of refrigerants.

Consequently, motor vehicle workshops may well have to provide the relevant local authorities with information on their use of refrigerant. It is therefore recommended to keep records of the quantities used during operation and maintenance (refrigerant log) and present them to the relevant authorities upon request.

 NOTE:

Other provisions may apply in countries that are not members of the EU.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > LAWS AND REGULATIONS > RECYCLING AND DISPOSAL REGULATIONS >

 NOTE:

The laws and regulations listed below are applicable in Germany. Different or additional laws and regulations may apply in other countries.

Addresses in other countries can be obtained from the relevant authorities.

Specifications and rules for handling and disposing of refrigerants and refrigerant oils can be found in the chemical-climate protection provision and recycling and disposal regulations. These are valid in Germany. Different specifications and rules may apply in other countries.

Refrigerant Disposal

Refrigerants intended for disposal are to be transferred to marked recycling containers, observing the permissible filling quantity. Refer to the chemical-climate protection provision and the recycling and disposal regulations in Germany. Different specifications and rules may apply in other countries.

Refrigerant Oil Disposal

Used refrigerant oils from systems employing halogenated hydrocarbons are to be disposed of as waste subject to special supervision. They are not to be mixed with other oils or substances. Proper storage and disposal must be ensured in line with local regulations. Refer to the chemical-climate protection provision and the recycling and disposal regulations in Germany. Different specifications and rules may apply in other countries.

Addresses in other countries can be obtained from the relevant authorities.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > LAWS AND REGULATIONS > REFRIGERANT CIRCUIT, CONVERTING R12 TO R134A AND SERVICING >

 NOTE:

The laws and regulations listed below are applicable in Germany. Different or additional laws and regulations may apply in other countries.

Addresses in other countries can be obtained from the relevant authorities.

For environmental reasons and on account of the corresponding legislation, refrigerant R12 can no longer be manufactured or supplied. Refrigerant R134a has been developed as a replacement for R12.

Air conditioning systems developed and designed for refrigerant R12 cannot however simply be charged with refrigerant R134a. To ensure trouble-free operation of the air conditioning system even after conversion, various components of the refrigerant circuit must be replaced.

A precise description of the conversion procedure and information on the servicing of converted refrigerant circuits can be found in Repair Information: Air conditioner with refrigerant R12 Parts 2 and 3. This repair information is only available in hard copy.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > LAWS AND REGULATIONS > REFRIGERANT, KEEPING RECORDS >



NOTE:

The laws and regulations listed below are applicable in Germany. Different or additional laws and regulations may apply in other countries.

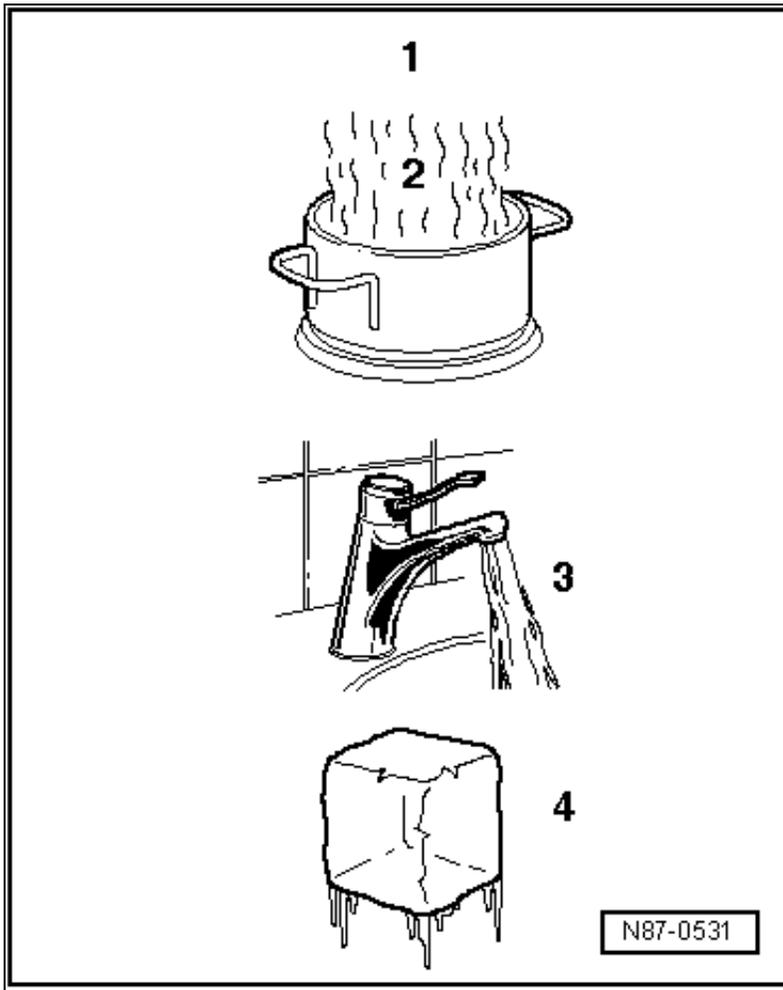
Addresses in other countries can be obtained from the relevant authorities.

Keep records about the quantities used during operation and maintenance so they can be presented to the authorities upon request. Other provisions may apply in countries that are not members of the EU.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM PRINCIPLES > PHYSICAL PRINCIPLES >

The four known states of water also apply to air conditioning system refrigerants.

Fig 1: Identifying Four States Of Water

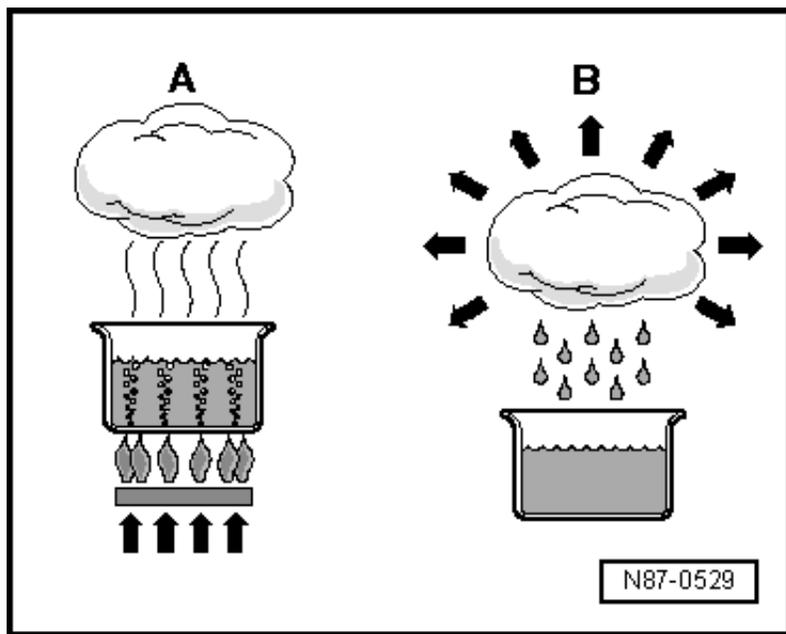


Courtesy of VOLKSWAGEN UNITED STATES, INC.

1. Gaseous (invisible)
2. Vapor
3. Fluid
4. Solid

When water is heated in a vessel (heat absorption), water vapor can be seen to rise. If the vapor is further heated through heat absorption, the visible vapor turns into invisible gas. The process is reversible. The warmth is extracted from gaseous water, vapor forms first, then water and then ice.

Fig 2: Identifying Diagram Of Heat Absorption & Heat Emission



Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Heat absorption

B - Heat emission

Heat Transfer

Every substance consists of a mass of moving molecules. The fast moving molecules of a warmer substance give off some of their energy to the cooler and thus slower molecules. As a result, the molecular motion of the warmer substance slows down and that of the colder substance is accelerated. This process continues until the molecules of both substances are moving at the same speed. They are then at the same temperature and no further heat exchange takes place.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM
PRINCIPLES > PRESSURE AND BOILING POINT >

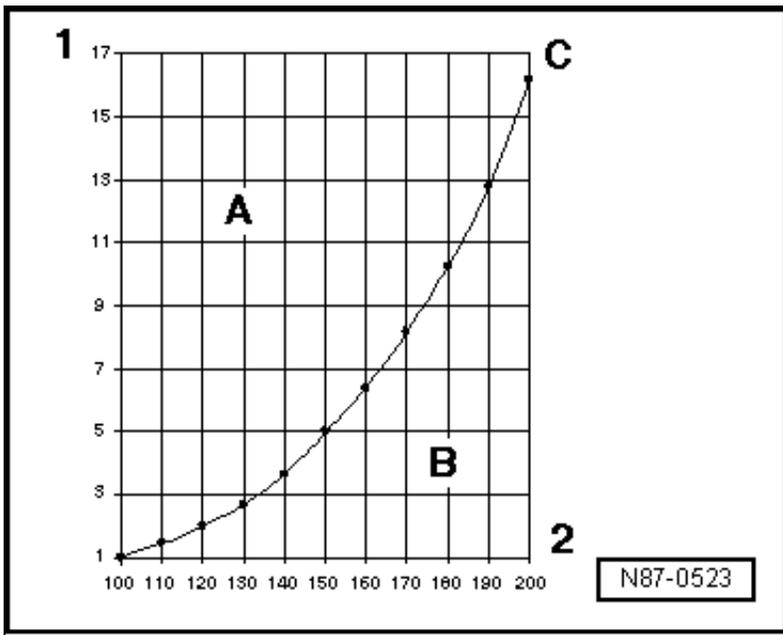
The boiling point given in tables for a liquid is always referenced to an atmospheric pressure of 1 bar. If the pressure acting on a fluid changes, its boiling point also changes.

For example, water boils at a lower temperature the lower the pressure.

The vapor pressure curves for water and refrigerant R134a show that, at constant pressure, reducing the temperature changes vapor to liquid (in the condenser) or that reducing the pressure causes the refrigerant to change from liquid to vapor (evaporator).

Vapor pressure curve of water

Fig 1: Identifying Vapor Pressure Curve Of Water Graph



Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Fluid

B - Gaseous

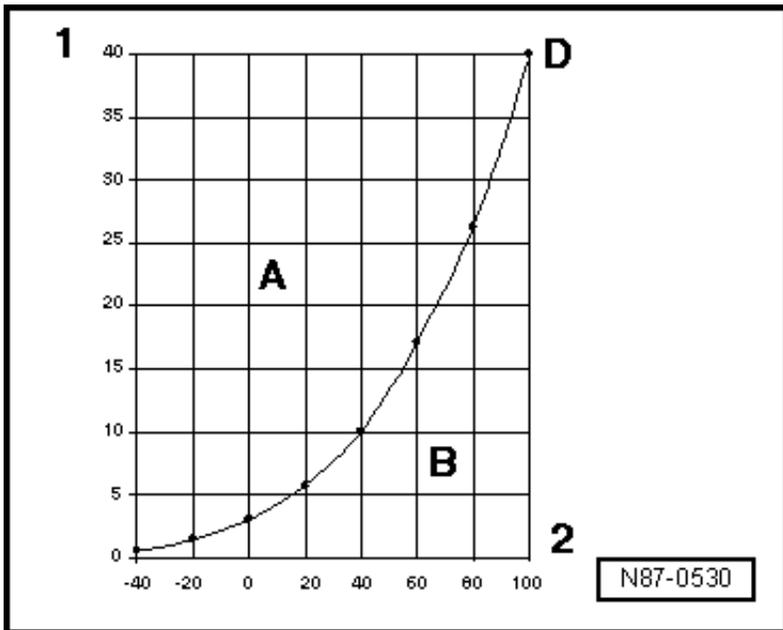
C - Vapor pressure curve of water

1 - Pressure acting on liquid in bar (absolute)

2 - Temperature in °C

Vapor pressure curve of refrigerant R134a

Fig 2: Identifying Vapor Pressure Curve Of Refrigerant R134a Graph



Courtesy of VOLKSWAGEN UNITED STATES, INC.

A - Fluid

B - Gaseous

D - Vapor pressure curve of refrigerant R134a

1 - Pressure acting on liquid in bar (absolute)

2 - Temperature in °C

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM
PRINCIPLES > COMFORT >

Being comfortable while driving leads to better concentration and safe driving. Air conditioning makes drivers and passengers more comfortable when temperatures or humidity are high. While opening the windows or sunroof or increasing the air flow can make vehicle occupants more comfortable, it also exposes them to more noise, draughts, exhaust, pollen and dust.

A well-designed heating and air conditioning system can increase comfort by controlling the temperature, humidity and air flow inside the vehicle. This is done both when the vehicle is moving and when it is stationary.

Air conditioning also offers these advantages:

- It cleans the air that enters the vehicle interior. The damp fins on the evaporator collect dust and pollen, which is then removed by condensation.
- Temperatures in a mid-size vehicle (for example: after a short drive, outside temperature 30°C in the shade and the vehicle exposed to sunlight).

	With A/C system	Without A/C system
Head area	23°C (73°F)	42°C (107°F)
Upper body area	24°C (75°F)	40°C (104°F)
Foot area	30°C (86°F)	35°C (95°F)

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > A/C SYSTEM
PRINCIPLES > A/C SYSTEM OPERATION >

The temperature in the passenger compartment depends on the amount of heat radiated through the windows and conducted by the metal parts of the body. In hot weather it is possible to achieve a more comfortable temperature for the passengers by pumping off some of the heat.

As heat spreads into cooler areas, the passenger compartment is equipped with a unit for generating low temperatures. In the unit, refrigerant is constantly evaporated. The heat required for this is extracted from the air flowing through the evaporator.

After absorbing heat, the refrigerant is pumped off through the compressor. The action of the A/C compressor increases the heat content and temperature of the refrigerant. Its temperature is then substantially higher than that of the surrounding air.

The warm refrigerant flows to the condenser. There, the refrigerant dissipates its heat to the surrounding air via the condenser due to the temperature gradient between the refrigerant and the surrounding air.

The refrigerant thus acts as a heat transfer medium. As it is to be reused, the refrigerant is returned to the

evaporator.

For this reason all air conditioning systems are based on the refrigerant circulation principle. There are however differences in the combination of aggregates.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > REFRIGERANT CIRCUIT AND COMPONENTS > REFRIGERANT CIRCUIT, GENERAL PRECAUTIONS >

- Follow the instructions for the workplace. They should be displayed in the workplace.
- Ensure absolute cleanliness when working.
- Wear work clothing, safety goggles and gloves when working with refrigerant and nitrogen.
- Turn on the exhaust gas ventilation system
- Use service station to discharge refrigerant circuit, only then open screw connections and replace malfunctioning components.
- Use caps to seal off opened assemblies and hoses to prevent ingress of moisture and dirt.
- Make exclusive use of tools and materials intended for refrigerant R134a.
- Be sure to close the container to prevent the refrigerant from absorbing moisture from the air.

-- Flushing refrigerant circuit with compressed air and nitrogen, refer to REFRIGERANT CIRCUIT, FLUSHING WITH COMPRESSED AIR AND NITROGEN .

-- Flush the refrigerant circuit with R134a refrigerant. Refer to REFRIGERANT CIRCUIT, FLUSHING WITH REFRIGERANT R134A .

On vehicles with A/C compressor without magnetic clutch:



NOTE:

The engine should only be started after assembling the refrigerant circuit.

If possible start engine only with a filled refrigerant circuit.

The A/C compressor is always driven by the ribbed belt pulley/torsion elastic clutch. It does not have a magnetic clutch.

If an A/C compressor locks-up the overload protection for the A/C compressor shaft is triggered. If no bumps are visible on the ribbed belt pulley/overload protection, the A/C compressor may be blocked. Another indicator is abraded rubber material in the area of the ribbed belt pulley/overload protection

The A/C compressor is equipped with a protected oil supply, this prevents A/C compressor damage in the event that the system is empty. This means that approximately 40 to 50 cm³ of refrigerant oil remains in the A/C compressor.

The engine may only be started when the refrigerant circuit is installed correctly. For example; if the refrigerant pipes are not connected to A/C compressor, when the engine is running the A/C compressor may heat up (via internal heat generation) so much that the A/C compressor will be damaged.

A/C Compressor Regulator Valve -N280- is not activated when the refrigerant circuit is empty and the A/C compressor idles with the engine.

If it is necessary to start the engine with a discharged refrigerant circuit:

Refrigerant circuit must be fully assembled.

At least 1/4 of the prescribed refrigerant oil must be in the A/C compressor.

Do not rev engine higher than 2000 RPM.

The engine should run less than 10 minutes.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > REFRIGERANT CIRCUIT AND COMPONENTS > O-RING SEALS >

- Only O-rings that are resistant to refrigerant R134a and refrigerant oil must be installed. Color coding of O-rings is no longer employed. Colored and black O-rings are used.
- Ensure inner diameter on seals used is correct.

Refer to Removal and Installation .

- The O-rings may be used one time only.
- Before installing O-rings, coat lightly with refrigerant oil (PAG oil).



NOTE:

When flushing components with compressed air and nitrogen, always extract the gas mixture escaping from the components with suitable extraction units (workshop extraction system).

After engine all service work, screw sealing caps (with seals) onto all connections with valve and service connections.

Before starting up A/C system. Observe vehicle specific filling capacities. Refer to Maintenance, Diagnosis .

Do not fill refrigerant, extract refrigerant present and refill the system.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > REFRIGERANT CIRCUIT

AND COMPONENTS > REFRIGERANT CIRCUIT PIPES AND HOSES >

The mixture of refrigerant oil and refrigerant R134a corrodes certain metals (for example copper) and alloys and dissolves some hose materials. Therefore use original replacement parts only.

Pipes and hoses are joined by threaded connections or special plug connectors.

 **NOTE:**

Observe specified torque for threaded connections, use appropriate release tools for plug connectors.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > REFRIGERANT CIRCUIT AND COMPONENTS > REFRIGERANT CIRCUIT PRESSURES AND TEMPERATURES >

 **WARNING:**

When performing work on refrigerant circuit, observe all generally applicable safety precautions and pressure vessel regulations.

The pressures and temperatures in the refrigerant circuit depend on the current operating conditions (such as engine RPM, coolant fan level 1, 2 or 3, engine temperature, A/C compressor on or off) as well as on the effects of outside influences (such as outside temperature, humidity, desired cooling output).

In vehicles with A/C compressor regulator valve -N280-, the pressure is modified on the low pressure side by the valve.

For this reason, values indicated in the following table are valid only as reference points. They are attained at an engine speed of 1500 to 2000 RPM and an ambient temperature of 20°C (68°F) after about 20 minutes.

The connections provided for measuring pressure for the manometer battery are located in the vehicle-specific refrigerant circuit.

Refer to Description and Operation .

At 20°C (68°F) with the engine not running, the pressure in the refrigerant circuit is 4.7 bar. Refer to REFRIGERANT R134A VAPOR PRESSURE TABLE .

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > REFRIGERANT CIRCUIT AND COMPONENTS > REFRIGERANT CIRCUIT, CONVERTING R12 TO R134A >

CFC refrigerants are no longer used in the automotive industry.

Converting refrigerant circuits from R12 refrigerant to R134a refrigerant and servicing converted circuits, refer to Repair Information Air conditioner with refrigerant R12 Parts 2 and 3. This repair information is only available in hard copy.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > REFRIGERANT CIRCUIT AND COMPONENTS > REFRIGERANT CIRCUIT, FLUSHING WITH COMPRESSED AIR

AND NITROGEN >



WARNING:

- Nitrogen can leak uncontrolled from the cylinder.
- Make exclusive use of pressure reducers for nitrogen cylinders (maximum work pressure 15 bar).
- Use appropriate emissions extraction units to draw off gas mixture escaping from components.

- In order to be able to force moisture and other contaminants out of refrigerant circuit, compressed air and nitrogen (to force moisture out of refrigerant circuit) are to be used.
- For the most part, blowing through the refrigerant circuit with compressed air and nitrogen requires significantly more work than flushing with refrigerant R134a. As flushing with refrigerant R134a cleans the components more efficiently, always flush in case of a complaint (blowing through should only be used for certain complaints and individual components).

Only individual components should be flushed if

- There is no possibility of flushing the refrigerant circuit with refrigerant R134a.
- Dirt or other contaminants are located in individual components of the circuit.
- Vacuum reading is not maintained on evacuating a leak-free refrigerant circuit (pressure build-up due to moisture in refrigerant circuit).
- Refrigerant circuit has been left open for longer than normal (for example following an accident).
- Pressure and temperature measurements in the refrigerant circuit indicate the likelihood of moisture.
- Stipulated by the vehicle-specific repair information. Refer to Removal and Installation following replacement of certain components.



NOTE:

Blowing compressed air and nitrogen through the refrigerant circuit does not achieve the level of cleanliness as flushing with refrigerant R134a. Flushing with refrigerant R134a loosens the refrigerant oil and the components are then cleaner. Refer to REFRIGERANT CIRCUIT, FLUSHING WITH REFRIGERANT R134A .

When blowing, working pressure must not exceed a maximum of 217 psi (15 bar), (also use a pressure reducer for compressed air if necessary).

-- Always flush components in direction opposite of refrigerant flow direction.

Restrictor, expansion valve, compressor, receiver and reservoir cannot be flushed with compressed air and nitrogen.

-- Remove dryer cartridge on condensers with dryer.

-- First blow out dirt with compressed air, then remove moisture from components with nitrogen.

-- Connect adapter to connect the pressure hose to the refrigerant circuit. Refer to ADAPTER FOR ASSEMBLING FLUSHING CIRCUIT and Removal and Installation .

Note the following points to prevent oil and moisture from entering the refrigerant circuit from the compressed air system.

- The compressed air must be routed through a compressed air purifier for cleaning and drying. Use is therefore to be made of filter and dryer for compressed air (included in scope of delivery as tool for painting work).
- For refrigerant lines with threads or union nut at connection, make use of Adapter -V. A. G 1785/1- up to Adapter -V. A. G 1785/8- for connection of 5/8" -18 UNF charging hoses. These adapters can be found in VW/Audi passenger vehicle adapter chest -VAS 6338/1- and Commercial vehicle adapter chest -VAS 6338/50-.
- On refrigerant pipes without thread or union nut on the connection, use adapter from VW/Audi passenger vehicle set adapter chest -VAS 6338/1- as well as Commercial vehicle adapter chest -VAS 6338/50- or a standard blower pistol with rubber mouthpiece.

 NOTE:

Compressed air/nitrogen emerging from components is to be drawn off by way of an appropriate system (for example workshop extraction system).

Certain contaminants cannot be removed or can only be removed insufficiently from the refrigerant circuit with compressed air. These contaminants can only be removed by flushing with refrigerant R134a. Refer to REFRIGERANT CIRCUIT, FLUSHING WITH REFRIGERANT R134A .

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > REFRIGERANT CIRCUIT AND COMPONENTS > REFRIGERANT CIRCUIT, FLUSHING >

 NOTE:

For vehicles in which no adapters fit on to the refrigerant pipes, a blower pistol with rubber mouthpiece is to be used to blow through individual components. Special care must be taken not to damage the connections (crushing or scratching).

Evaporator is to be flushed via the connection for low-pressure pipe (large diameter) after removing expansion valve or removing restrictor.

Always flush components in direction opposite of refrigerant flow direction.

Check expansion valve and replace if dirty or corroded.

If there are dark, sticky deposits in the components that cannot be removed with compressed air, replace these components.

Thin, light grey deposits on the insides of refrigerant pipes do not impair the function of the components.

After flushing, always replace receiver or reservoir and restrictor. Replace dryer cartridge or dryer on condensers with attached dryer.

00 GENERAL, TECHNICAL DATA > GENERAL INFORMATION > REFRIGERANT CIRCUIT AND COMPONENTS > REFRIGERANT CIRCUIT, FLUSHING WITH REFRIGERANT R134A >

Special tools and workshop equipment required

- Robinair A/C Service Unit -ROB134APF- or Rinsing device for refrigerant circuits -VAS6337/1-. The auxiliary function "Flush refrigerant circuit" and the refrigerant circuit flushing device required for it are present on these A/C service stations.
- VW/Audi passenger vehicle set adapter chest -VAS 6338/1-. Refer to ADAPTER FOR ASSEMBLING FLUSHING CIRCUIT .
- Commercial vehicle set adapter chest -VAS 6338/50-. Refer to ADAPTER FOR ASSEMBLING FLUSHING CIRCUIT .



CAUTION:

- If it is suspected that chemicals were added to the refrigerant circuit to seal leaks, do not connect the A/C service station and do not extract the refrigerant.
- Chemicals that seal leaks in the coolant circuit form deposits that affect the function of the A/C system and lead to failure of the A/C system and the A/C service station.
- Inform that customer that there are substances in the A/C system that are not approved by Volkswagen. This A/C system cannot be drained or serviced in the workshop.

 NOTE:

VW does not approve the use of chemicals to seal leaks in the refrigerant circuit.

Chemicals used to seal leaks in the refrigerant circuit often react with air and the moisture in it. They cause deposits in the refrigerant circuit and the A/C service station and malfunctions in valves and other components that they come in contact with. These deposits cannot be removed completely from the components, even by flushing.

Chemicals used to seal leaks in the refrigerant circuit usually cannot be detected from outside. The label that should be applied to identify it is often missing. Therefore be careful when working with it if you do not know its service history.

- Refrigerant circuit must be flushed with refrigerant R134a in order to force out contaminants (such as abraded material from a malfunctioning A/C compressor) as well as old refrigerant oil as efficiently and as cleanly as possible and without the need for extensive work.

 NOTE:

The procedure for flushing the refrigerant circuit is displayed in Volkswagen Service Net; Volkswagen TV; API Online; or Volkswagen TV Net; API/PKW under the book title Body and the program from June 8, 2005 Refrigerant Circuit, Flushing, Golf Plus.

The refrigerant circuit should be flushed with refrigerant R134a if

- Dirt or other contamination is in the refrigerant circuit.
- Vacuum reading is not maintained on evacuating a leak-free refrigerant circuit (pressure build-up due to moisture in refrigerant circuit).
- Refrigerant circuit has been left open for longer than normal (for example following an accident).
- The pressure and temperature measurements in the refrigerant circuit indicate the likelihood of moisture in the circuit.
- In the event of doubt about the amount of refrigerant oil in the circuit. If the A/C compressor should be reinstalled, the refrigerant should be drained from the compressor via the oil drain plug. To facilitate this, the ribbed belt pulley or magnetic clutch plate on the A/C compressor should be rotated by hand. After flushing, the entire quantity of refrigerant oil specified by, see Maintenance, Diagnosis should be added to the refrigerant circuit (50 grams directly in the A/C compressor). Note additional oil quantity for systems with a 2nd evaporator.
- A/C compressor had to be replaced on account of internal damage (for example noise or no output).

- Stipulated by the vehicle-specific repair information following replacement of certain components.

 NOTE:

If neither of the two A/C service stations listed above are available for use in the workshop, Refrigerant Circuit Flushing Device -VAS 6336/1- or Refrigerant Circuit Flushing Device -VAS 6337/1- (depending on the workshop A/C service station version) (minimum 7 kg refrigerant R134a in refrigerant bottle) can also be used to flush the refrigerant circuit. However, the flushing procedure must then be performed manually. Refer to FLUSHING SEQUENCE PROCEDURE (OCCURS AUTOMATICALLY ACCORDING TO A/C SERVICE STATION PROGRAM) .

In vehicles with screw-connections on refrigerant circuit, Adapter -V. A. G 1785/1- up to Adapter -V. A. G 1785/8- from VW/Audi passenger vehicle set adapter chest -VAS 6338/1- or Commercial vehicle set adapter chest -VAS 6338/50- may be used. In vehicles with screw-connections on A/C compressor and on accumulator, two of the Adapters -V. A. G 1785/8- are required.

A Charging hose -VAS 6338/31- with 5/8 -18 UNF connections and large internal diameter can be found in the adapter chests in order to be able to bridge components (it is commercially available).

Preparation

- Discharge refrigerant circuit. Refer to REFRIGERANT CIRCUIT , DISCHARGING WITH SERVICE STATION .
- Remove A/C compressor. Refer to Removal and Installation .

On a vehicle with restrictor and reservoir:

- Remove restrictor (specific to vehicle) and reconnect refrigerant pipes to each other. Refer to Removal and Installation .
- Remove reservoir (specific to vehicle). Refer to Removal and Installation and connect refrigerant pipes to each other (to do this, use adapter and Charge hose -VAS 6338/31-) from VW/Audi passenger vehicle set adapter chest VAS 6338/1. Refer to ADAPTER FOR ASSEMBLING FLUSHING CIRCUIT .

 NOTE:

The reservoir could be flushed, but it requires too much refrigerant due to its large volume. When this refrigerant is extracted, the reservoir ices up severely and this prolongs the extraction process significantly.