

Edition 03.2020

List of Workshop Manual Repair Groups

Repair Group 00 - General, Technical Data 87 - Air Conditioning



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Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

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00 – General, Technical Data

1 Safety Precautions

(Edition 03.2020)

 \Rightarrow "1.1 Safety Precautions when Working on Air Conditioning Systems Safety Precautions", page 1

 \Rightarrow "1.2 Safety Precautions when Handling Refrigerant", page 1

 \Rightarrow "1.3 Safety Precautions when Working on Vehicles with Start/ Stop System", page 2

 \Rightarrow "1.4 Safety Precautions when Working on Vehicles with High-Voltage System", page 2

 \Rightarrow "1.5 Safety Precautions when Working near High-Voltage Components", page 3

 \Rightarrow "1.6 Safety Precautions during Road Test with Testing Equipment", page 3

1.1 Safety Precautions when Working on Air Conditioning Systems Safety Precautions

Ignition sources are extremely dangerous and pose a risk of explosion

Ignition sources near the A/C system and refrigerant containers are extremely dangerous and pose a risk of explosion. Leaking refrigerant can ignite and lead to an explosion. Death or serious bodily injury by explosion.

- Never bring equilibrium convince or Aric to systems and practice or accept any liability containers.
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- Discharge electrostatic and prevent sparks resulting from striking tools and hot surfaces.

Risk of destroying the refrigerant lines.

The refrigerant lines can be destroyed by ripping through the inner foil.

 Never bend the refrigerant lines to a radius smaller than r = 100 mm.

1.2 Safety Precautions when Handling Refrigerant

Risk of asphyxiation and poisoning from the refrigerant

Dry coughing and nausea to suffocation and poisoning is possible do to refrigerant fumes.

– Never breathe in refrigerant fumes.

- Only perform procedures on the refrigerant circuit in well ventilated areas and store in refrigerant container.
- Never perform procedures in and near basement staircases or other below ground areas.
- Switch on the exhaust extracting system.

There is a risk of getting frostbite from the refrigerant.

Refrigerant can come out under pressure when working on the A/ C system. Frostbite on the skin and other parts of the body is possible.

- Wear safety gloves.
- Wear protective eyewear.
- Evacuate or drain refrigerant and open the refrigerant circuit immediately.
- If more than 10 minutes elapse after extracting or draining the refrigerant and the refrigerant circuit was not opened, extract or drain the refrigerant again. Pressure develops in the refrigerant circuit due to evaporation.

1.3 Safety Precautions when Working on Vehicles with Start/Stop System

There is a risk of injury from the engine starting unexpectedly.

The engine can start unexpectedly on vehicles with an activated Start/Stop System. A message appears in the instrument cluster indicating whether the Start/Stop System is activated.

- Deactivate the Start/Stop System: Turn off the ignition.

1.4 Safety Precautions when Working on Vehicles with High-Voltage System

🚺 DANGER

High voltage is extremely dangerous.

The high-voltage system is under high voltage. Severe bodily injury or death by electrocution or arcing is possible.

- When working on the high-voltage system, de-energize the high-voltage system.
- If procedures do not affect the high-voltage system directly, the high-voltage system should still be de-energized in some cases.
- For known procedures that require the high-voltage system to be de-energized. Refer to ⇒ Rep. Gr. 00; High-Voltage System Danger Classificationt.Copying for private or commercial purposes, in part or in whole, is not
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 Have an Audi/high+voltage.technician_orean Audi/high+voltage: by AUDI AG.
 expert de-energize the high-voltage system.

WARNING

There is a risk of injury from the engine starting unexpectedly.

On electric and hybrid vehicles an active ready mode is difficult to identify. Parts of the body can be pinched or pulled.

- Switch off the ignition.
- Place the ignition key outside of the vehicle interior.

Risk of injury due to an activated parking heater and A/C

The parking heater and A/C can switch on unintentionally on electric and hybrid vehicles with an activated parking heater and A/C. Parts of the body can be pinched or pulled by self-actuating radiator fans.

Deactivate the parking heater and A/C.

1.5 Safety Precautions when Working near High-Voltage Components

🚹 DANGER

High voltage is extremely dangerous ed by copyright. Copying for private or dommercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability The high-voltage system is under high-voltage. Severe bodily tion in this document. Copyright by AUDI AG.

injury or death by electrocution or arcing is possible if the highvoltage components and high-voltage cables are damaged.

- Perform a visual inspection of the high-voltage components and the high-voltage cables.
- Never use cutting, shaping, or sharp-edged tools near highvoltage components and high-voltage cables.
- Never weld, solder, use thermal bonding or hot air near highvoltage components and high-voltage cables.

Risk of damaging the high-voltage cables.

Misuse can damage the insulation of high-voltage cables or high-voltage connectors.

- Never support objects on the high-voltage cables and the high-voltage connectors.
- Never support tools on the high-voltage cables and the high-voltage connectors.
- Never sharply bend or kink the high-voltage cables.
- When connecting pay attention to the coding of the high-voltage connectors.

1.6 Safety Precautions during Road Test with Testing Equipment

There is a risk of personal injury if testing equipment is not secured properly.

If the front passenger airbag deploys during an accident, then testing equipment that is not secured properly can become a dangerous projectile.

- Secure the testing equipment to the rear seat with a strap.

or

 Have a second technician operate the testing equipment from the rear seat.



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2 Laws and Regulations

⇒ "2.1 Regulations and Directives", page 5

⇒ "2.2 Refrigerant Circuit, Filling with other Refrigerants", page

⇒ "2.3 Occupational Safety", page 6

2.1 Regulations and Directives

i Note

- The laws and regulations listed below are applicable in Germany. Different or additional laws and regulations may apply in other countries.
- The effects of climate change can be seen worldwide. Protecting the climate is one of the most important responsibilities or commercial purposes, in part or in whole, is not However, this responsibility presents experiments of the most important responsibility and a does not guarantee or accept any liability 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 global warming potential.
- Vehicles which were type-tested before 2011 with Refrigerant R134a may only be place on the market until 12/31/2016 (this applies to EU countries, countries outside of the EU can have other laws). From 01/01/2017 in EU countries only cars whose refrigerant circuit is filled with a refrigerant circuit with a GWP less that 150 can be brought into the market. Refrigerant R1234yf fulfills the specifications in the provision (EU) number 706/2007.

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 08/01/2008 in Germany in order to define the European legislation in more detail.

In the European community different regulations have been created for handling refrigerant for example:

- Provision (EU) number 1005/2009
- Provision (EU) number 2037/2000
- Provision EU number 517/2014
- Provision (EU) number 706/2007
- Provision (EU) number 307/2008
- Guideline 2006/40/EU

In Germany there are different laws have been created refrigerant for example:

- Chemical-climate protection regulations, recycling and disposal law
- TRG (technical regulations for compressed gases)



The refrigerant R1234yf is currently not named in the different laws and regulations. Due to its chemical composition it is to be



excepted that a revision of the corresponding laws and regulations will also be included. For this reason pay attention to and observe the laws and regulations which apply to the refrigerant R134a also when working with Refrigerant R1234yf.

Maintenance and Repair Work on the A/C System Refrigerant Circuit

Only technicians with verifications of there expertise according to provision (EU) number 307/2008 may perform repair and service procedures on the A/C system refrigerant circuit. (Applies to countries in which these provisions apply, in other countries other regulations or laws may apply.)

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 on the quantities used during operation and maintenance so they can be presented to the authorities upon request. A record sheet currently no longer needs to be kept in the EU due to a provision by the European Parliament in 2005. 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 preparrial purposes, in part or in whole, is not rations named in this legislation may only be accepted by AG does not guarantee or accept any liability those with the necessary qualification (expertise) and technisis document. Copyright by AUDI AG. cal equipment.

Recycling and Disposal Law as Well as Processing and Disposal of Contaminated Refrigerant and Refrigerant Oil

Pay attention to the applicable regulations and laws of the country.

2.2 Refrigerant Circuit, Filling with other Refrigerants

A/C systems which were developed and designed for Refrigerant R1234yf, must not be filled with other refrigerant such as R134a.



The refrigerant R134a my not be filled in vehicles which were place on the market with Refrigerant R1234yf according to the current legal situation.

2.3 Occupational Safety

- Laws for general safety precautions according to VBG (association of industrial professional associations) for example VGB 20 accident prevention regulations (UVV) for "refrigeration systems, heat pump and cooling equipment" and VGB 1 "general laws company obligations" and "insurance obligations".
- Pay attention to the work station related Owner's Manual.
- Only technicians with verifications of there expertise according to provision (EU) number 307/2008 may perform repair and

service procedures on the A/C system refrigerant circuit. (Applies to countries in which these provisions apply, in other countries other regulations or laws may apply.)



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3 Repair Information

⇒ "3.1 Guidelines for Clean Working Conditions", page 8

- ⇒ "3.2 Refrigerant Circuit Seals", page 8
- ⇒ "3.3 Refrigerant and Refrigerant Oil", page 9
- ⇒ "3.4 Using the Pressure Reservoir", page 11
- ⇒ "3.5 Refrigerant, Handling", page 12

3.1 Guidelines for Clean Working Conditions

Even Slight Contamination Can Cause Malfunctions for This Reason When Working on the a/C System Pay Attention to the Following Cleanliness Regulations:

- Immediately seal off any open lines and connections with clean plugs taken from the Engine Bung Set - VAS6122-, for example.
- Place removed parts on a clean surface and cover them with lint-free cloths.
- Carefully cover or seal opened components if repairs are not performed immediately.
- Only install clean parts: remove the replacement parts from their packaging just before installing them. Do not use any parts that have been kept out of packaging (for example, in a toolbox).
- Do not work with compressed air when the system is open.
- Protect any disconnected connectors from dirt and moisture, and only connect them when they are completely dry.

3.2 Refrigerant Circuit Seals

- Make exclusive use of seals which are resistant to refrigerant R1234yf and the related refrigerant oils. Color coding of the seals is no longer offered. Black and colored seals are used, for this reason only use seals which can be clearly assigned. Refer to the Parts Catalog.
- Seals which were developed for refrigerant R134a, are not always suitable for refrigerant R1234yf for this reason only use seals which can be clearly assigned. Refer to the Parts Catalog.
- The seals may be used only one time.
- Replace the seals after removing.
- Coat the seals with refrigerant oil before installing in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not quarantee or accept any liability.
- Make sure the seals are positioned properly on the pipe or in AG. the groove.
- Ensure cleanliness when working. Even the smallest contaminant, a hair for example, can cause a leak.
- Only install seals that are resistant to refrigerant R1234yf and the corresponding refrigerant oil. These seals can be colorcoded to eliminate the risk of interchanging. Refer to Parts Catalog.

The dimensions -a and b- are dependent on the component location of the seal. Refer to Parts Catalog.

Refer to \Rightarrow "2.2.15 Seals", page 50 for additional information and notes.

3.3 Refrigerant and Refrigerant Oil

 \Rightarrow "3.3.1 Important Repair Information for Refrigerant and Refrigerant Oil", page 9

⇒ "3.3.2 Refrigerant Oil", page 10

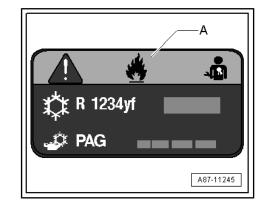
3.3.1 Important Repair Information for Refrigerant and Refrigerant Oil

- No refrigerant R134a may be filled in a A/C system for refrigerant R1234yf.
- No refrigerant R1234yf may be filled in a A/C system for refrigerant R134a.
- The specifically developed refrigerant oils for the refrigerant circuit with refrigerant R1234yf and R134a may only be used in a refrigerant circuit which was filled with another refrigerant when the corresponding approvals for this are available. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oil and Capacities for Refrigerant Oil (vehicle-specific repair manual).
- A/C service stations that come in contact with the refrigerant are only to be used for the intended refrigerant.
- An information label -A- 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.
- Depending on the version and the vehicle date of manufacture, the GWP value (global warming potential) for the refrigerant used may also be specified.
- To make sure that only Refrigerant R1234yf with a specific purity is extracted in the R1234yf A/C service station perform a gas analysis before discharging the refrigerant circuit. Refer to ⇒ "3.3 Refrigerant Gas Analysis, Performing", page 138.



Note

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not P If it is determined by the gas analysis that the refrigerant R1234yf is contaminated with another gas, it must be extracted from the refrigerant circuit and be analyzed, recycled or disposed of as a gas from an unknown composition according to the legal requirements. Refer to \Rightarrow "3.3 Refrigerant Gas Analysis, Performing", page 138 and \Rightarrow "6.2.17 Return of Contaminated Refrigerant R1234yf for Analysis, Preparation or Disposal", page 26.



3.3.2 Refrigerant Oil

Risk of acid burns due to atomized refrigerant oil. Eye or other body injury possible.

- Wear safety gloves.
- Wear protective eyewear.
- Never breath in atomized refrigerant oil.
- Refrigerant oil mixes with the refrigerant (about 10-40%, depending on compressor type and amount of refrigerant), circulates continuously in the circuit and lubricates the moving parts.
- In connection with R1234yf A/C system a specialized synthetic refrigerant oil for example polyalkylene glycol (PAG) oil which is matched to the refrigerant can be used as an additive. This is necessary because mineral oil for example does not mix with R1234yf a malfunction of this additive can lead to to an undesirable reaction with the refrigerant or the refrigerant circuit components. In addition, the components of the R1234yf A/C system could be affected if the mixture flows through the refrigerant circuit under pressure at high temperatures or the lubricating film in the A/C compressor tears. The use of non-approved oils can lead to the failure of the A/C system and exclusive use is therefore to be made of authorized refrigerant oils. Refer to the Parts Catalog.
- Type of oil for refrigerant R1234yf in motor vehicles: PAG oil with additive specified to refrigerant R1234yf (Poly-Alkylen-Glykol with specific additions).
- ◆ The most important properties are the high degree of solubility with refrigerant, good lubrication, no acid content and very minimal water content. For this reason only very specific oils may be used. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual) for a list of the approved refrigerant oils and capacities.
- PAG oils, which are appropriate for refrigerant R1234yf, are highly hygroscopic and do not always mix with other oils. For this reason only use approved refrigerant oils.
- Moisture and acids promote aging of refrigerant oil, causing it to become dark and viscous as well as corrosive towards metals. For this reason close containers with refrigerant oil toAG does not guarantee or accept any liability protect it from moisture, immediately seal opened containers document. Copyright by AUDI AG.
- Refrigerant oil, because of its chemical properties, must not be disposed of with engine oils or transmission oils. Dispose of refrigerant oil as a used oil of unknown origin (pay attention to local regulations).
- ◆ For refrigerant circuit with refrigerant R1234yf only the approved oil may be used for this refrigerant and the installed A/ C compressor. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oil and Capacities for Refrigerant Oil.
- ◆ Refrigerant oil which was developed for Refrigerant R134a is not suitable for refrigerant circuits with refrigerant R1234yf (a specific additive is missing). For this reason pay attention to the correct version. Refer to the Parts Catalog and the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oil and Capacities for Refrigerant Oil (vehicle-specific repair manual).

- ◆ Refrigerant oil which was developed for refrigerant R1234yf, can also be suitable for refrigerant circuits with refrigerant R134a. Pay attention to the notes. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- Do not use ester-based oils (POE oils), these are only for large system under other operating conditions (not for vehicle A/C systems).
- Do not store open containers of refrigerant oil because it is hygroscopic (attracts moisture).
- Always keep containers with refrigerant oil and the perfigerant or commercial purposes, in part or in whole, is not circuit closed.
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3.4 Using the Pressure Reservoir

Seal the Container and Store in a Well Ventilated Cool Area.

The refrigerant is heavier than air, gas leaks spread especially on the ground.

Protect from heat and direct sunlight, do not store in areas with temperatures above 50 $^\circ\text{C}$ (122 $^\circ\text{F}$).

Do not store near basements or other low laying areas.

Only store in well ventilated areas.

Keep the Container Away from Ignition Sources!

Do not smoke in areas where there is Refrigerant R1234yf. In addition take measures against electrostatic charge.

Secure Reservoirs to Prevent Them from Falling Over.

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

Do Not Throw Reservoirs.

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

To Protect the Valves, Cylinders Must Only Be Transported with the Cap Screwed On.

Valves may break off if cylinders are not properly transported.

Never Store near Heating Devices.

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

No Warming above 50 °C (122 °F)

To avoid possible risk, pressure vessel regulations specify that containers with refrigerant are not to be heated to in excess of 50 $^{\circ}C$ (122 $^{\circ}F$).

No Unmonitored Warming

Do not heat using an open flame under any circumstances. Localized overheating can cause structural changes in the container material, which then reduces its ability to withstand pressure. There is also a danger of refrigerant decomposition due to localized overheating.

Empty Containers, Sealing

Empty refrigerant containers must always be sealed to prevent the ingress of moisture. Moisture causes steel containers to cor-



rode. This weakens the container walls. In addition to this, rust particles that enter the refrigerant circuit of systems from containers will cause malfunctions.

3.5 Refrigerant, Handling

i Note

- The refrigerant has a faintly noticeable odor which is therefore mostly not perceptible.
- The refrigerant is heavier than air and falls to lower lying areas such as the work pit, basements, and deep spots and displaces the breathable air and oxygen. Remaining in oxygen deprived areas is life endangering.
- Liquid refrigerant for example from a leak evaporates at an ambient pressure of approximately 1 bar (14.5 psi) at roughly -29.4 °C (-20.92 °F). If the refrigerant evaporates on skin, it can cause cryogenic burning. Delicate organs, such as the cornea and mucous membranes are especially at risk. Excessive frostbite may be life threatening.
- Refrigerant gas is combustible, electrostatic discharge and sparks resulting from striking tools, hot surfaces and open flames can ignite a mixture of refrigerant R1234yf and the surrounding air. The refrigerant only burns if there is a burning supporting flame or in the area of a hot surface, the refrigerant flame goes out when for example the flam is no longer present.
- The refrigerant breaks down near flames or when it comes in contact with hot surfaces. There is a danger of becoming poisoned by the resulting toxic fumes if inhaled. A pungent odor indicates that the products of the 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.
- The specific dangers associated with the refrigerant, material data etc. can be found in the safety data sheets.
- Never weld or hard/soft solder components of a filled A/C system. This also applies to welding and soldering on the vehicle, if there is a risk that it may heat up components in the A/Cⁿ whole is not system. When performing paint work repairs the temperature of AG. 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 Measure:

Discharge the refrigerant circuit using the A/C service station.
 Refer to ⇒ "3 Working with A/C Service Station", page 134



Damaged or leaking parts of the air conditioner are never to be repaired by welding or soldering them; they are always to be replaced.

Refrigerant containers (for example, charging cylinders of A/C service station) must never be overfilled, subjected to excessive heat or exposed to direct sunlight.

Reason:

Refrigerant stretches when warmed.

Corrective Measure:

- When filling and storing compressed-gas containers (return bottles, recycling bottles etc.) the applicable regulations, technical regulations and laws must be observed.
- Reservoirs must never be completely filled with liquid refrigerant. Without sufficient room for expansion (gas cushion), reservoirs will rupture with devastating effects in the event of a temperature increase. Refer to <u>⇒ "6.2 Pyrotechnical Characteristics", page 20</u>.

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

Corrective Measure:

Evacuate systems and reservoirs before charging with refrigerant. Refer to <u>⇒ "3 Working with A/C Service Station", page 134</u>.



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4 Identification

⇒ "4.1 Refrigerant Circuit Information Label", page 14

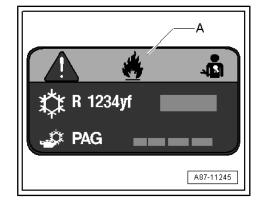
4.1 Refrigerant Circuit Information Label

- The information label -A- provides information about the type of refrigerant used, the refrigerant quantity filled at production and the refrigerant oil filled.
- Symbols on the information label -A- indicate the dangers which may occur when handling refrigerant and/or when working on the refrigerant circuit.
- Norms and standards can also be stated, such as the valid SAE standards defined in the USA. The SAE J639 describes the safety precautions for A/C systems in passenger vehicles. The SAE J842 explains that only approved components and materials may be used for refrigerant R1234yf, and SAE J2845 says that only trained and certified technicians may perform repair and service procedures on the A/C system refrigerant circuit.
- ◆ Depending on the version and the vehicle date of manufacture, the GWP value (global warming potential) for the refrigerant used may also be specified. Refer to ⇒ <u>"6.2.5 Refrigerant</u> <u>R1234yf</u>, <u>Environmental Information"</u>, <u>page 22</u>.
- ◆ Depending on the version and the vehicle date of manufacture there maybe be a CO2 equivalent "CO2 eq" of R1234yf given on the information label -A-. The value states what influence the quantity of R1234yf filled in this refrigerant circuit has on the Earth's atmosphere, if it completely escapes. The influence of carbon dioxide ("CO2") is used here as a reference value. Refer to ⇒ "6.2.5 Refrigerant R1234yf, Environmental Information", page 22.
- ◆ The capacities and the type of refrigerant oil specified on the information label -A- show the status at the time of vehicle production. The current applicable values are those in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).

i Note

Regardless of the specifications on the information label -A- always adhere to the country-specific applicable laws, legislation and standards. In the area of the European Union for example the applicable European Union laws apply. Refer to \Rightarrow <u>"2 Laws and Regulations", page 5</u>.

Specifies the type of refrigerant and designated capacity by Reference or commercial purposes, in part or in whole, is not to \Rightarrow Heating, Ventilation and Air Conditioning, Reput Greed00AUDI AG. AUDI AG does not guarantee or accept any liability Technical Data (vehicle-specific repair manual).





5 Technical Data

 \Rightarrow "5.1 Refrigerant Capacities", page 15

⇒ "5.2 Refrigerant Oil Capacity", page 15

5.1 Refrigerant Capacities

The capacity of the refrigerant R1234yf can be found in the vehicle-specific repair manual. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data; Refrigerant R1234yf Capacity .

i Note

- When charging the high-pressure side of refrigerant circuits, always use maximum amount of refrigerant (some of the refrigerant remains in the charging hoses).
- Make sure the A/C service station is on the same level as the vehicle (maximum difference 50 cm) when charging the refrigerant circuit. If a difference in height is too large, a difference between the amount of refrigerant displayed on the service station and the actual amount filled in the circuit may result (depending on the version of the A/C service station). The filling precision of the A/C service station may change.

5.2 Refrigerant Oil Capacity

⇒ "5.2.1 Approved Refrigerant Oils", page 15

⇒ "5.2.2 Refrigerant Oil Capacity", page 16

5.2.1 Approved Refrigerant Oils

- The special refrigerant oil (for use with refrigerant R1234yf refrigerant circuits only) is no longer commercially available. Refrigerant oils specifically designed for refrigerant R1234yf and each compressor can therefore be obtained from the replacement parts program. Refer to the Parts Catalog.
- The use of other refrigerant oils can lead to A/C system malfunctions. The stability and the chemical effect of other refrigerant oils not deigned for refrigerant R1234yf and the A/C compressor (which are not checked and approved) can lead to damage in the refrigerant circuit. In this way for example process, in part or in whole, is not unsuitable refrigerant oil can prematurely aged when operat guarantee or accept any liability ing the A/C system, due to unknown residues in the oil or duent. Copyright by AUDI AG. to missing additive and can effect and damage refrigerant circuit components. The ability to mix and the circulation with refrigerant R1234yf for the lubrication of the A/C compressor in the refrigerant circuit is not always available.
- Depending on the manufacturer of the A/C compressor different refrigerant oils are approved for the respective A/C compressor, for this reason pay attention to the correct allocation. Refer to the Parts Catalog.
- For Audi the current refrigerant oils are used: for vehicles with a "Sanden" or "Delphi/Mahle" A/C compressor the refrigerant oil part number G 052 535 M2 (external name SP A2). For vehicles with a "Denso" A/C compressor the refrigerant oil part number G 055 535 M2 (external designation ND 12). Refer to the Parts Catalog.
- Additional information can be found in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant

Oil and Capacities for Refrigerant Oil (vehicle-specific repair manual).

5.2.2 Refrigerant Oil Capacity

The capacity of the refrigerant oils can be found in the vehicle-specific repair manual. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oil and Capacities for Refrigerant Oil.

5.3 Safety Data Sheets

Refer to VW/Audi ServiceNet for the safety data sheets.



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6 Technical and Physical Principles

- ⇒ "6.1 A/C Technology Basic Principles", page 17
- ⇒ "6.2 Pyrotechnical Characteristics", page 20
- ⇒ "6.3 Product Characteristics", page 27
- \Rightarrow "6.4 A/C System Functions and Tasks", page 27
- ⇒ "6.5 Additional Information Sources", page 29

6.1 A/C Technology Basic Principles

- ⇒ "6.1.1 A/C System Physical Principles", page 17
- ⇒ "6.1.2 Refrigerant Pressure and Boiling Point", page 17
- <u>⇒ "6.1.3 Refrigerant Vapor Pressure Table", page 18</u>
- ⇒ "6.2 Pyrotechnical Characteristics", page 20

6.1.1 A/C System Physical Principles

The four known states of water also apply to A/C system refrigerants.

- 1 Gaseous (invisible)
- 2 Vapor
- 3 Liquid
- 4 Solid

When water is heated in a container (heat absorption), rising water vapor becomes visible. If the vapor continues to heat up through heat absorption, the visible vapor turns into invisible gas. The process is reversible. If heat is extracted from water in gaseous form -A-, it changes first to vapor -B-, then to water and finally to ice.

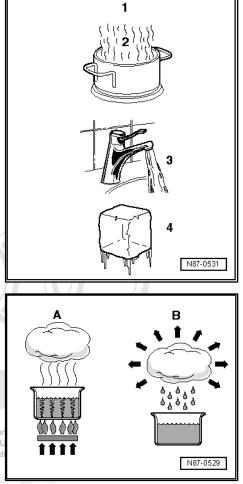
A - Heat Absorption

B - Heat Emission

Heat Always Transfers from Warm to Colde Matter opyright. Copying for private of permitted unless authorised by AUDI AG. Al

All matter consists of a mass of moving molecules. The fast mov-informating 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 more heat transfer occurs.

6.1.2 Refrigerant Pressure and Boiling Point



The boiling point given in tables for a liquid is always referenced to an atmospheric pressure (1 bar (14.5 psi) absolute pressure). If the pressure acting on a fluid changes, its boiling point also changes.



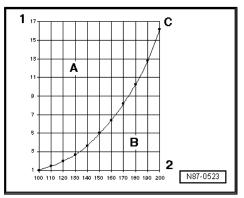
Pressure is measured in different units: 1 MPa (mega Pascal) corresponds to 10 bar (145 psi) positive pressure. 1 bar (14.5 psi) absolute pressure corresponds to 0 bar (0 psi) positive pressure and thus to the ambient pressure (atmospheric pressure).

It is known that, for example, water boils at a lower temperature when the pressure is lower.

The vapor pressure curves for water and refrigerant R123yf 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 (inside the evaporator).

Vapor pressure curve of water

- A Liquid
- B Gaseous
- C Vapor pressure curve of water
- 1 Pressure acting on liquid in bar (absolute)
- 2 Temperature in °C



Refrigerant R1234yf vapor pressure

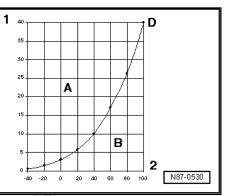
- A Liquid
- B Gaseous
- D Refrigerant R1234yf vapor pressure
- 1 Pressure acting on liquid in bar (absolute)
- 2 Temperature in °C

Note

The vapor pressure curves of both refrigerant R1234yf and R134a is similar across a large temperature range. The pressure difference between both refrigerants in the temperature range of 0 to 50 °C (32 to 122 °F) if for example only approximately 0.2 bar (3 psi) for this reason distinguishing the two refrigerants is not possible. Refer to ⇒ <u>"6.1.3 Refrigerant Vapor Pressure Table"</u>, <u>page 18</u> and ⇒ Refrigerant R134a Servicing; Rep. Gr. 87 ; A/C System, General Information (Refrigerant R134a Servicing, A/C System, General Information). Distinguishing is only possible by suitable sensors which can analyze the chemical characteristed purposes, in part or in whole, is not tics of the refrigerant. Refer to <u>set 0.2.16 Refrigerant R1234yf</u> does not guarantee or accept any liability Analysis", page 25.

6.1.3 Refrigerant Vapor Pressure Table

The vapor pressure tables for every refrigerant is published in the literature for the refrigeration system technicians. 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.

Each refrigerant has its own characteristic vapor pressure table which one can differentiate the refrigerants through their pressure and temperature measurement under a specific temperature range. Does not apply for differentiating between R1234yf and R134a, their pressures are too close. Refer to \Rightarrow "6.1.2 Refrigerant Pressure and Boiling Point", page 17.



- The possibility of distinguishing only applies to clean refrigerant whose vapor pressure differs sufficiently. If different refrigerants are mixed with a new refrigerant (for example three different refrigerants to refrigerant R407C) a vapor pressure will occur that corresponds to the vapor pressure of the refrigerant and its portion in the mixture.
- In terms of absolute pressure, "0 bar" (0 psi) corresponds to an absolute vacuum. Normal ambient pressure (positive presprosure) corresponds to "1 bar" (14.5 psi) absolute pressure. "0
- bar" (0 psi) pressure corresponds to an absolute pressure of one bar on most pressure gauges (indicated for example by "-1 bar" (-14.5 psi) below "0"(0 psi)).
- Pressure is measured in different units: 1 MPa (mega Pascal) corresponds to 10 bar positive pressure (145 psi). 1 bar (14.5 psi) absolute pressure corresponds to 0 bar (0 psi) positive pressure and thus to the ambient pressure (atmospheric pressure).
- ◆ The vapor pressure of both refrigerant R1234yf and R134a are very similar across a large temperature range for this reason no differentiation of the two refrigerants is possible. Refer to ⇒ "6.1.3 Refrigerant Vapor Pressure Table", page 18 and ⇒ Refrigerant R134a Servicing; Rep. Gr. 87; A/C System, General Information. Distinguishing is only possible by suitable sensors which can analyze the chemical characteristics of the refrigerant. Refer to ⇒ "6.2.16 Refrigerant R1234yf Analysis", page 25.

Temperature in °C (°F)	Pressure in Bar (psi) of R1234yf
-40 (-40 °F)	-0.40 (-5.80 psi)
-30 (-22 °F)	-0.01 (-0.15 psi)
-25 (-13 °F)	0.12 (1.74 psi)
-20 (-4 °F)	0.50 (7.25 psi)
-15 (5 °F)	0.83 (12.03 psi)
-10 (14 °F)	1.21 (17.55 psi)
-5 (23 °F)	1.65 (23.93 psi)
0 (32 °F)	2.15 (31.18 psi)
5 (41 °F)	2.72 (39.45 psi)
10 (50 °F)	3.36 (48.73 psi)
15 (59 °F)	4.09 (59.32 psi)
20 (68 °F)	4.90 (71.06 psi)
25 (77 °F)	5.81 (84.27 psi)
30 (86 °F)	6.82 (98.92 psi)
35 (95 °F)	7.93 (115.02 psi)
40 (104 °F)	9.17 (133.00 psi)

Temperature in °C (°F)	Pressure in Bar (psi) of R1234yf
45 (113 °F)	10.52 (152.58 psi)
50 (122 °F)	12.01 (174.19 psi)
55 (131 °F)	13.64 (197.83 psi)
60 (140 °F)	15.41 (233.50 psi)
65 (149 °F)	17.35 (261.64 psi)
70 (158 °F)	19.46 (282.24 psi)
75 (167 °F)	21.75 (315.46 psi)
80 (176 °F)	24.24 (351.57 psi)
85 (185 °F)	26.94 (390.73 psi)
90 (194 °F)	29.09 (421.92 psi)

6.2 Pyrotechnical Characteristics

<u>⇒ "6.2.1 Refrigerant R1234yf", page 20</u>

⇒ "6.2.2 Refrigerant R1234yf Possible Dangers", page 21

 \Rightarrow "6.2.3 Refrigerant R1234yf Physical and Chemical Characteristics", page 21

⇒ "6.2.4 Critical Point", page 21

 \Rightarrow "6.2.5 Refrigerant R1234yf, Environmental Information", page 22

 \Rightarrow "6.2.6 Refrigerant R1234yf Trade Names and Designation", page 22

⇒ "6.2.7 Refrigerant R1234yf Color and Odor", page 23

⇒ "6.2.8 Refrigerant R1234yf Vapor Pressure", page 23

⇒ "6.2.9 Refrigerant R1234yf Pyrotechnical Characteristics", page 23

 \Rightarrow "6.2.10 Refrigerant R1234yf, Affect on Metal and Plastic", page 23

<u>⇒ "6.2.11 Refrigerant R1234yf Critical Temperature/Pressure",</u> page 24

⇒ "6.2.12 Refrigerant R1234yf Water Content", page 24

 \Rightarrow "6.2.13 Refrigerant R1234yf Combustibility/Decomposition", page 24

⇒ "6.2.14 Refrigerant R1234yf Charge Factor", page 24 rotected by copyright. Copying for private or commercial purposes, in part or in whole, is not

permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability ⇒ "6.2.15 Refrigerant Circuit with Refrigerant R1234yf, Verificae ct to the correctness of information in this document. Copyright by AUDI AG. tions and Leaks", page 25

⇒ "6.2.16 Refrigerant R1234yf Analysis", page 25

 \Rightarrow "6.2.17 Return of Contaminated Refrigerant R1234yf for Analysis, Preparation or Disposal", page 26

6.2.1 Refrigerant R1234yf

- A/C systems in vehicles utilize the vaporization and condensation process. At the same time the substance (refrigerant) moves in a closed system.
- One works with a substance which boils easily, which is called here as R1234yf.
- The refrigerant R1234yf is known under different trade names (HFO 1234yf, Opteon 1234yf etc.).



- Only use approved refrigerant with the required purity. Refer to <u>⇒ "6.2.16 Refrigerant R1234yf Analysis", page 25</u>.
- Refrigerant R1234yf is a halogenated hydrocarbon compound with the chemical name "2,3,3,3-Tetrafluorprop-1-en" which boils at -29.4 °C (-20.92 °F) at a vapor pressure "1 bar (14.5 psi)" (corresponds to the ambient pressure).

6.2.2 Refrigerant R1234yf Possible Dangers

- ◆ The refrigerant is combustible in a specified mixture ratio with the surrounding air. Refer to ⇒ "6.2.3 Refrigerant R1234yf Physical and Chemical Characteristics", page 21 and ⇒ "6.2.13 Refrigerant R1234yf Combustibility/Decomposition", page 24.
- Quick evaporation of the fluid can cause frostbite.
- High vapor concentrations can cause headaches, dizziness, drowsiness, sleepiness and nausea and can even lead to loss of consciousness.

6.2.3 Refrigerant R1234yf Physical and Chemical Characteristics

The following are the most important characteristics and safety precautions for refrigerant R1234yf. The complete specifications can be found in the respective safety data sheets.

Chemical formula	CF3CF=CH2
Chemical designation	2,3,3,3-Tetrafluorprop-1-en, HFO-1234yf
Boiling point at 1 bar (14.5 psi)	-29.4 °C (-20.92 °F)
Solidification point	-152.2 °C (-241.96 °F)
Critical temperature	94.7 °C (202.46 °F)
Critical pressure	32.82 bar (476 psi) 33.82 bar (476 psi)
Self-ignition point	405 °C (761 °F) at 1.02 bar (14.79 psi)
Flammability Protected by copy permitted unless a with respect to	Flammable gas tota Cower flammability finit rooses in part or in who uthor cover all of a dupi AC does not guarantee or accept an the cover solution in this document. Copyright by AUD
	 Upper flammability limit 12.3% (volume)
Shape	Compressed liquid gas
Color	Colorless
Smell	Faint odor

6.2.4 Critical Point

The critical point (critical temperature and critical pressure) means the substance has gone above the point when 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 reservoirs exhibit both a liquid and a gas phase meaning 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 \Rightarrow <u>"6.1.3 Refrigerant Vapor Pressure Table", page 18</u>.

i Note

- The refrigerants used in vehicles must not be mixed. Only the refrigerant designated for the corresponding A/C system may be used.
- ◆ The vapor pressure of both refrigerant R1234yf and R134a are very similar across a large temperature range for this reason no differentiation of the two refrigerants is possible. Refer to ⇒ "6.1.3 Refrigerant Vapor Pressure Table", page 18 and ⇒ Refrigerant R134a Servicing; Rep. Gr. 87; A/C System, General Information . Distinguishing is only possible by suitable sensors which can analyze the chemical characteristics of the refrigerant. Refer to ⇒ "6.2.16 Refrigerant R1234yf Analysis", page 25.

6.2.5 Refrigerant R1234yf, Environmental Information

- R1234yf is a fluorocarbon and is colorless.
- R1234yf has a shorter atmospheric life span as R12 refrigerant and R134a and has a lower global warming effect (a lower global warming potential).
- R1234yf does not damage the ozone layer. The ozone depletion potential is zero (the same as R134a).
- The global warming potential of R1234yf (Global Warming Potential = GWP) is approximately 4 (the GWP of carbon dioxide = 1).
- The global warming effect of R1234yf is "350" times less than that of refrigerant R134a (global warming potential (GWP) of R134a is approximately 1400).

Note

- The global warming effect of substances is calculated through different processes by there effect in a time frame of 100 years, for this reason there are different values (for example on R134a a GWP between 1300 and 1450).
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 To make the influence of the greenhouse grasses on the rantee or accept any liability Earth's atmosphere comparable a conversion takes place with right by AUDI AG. the carbon dioxide equivalent. The refrigerant R1234yf has a global warming potential (GWP) of 4, for this reason 1 kg (2.2 lbs) of refrigerant R1234yf has approximately the same influence on the atmosphere as 4 kg (8.8 lbs) carbon dioxide ("CO2").

6.2.6 Refrigerant R1234yf Trade Names and Designation

Refrigerant R1234yf is currently available under the following brand names:

- H-FKW 1234yf
- HFO 1234yf
- "Opteon yf" or "Solstice yf" (example manufacturer names)



- Different brand names may be used in other countries.
- Of the wide range of refrigerants available, only this refrigerant may be used in motor vehicles. The designations Frigen and Freon are brand names. They also apply to refrigerants which are not allowed be used in motor vehicles.

6.2.7 Refrigerant R1234yf Color and Odor

- 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 charging cylinder tube or bubbles in sight glass). Refrigerant R1234yf fluid may appear colored (milky) in a sight glass. This cloudiness is caused by partially dissolved refrigerant oil and does not indicate a malfunction.
- The refrigerant is almost odorless, if refrigerant R1234yf leaks, depending on the ambient conditions a light odor of ether can be detected.

6.2.8 Refrigerant R1234yf Vapor Pressure

In a partially filled, closed reservoir, 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 pressure and is often called vapor pressure. Vapor pressure is dependent on temperature. Refer to \Rightarrow "6.1.3 Refrigerant Vapor Pressure Table", page 18.

6.2.9 Refrigerant R1234vf Pyrotechnical Protected by coloright. Copying for private or commercial purposes, in part or in whole, is not perm Characteristics OI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

- ◆ The vapor pressure curves of both refrigerant R1234yf and R134a are very similar across a large temperature range for this reason no differentiation of the two refrigerants is possible. Refer to ⇒ "6.1.3 Refrigerant Vapor Pressure Table", page 18 and ⇒ Refrigerant R134a Servicing; Rep. Gr. 87; A/C System, General Information . Distinguishing is only possible by suitable sensors which can analyze the chemical characteristics of the refrigerant. Refer to ⇒ "6.2.16 Refrigerant R1234yf Analysis", page 25.
- With R1234yf, the A/C compressor is lubricated with special synthetic refrigerant oils, for example PAG oils (polyalkylene glycol oils) which are specified to the refrigerant R1234yf, the A/C compressor and the operating conditions of the specified additions (additives).

6.2.10 Refrigerant R1234yf, Affect on Metal and Plastic

- In the right state refrigerant R1234yf is chemically stable and does not damage iron, aluminum and corresponding developed and suitable plastic.
- Contamination in the refrigerant circuit can lead to damage and destroying of the refrigerant circuit components.
- Unsuitable materials (for example seals and hoses which were not developed for refrigerant R1234yf and the refrigerant oil used) can also be damaged by clean refrigerant R1234yf or from refrigerant oil.
- Refrigerant contamination for example with chlorine compounds or under the effect of UV light can cause damage to metal and also plastic that was designed and checked for this refrigerant and the corresponding refrigerant oil. This can lead to blockage, leaks or deposits on the A/C compressor piston.

 Specific metals can be damaged from refrigerant R1234yf (for example finely distributed aluminum, zinc and magnesium)

6.2.11 Refrigerant R1234yf Critical Temperature/Pressure

Up to a gas pressure of 32.82 bar (476 psi) (this corresponds to a temperature of 94.7 $^{\circ}$ C (202.46 $^{\circ}$ F)) the quantity of refrigerant evaporating from the surface equals the quantity returning to the liquid state as vapor particles condense. Above this temperature/ this pressure there is no longer a boundary between liquid and gas.

6.2.12 Refrigerant R1234yf 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.
- Any water in the refrigerant circuit will be entrained in droplet form once the dryer in the receiver or reservoir is saturated (absorbed approximately 7g of (0.25 oz) water). This water flows up to the expansion valve nozzle or restrictor and turns to ice, and the A/C system no longer has a cooling effect.
- If the water present on the A/C compressor regulator valve turns to ice, it can lead to different complaints depending on the design of the A/C compressor (either the A/C system does not cool or it cools so strongly that the evaporator ices up).
- Water destroys the A/C system, because it can form acids when combined with other contaminants at high pressures and temperatures.

composition

6.2.13 Refrigerant R1234yf Combustibility/De-

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- The refrigerant R1234yf is combustible in a specified concentration in this document. Copyright by AUDI AG. tration in the surrounding air.
- The refrigerant R1234yf breaks down when exposed to flames and glowing or hot surfaces. UV light also causes refrigerant decomposition (UV light is a component of normal sunlight, it is also created for example by electric welding) the resulting decomposition products are toxic and must not be inhaled. However, irritation of the mucous membranes provides an adequate and timely warning.
- During decomposition specific dangerous products such as carbon monoxide, hydrogen fluoride and/or hydrocarbons can be created.

6.2.14 Refrigerant R1234yf Charge Factor

- When filling compressed-gas containers (return bottles, recycling bottles etc.) the applicable regulations, technical regulations and laws must be observed.
- Overfilling of compressed-gas containers (return bottles, recycling bottles etc.) must always be avoided. Overfilled compressed-gas containers do not have a sufficient gas cushion to accommodate the liquid expansion caused by the effects of heat. There is a danger of rupture.
- To ensure safety, make exclusive use of compressed-gas containers fitted with a safety valve.
- Return bottles and recycling bottles must either be weighed on a scale or the volume must be ensured while filling so that the container specified permitted weight for filling is not exceeded. The maximum permitted capacity is 80% of the max-



imum refrigerant fill weight of the return bottles and recycling bottles specified fill weight or 70% of the maximum fill volume (charge factor, the respective smaller value always applies). Explanation: it cannot be determined if along with the refrigerant the return and recycling bottles were filled with refrigerant oil.

- A reservoir must have space for vapor as well as liquid. As the temperature rises, the liquid expands. The space filled with vapor decreases. At a certain point, there will only be liquid in the reservoir. Beyond this, even a slight increase in temperature causes extremely high pressure to build up in the reservoir, because the liquid will continue to expand even though there is not enough space for it. The forces that result are strong enough to rupture the reservoir. To prevent a reservoir from being overfilled, the regulations regarding compressed whole, is not gases specify how many kilograms of refrigerant may be accept any liability added to a reservoir per liter of interior volume. Multiplying this UDLAG, charge factor by the interior volume gives the permitted capacity. The figure for refrigerant used in vehicles is 1.15 kg/ liter.
- Because contaminated refrigerant can have another density as clean refrigerant R1234yf always pay attention to the maximum permitted charge factor.

6.2.15 Refrigerant Circuit with Refrigerant R1234yf, Verifications and Leaks

- The refrigerant circuit can leak for example due to external damage by the use of unsuitable or contaminated refrigerant or due to unapproved materials in unsuitable components.
- 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 can recognize leaks with refrigerant losses of less than 5 grams (0.17 oz) per year.

i Note

Use leak detectors designed for the type of refrigerant. Leak detectors for R12 refrigerant are not suitable for R1234yf, because these leak detectors do not always respond. Also leak detectors only for refrigerant R134a are not suitable for R1234yf because refrigerant R1234yf has a different chemical composition than R134a, so this leak detector will not respond or will only respond to a high concentration of refrigerant in the air. Refer to the Parts Catalog.

6.2.16 Refrigerant R1234yf Analysis

It is necessary for the operation of the A/C system that the refrigerant used has a certain purity.



- Faulty gas analysis is possible due to air in the refrigerant hose or not following the procedure of the gas analysis according to the Owner's Manual.
- Pay exact attention to the gas analyzer/A/C service station Owner's Manual.
- Evacuate the refrigerant hose from the A/C service station before connecting the service couplings to the refrigerant circuit/

on the gas bottle with refrigerant R1234yf. Refer to the gas analyzer/A/C service station Owner's Manual. Refer to > <u>"3.3 Refrigerant Gas Analysis, Performing", page 138</u> .

Contamination with other refrigerants or gases can case damage and lead to failure of the A/C system and the A/C service station.

Contaminated refrigerant must be analyzed as a gas of an unknown composition according to the legal requirements and then recycled (or disposed). Refer to \Rightarrow "3.3 Refrigerant Gas Analysis, Performing", page 138



Return the contaminated refrigerant R1234yf for analysis to the refrigerant supplier. If because of the damage on the refrigerant circuit, which has already occurred or is expected it must be known with which foreign substance the refrigerant is contaminated, perform the corresponding claim to request the analysis findings. Refer to = "6.2.17 Return of Contaminated Refrigerant <u>R1234yf for Analysis, Preparation or Disposal", page 26</u>.

The following values apply for a gas analysis of clean refrigerant R1234yf:

- The extracted refrigerant gas is made up of a minimum of 95% ٠ refrigerant R1234yf.
- The portion of foreign gases (oxygen, nitrogen, steam, and other refrigerants) is smaller than 5%.



Note

So that fluids components (for example drops of refrigerant oil) in the extracted refrigerant gas does not lead to a faulty result of the gas analysis, a separator (filter) is installed in the gas analyzer which separates the fluid drops. Replace the separator according to the specification of the gas analyzer for example the Owner's Manual belonging to the A/C service station. Refer to the Gas Analyzer Owner's Manual or Owner's Manual A/C service station.

6.2.17 **Return of Contaminated Refrigerant** R1234yf for Analysis, Preparation or Disposal

- Pay attention to the legal requirements for returning contaminated refrigerant that is no longer used for analysis, processing or disposal. Refer to <u>⇒ "2 Laws and Regulations", page</u> Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not <u>5</u>. permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
- For the disposal of refrigerant oil that is holonger used pay in this document. Copyright by AUDI AG. attention to the same legal requirements. Refer to = "2 Laws and Regulations", page 5
- For environmental protection reasons, refrigerants must not be released into the atmosphere. Refer to \Rightarrow "2 Laws and Regulations", page 5.
- If it is determined by the gas analysis that the refrigerant R1234yf is contaminated with another gas, it must be extracted from the refrigerant circuit and returned to be analyzed, recycled or disposed of to the gas supplier as a gas from an unknown composition according to the legal requirements. Refer to ⇒ "3.13 Contaminated Refrigerant, Filling in Recycling Container for Analysis, Processing, or Disposal", page 162.

Note

Return the contaminated refrigerant R1234yf for analysis to the refrigerant supplier. If because of the damage on the refrigerant circuit, which has already occurred or is expected it must be known with which foreign substance the refrigerant is contaminated, perform the corresponding claim, for requesting the analysis findings. Refer to \Rightarrow "3.4 Refrigerant Circuit, Discharging", page 141.

6.3 Product Characteristics

The refrigerant R1234yf used in motor vehicle air conditioning systems belong to the new generation of refrigerants based on chlorine-free, partially fluorinated hydrocarbons.

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

Compliance with specific conditions is required to ensure safe and proper use. Refer to \Rightarrow "1 Safety Precautions", page 1.

6.4 A/C System Functions and Tasks

⇒ "6.4.1 Function", page 27

 \Rightarrow "6.4.2 Comfort", page 27

⇒."6.4.3 Environmental Information", page 28, in part or in whole, is not

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- 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 the heat, the refrigerant is pumped through the A/C 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 hot refrigerant flows to the condenser. There, the refrigerant releases its heat through the condenser to the surrounding air due to the temperature difference between the refrigerant (condenser surface) and the surrounding air.
- The refrigerant thus acts as a heat transfer medium. Since it is to be reused, the refrigerant returns to the evaporator.
- ◆ For this reason, all A/C systems are based on the refrigerant circulation principle. However there are differences in the makeup of the assemblies. Refer to ⇒ "2.1 System Overview Refrigerant Circuit", page 31.

6.4.2 Comfort

 Being comfortable while driving leads to better concentration and safe driving. An A/C system makes drivers and passengers more comfortable especially when temperatures or hu-

midity are high. While open windows, an open sunroof or an increased airflow can make vehicle occupants feel more comfortable, it also exposes them to more noise, drafts and unhindered entry of exhaust, pollen and dust.

A well-designed heating and air conditioning system can in-crease 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.

The A/C system also offers these advantages:

- Drying the air in the vehicle interior (on the cold evaporator the humidity condenses and is routed as condensation water, at the heater core for the heater the air is warmed back to preset temperature, from this the proportion of water in the air is lowered and the relative humidity is lowered).
- Additional cleaning of the air entering the vehicle interior (dust AUDI AG. AUDI AG does not guarantee or accept any liability and pollen, for example which may have already passed the dust and pollen filter, are washed out by the moist fins of the evaporator and removed with the condensation water).
- Temperatures in a mid-size vehicle (for example: after a short drive, outside temperature 30 °C (86 °F) in the shade and the vehicle exposed to sunlight).

	With A/C System	Without A/C System
Head area	23 °C (73.4 °F)	42 °C (107.6 °F)
Upper body area	24 °C (75.2 °F)	40 °C (104 °F)
Foot area	30 °C (86 °F)	35 °C (95 °F)

6.4.3 Environmental Information

- Until roughly 1992, refrigerant R12 was used for A/C systems. Due to its chlorine atoms, this CFC has a very high potential for depleting the ozone layer as well as a tendency to increase the greenhouse effect.
- From 1992 the A/C systems in newly manufactured cars have been successively converted from R12 refrigerant to refrigerant R134a. This refrigerant does not contain chlorine and does not deplete the ozone layer. Do to its high global warming potential of 1400 (Global Warming Potential = GWP) it may no longer be used from 01/2011 in new type-approved vehicles. Vehicles which were type-tested before 2011 with Refrigerant R134a may be place on the market until 12/31/2016 (this applies to EU countries, countries outside of the EU can have other laws).
- After 01/01/2011 only vehicle whose refrigerant has a GWP less than 150 filled in the refrigerant circuit will receive a new type approval. The refrigerant R1234yf has a GWP of approximately 4 and and is significantly under the specified value.
- From 2011 the A/C systems in newly manufactured cars have been successively converted from refrigerant R134a to refrigerant R1234yf. This refrigerant has a global warming potential of approximately 4, the global warming potential of carbon dioxide = 1 (Global Warming Potential = GWP) and for this reason has a much smaller impact on the Earth's atmosphere than refrigerant R134a.
- Conversion programs were developed and are available for old existing systems filled with the ozone-depleting substance R12. Refer to Repair Manual for A/C Systems with Refrigerant R12 (this repair manual is only available in hard copy).
- The refrigerant R134a may according to the current legal situation be filled on vehicles which were type-tested with refrigerant R134a (or in vehicles retrofitted from R12 refrigerant to



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refrigerant R134a) until their decommissioning. For this reason retrofitting the A/C system from refrigerant R134a to refrigerant R1234yf is currently not available. Refer to \Rightarrow Refrigerant R134a Servicing; Rep. Gr. 87; Refrigerant R134a Capacities, Refrigerant Oil and Approved Refrigerant Oil Capacities.

- ◆ For environmental protection reasons, refrigerants must not be released into the atmosphere. Refer to ⇒ "2 Laws and Regulations", page 5.
- Refrigerant R1234yf is chemically stable in a closed system. In the Earth's atmosphere it decomposes after a short time from the influence of UV light (within approximately 14 days) into non-hazardous compounds for the Earths atmosphere (for this reason the GWP of 4).

6.5 Additional Information Sources

- Repair manual for model-specific maintenance. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual) and ⇒ Wiring diagrams, Troubleshooting & Component locations.
- Technical Service Handbook (HST) outlining action to be taken to rectify current problems
- Self-study program, video programs for in-dealership training and VW/Audi TV programs about the A/C system
- The specific dangers associated with the refrigerant, material data etc. can be found in the safety data sheets.
- Special tools and workshop equipment needed to service the A/C system. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- ◆ For vehicles who refrigerant circuit is filled with refrigerant R134a (vehicles with a type approval which was released before 12/31/2010 and until 12/31/2016 for those which were/are place on the market for the first time. Refer to ⇒ "2 Laws and <u>Regulations", page 5</u>.

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87 – Air Conditioning

1 Safety Precautions

Observe the safety instructions. Refer to \Rightarrow "1 Safety Precautions", page 1.



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2 Refrigerant Circuit

⇒ "2.1 System Overview - Refrigerant Circuit", page 31

 \Rightarrow "2.2 General Description - Refrigerant Circuit Components", page 36

- ⇒ "2.3 Possible Concerns", page 60
- ⇒ "2.4 Leaks, Finding", page 63
- ⇒ "2.5 Components, Replacing", page 71
- ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86
- ⇒ "2.7 Pressure, Checking with Pressure Gauge", page 132

2.1 System Overview - Refrigerant Circuit

⇒ "2.1.1 System Overview - Refrigerant Circuit with Expansion Valve and Receiver/Dryer", page 31

⇒ "2.1.2 System Overview right Refrigerant Circuit with Refrigerant or in whole, is not Circuit and Reservoit specified by ADDI AC. ADDI AG does not gualantee or accept any liability Circuit and Reservoit specified by ADDI AG.

 \Rightarrow "2.1.3 System Overview - Refrigerant Circuit with Electrically-Driven A/C Compressor (with or without Battery Cooling Module)", page 34

2.1.1 System Overview - Refrigerant Circuit with Expansion Valve and Receiver/ Dryer



- The arrows indicate the refrigerant flow direction.
- The following illustration shows a refrigerant circuit with two evaporators and an internal heat exchanger as an example.
- ♦ The layout of the refrigerant circuit is vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

HD = High Pressure Side

ND = Low Pressure Side

1 - A/C Compressor Regulator Valve - N280-

2 - A/C Compressor

3 - Belt Pulley

- Depending on the version a A/C Clutch N25is installed in the belt pulley. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Depending on the version instead of the belt pulley a drive unit can also be present. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

4 - Pressure Relief Valve

5 - Refrigerant Pressure Sensor

❑ Vehicle-specific version. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit.

6 - Condenser (with Receiver/ Dryer)

7 - Receiver/Dryer

- Installed on a condenser or in the condenser. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- □ With dryer cartridge

8 - Service Connection - High Pressure Side

With closure cap

9 - Refrigerant Line with Inner Heat Exchanger

10 - Front Expansion Valve

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11 - Front Evaporator

D Evaporator in the front heater and A/C unit (installed under the instrument panel)

12 - Service Connection - Low Pressure Side

With closure cap

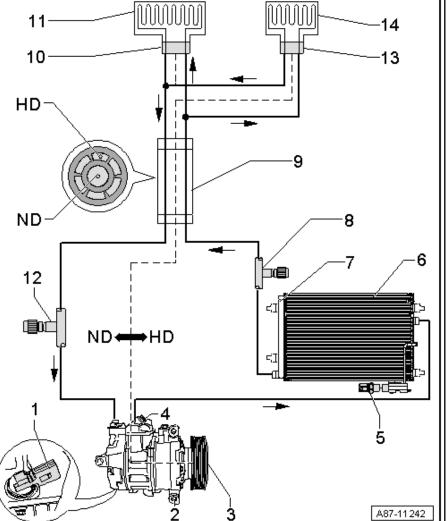
13 - Rear Expansion Valve

Only present in vehicles with a rear A/C unit (optional equipment)

14 - Rear Evaporator

Only present in vehicles with a rear A/C unit (optional equipment)

2.1.2 System Overview - Refrigerant Circuit with Refrigerant Circuit and Reservoir



Note

- The arrows indicate the refrigerant flow direction.
- The following illustration shown a refrigerant circuit with an evaporator as an example.
- This layout of a refrigerant circuit is not planned at this time for VW/Audi.
- ♦ The layout of the refrigerant circuit is vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

HD = High Pressure Side

ND = Low Pressure Side

1 - A/C Compressor Regulator Valve - N280-

2 - A/C Compressor

3 - Belt Pulley

- Depending on the version a A/C Clutch N25is installed in the belt pulley. Refer to - Heating, Ventilation, and Atro-Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- □ Depending on the version instead of the belt pulley a drive unit can also be present. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

4 - Pressure Relief Valve

5 - Condenser

6 - Refrigerant Pressure Sensor

❑ Vehicle-specific versions. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

7 - Service Connection - High Pressure Side

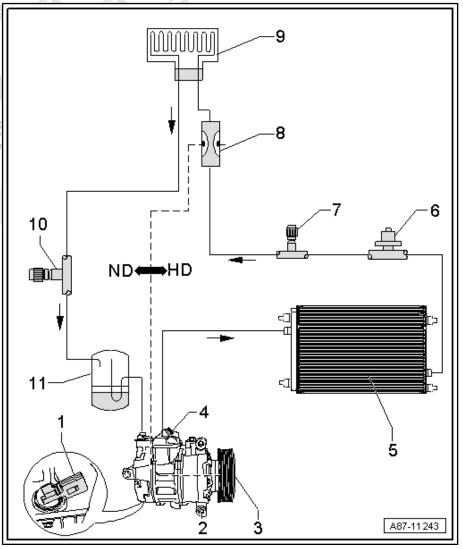
With closure cap

8 - Restrictor

9 - Evaporator

• Evaporator in the front heater and A/C unit (installed under the instrument panel)

10 - Service Connection - Low Pressure Side



□ With closure cap

11 - Reservoir

- □ With dryer cartridge
- 2.1.3 System Overview Refrigerant Circuit with Electrically-Driven A/C Compressor (with or without Battery Cooling Module)

i Note

- The arrows indicate the refrigerant flow direction.
- The following illustration shows a refrigerant circuit with an expansion valve and a second evaporator for cooling the battery and an inner heat exchanger as an example.
- The layout of the refrigerant circuit is vehicle-specific. Refer to
 ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87;
 Refrigerant Circuit (vehicle-specific repair manual).
- HD = High Pressure Side
- ND = Low Pressure Side



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1 - Electrically-Driven A/C Compressor

With A/C Compressor Control Module - J842and Electrical A/C Compressor - V470-. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

2 - Pressure Relief Valve

3 - Condenser

 With receiver/dryer and dryer cartridge.

4 - Receiver/Dryer

Is a component of the condenser

5 - Refrigerant Pressure Sensor

❑ Vehicle-specific versions. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr.
 87; Refrigerant Circuit (vehicle-specific repair manual).

6 - Service Connection - High Pressure Side

□ With closure cap.

7 - Refrigerant Line with Inner Heat Exchanger

8 - Refrigerant Shut-Off Valve

- □ Different names. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Only on vehicles with a battery cooling module for the Hybrid Battery Unit AX1-.

i Note

The Refrigerant Shut-Off Valve is for example activated, if the battery needs to be cooled and the vehicle interior is not already being cooled (open without activation).

9 - Expansion Valve

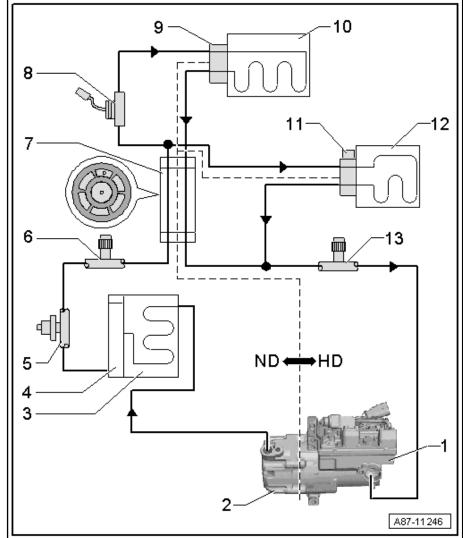
□ On the heater and A/C unit evaporator

10 - Front Evaporator

□ Heater and A/C unit evaporator

11 - Expansion Valve with Shut-Off Valve

- □ Different names. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- $\hfill\square$ On the evaporator in the battery cooling module
- Only on vehicles with a battery cooling module for the Hybrid Battery Unit AX1- .



i) Note

The Expansion Valve with Shut-Off Valve is activated when it is necessary to cool the battery (closed without activation).

12 - Evaporator

- □ Evaporator in the battery cooling module
- Only on vehicles with a battery cooling module for the Hybrid Battery Unit AX1- .

13 - Service Connection - Low Pressure Side

With closure cap

2.2 General Description - Refrigerant Circuit Components

- ⇒ "2.2.1 Refrigerant Circuit Layout and Function", page 37
- ⇒ "2.2.2 Mechanically Driven A/C Compressor", page 37
- ⇒ "2.2.3 Electrically-Driven A/C Compressor", page 39
- ⇒ "2.2.4 Condenser", page 41
- ⇒ "2.2.5 Evaporator", page 42
- ⇒ "2.2.6 Reservoir", page 42
- ⇒ "2.2.7 Heat Pump Operation Heater Core", page 43
- ⇒ "2.2.8 Fluid Collector", page 43
- ⇒ "2.2.9 Restrictor", page 43
- ⇒ "2.2.10 Receiver/Dryer", page 44
- \Rightarrow "2.2.11 Expansion Valve with and without Shut-Off Valve" page 45
- ⇒ "2.2.12 Refrigerant Shut-Off Valves", page 47
- \Rightarrow "2.2.13 Refrigerant Line with Inner Heat Exchanger", page <u>48</u>
- \Rightarrow "2.2.14 Quick-Release Coupling Connections on Refrigerant Lines", page 48
- <u>⇒ "2.2.15 Seals", page 50</u>
- ⇒ "2.2.16 Refrigerant Circuit Pipes and Hoses" Propage 50 pyright. Copying for private or commercial purposes, in part or in whole, is not purposes and Hoses" to be applied by 50 pyright. Copying for private or commercial purposes, in part or in whole, is not purpose and Hoses" to be applied by 50 pyright. Copying for private or commercial purposes, in part or in whole, is not purpose and Hoses" to be applied by 50 pyright. Copying for private or commercial purposes, in part or in whole, is not purpose and Hoses" to be applied by 50 pyright. Copying for private or commercial purposes, in part or in whole, is not purpose and Hoses" to be applied by 50 pyright. Copying for private or commercial purposes, in part or in whole, is not purpose and Hoses" to be applied by 50 pyright. Copying for private or commercial purposes, in part or in whole, is not purpose and Hoses" to be applied by 50 pyright. Copying for private or commercial purposes, in part or in whole, is not purpose and Hoses" to be applied by 50 pyright. Copying for private or commercial purposes, in part or in whole, is not purpose and the private or commercial purpose and Hoses" to be applied by 50 pyright. Copying to the correctness of information in this document. Copyright by AUDI AG.
- ⇒ "2.2.17 Pressure Relief Valve", page 50
- ⇒ "2.2.18 Check Valves", page 51
- ⇒ "2.2.19 Quick-Release Coupling Connections on Refrigerant <u>Circuit", page 51</u>
- ⇒ "2.2.20 Refrigerant Circuit Connections with Valve for Switches ", page 55
- \Rightarrow "2.2.21 Pressure Sensor and Switch on Refrigerant Circuit", page 55
- ⇒ "2.2.22 A/C Pressure/Temperature Sensor", page 56
- ⇒ "2.2.23 A/C Compressor Regulator Valve N280 ", page 59
- <u>⇒ "2.2.24 Refrigerant Temperature Sensor", page 59</u>

2.2.1 Refrigerant Circuit Layout and Function

- The condenser and the receiver/dryer are on the high pressure side, and the receiver/dryer or the expansion valve serves as the separator between the high pressure side and the low pressure side.
- High pressure results from the restrictor or expansion valve forming a constriction and causing the refrigerant to accumulate, thus leading to an increase in pressure and temperature.
- Excess pressure is generated if too much refrigerant or refrigerant oil is added, the condenser is contaminated, the radiator fan is faulty, the system is blocked or if there is moisture in the refrigerant circuit (the restrictor or expansion valve freezes).
- Located on the low pressure side are the evaporator, the evaporator temperature sensor and compressor to separate low pressure side (ND gas sides) and high pressure side (HD gas sides).
- A drop in system pressure can be caused by loss of refrigerant, faulty or plugged restrictor or expansion valve (no constriction), a malfunctioning A/C compressor or an iced-up evaporator.

2.2.2 Mechanically Driven A/C Compressor

The A/C compressor is driven by a ribbed belt -B- or an input shaft, which is driven by the vehicle engine.

A/C Compressor with A/C Clutch - N25-

An electromagnetic clutch -A- attached to A/C compressor provides the power link between the ribbed belt pulley -B- and A/C compressor crankshaft with A/C system switched on.

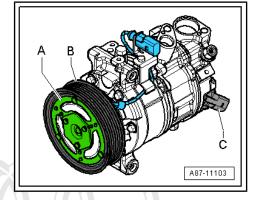
An overload safeguard attached to the clutch plate or in the A/C compressor solenoid coil is tripped if the compressor does not move freely, thus protecting the belt drive or the drive unit against overload.

i Note

- So that the A/C compressor does not get damaged when the refrigerant circuit is empty, the A/C Compressor Regulator Valve - N280- and the A/C Clutch - N25- is no longer activated (the A/C compressor only runs when the A/C Clutch - N25- is activated at idle with the engine).
- An A/C compressor with an A/C Clutch N25- (without A/C Compressor Regulator Valve - N280-) is not activated by an empty refrigerant circuit and not driven.

A/C Compressor Without A/C Clutch - N25^acted by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

- ◆ An overload safeguard attached to the bëlt pulley be or in the information in this document. Copyright by AUDI AG. A/C compressor drive unit is tripped if the compressor does not move freely, thus protecting the belt drive or the drive unit against overload.
- An A/C compressor with A/C Compressor Regulator Valve -N280- (without A/C Clutch - N25-) is switched to internal lubrication by way of a valve when the refrigerant circuit is empty.





- On A/C compressors without an A/C Clutch N25-, the engine is only to be started if the refrigerant circuit is completely assembled.
- So that the A/C compressor does not get damaged when the refrigerant circuit is empty, the A/C Compressor Regulator Valve - N280- is no longer activated (A/C compressor runs at idle with engine).

All A/C compressors

The A/C compressor extracts the refrigerant gas from the evaporator, compresses it and relays it to the condenser.



- The A/C compressor contains refrigerant oil, which can be mixed with refrigerant R1234yf at any temperature.
- ◆ The type plate lists the type of refrigerant required for the A/C compressor. A regulator valve regulates the pressure of the low pressure side inside a specific specified range (control characteristic). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ Depending on the version of the A/C compressor different rep for private or commercial purposes, in part or in whole, is not frigerant oil are filled in the A/C compressor different rep for private or commercial purposes, in part or in whole, is not frigerant oil are filled in the A/C compressor different rep for private or accept any liability which was only developed for the refrigerant R134a, may not be used for the refrigerant R1234yf. Refer to ⇒ Heating, Ven-tilation and Air Conditioning; Rep. Gr. 00 ; Technical Data; Refrigerant Oil .
- A/C compressors with or without a A/C Clutch N25- are currently activated from the outside by a A/C Compressor Regulator Valve N280- -C-. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ The refrigerant for which the A/C compressor is designed is listed on the manufacturer's plate. A A/C Compressor Regulator Valve - N280- regulates the pressure of the low pressure side inside a specific specified range (control characteristic). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- The A/C Compressor Regulator Valve N280- is activated from the outside. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system.
- ◆ The engine on a vehicle with an A/C compressor without an A/C Clutch N25- cannot be activated, when the refrigerant circuit is under vacuum (for example when evacuating). Refer to ⇒ "3 Working with A/C Service Station", page 134.
- The engine can be restarted on a vehicle with an A/C compressor without a A/C Clutch - N25- when the refrigerant circuit is completely assembled.
- So that the A/C compressor does not get damaged when the refrigerant circuit is empty, the A/C Compressor Regulator Valve - N280- is no longer activated (the A/C compressor runs at idle with engine) if the refrigerant circuit is too low (smaller than 2 bar (29 psi)).
- An A/C compressor with A/C Compressor Regulator Valve -N280- is switched to internal lubrication by way of a valve when the refrigerant circuit is empty.

or commercial purposes in part or in whole is not

- Depending on the A/C compressor version, there may be a valve installed on the high pressure side of the A/C compressor, which prevents the liquid refrigerant from flowing back into the compressor once the A/C is turned off. If an A/C compressor with this valve is installed in a vehicle with a refrigerant circuit having an expansion valve, then it may take some time until the pressure in the high pressure side decreases (the expansion is cold and the pressure in the low pressure side quickly increases after it is turned off, the expansion valve closes and the refrigerant flows slowly into the low pressure side). If the A/C compressor is switched on, the pressure on the low pressure side reduces, the expansion valve opens and the refrigerant can flow to the low pressure side.
- ♦ On A/C compressors with an electro-magnetic clutch -A- and a regulator valve -C-, the electro-magnetic clutch -A- is, for the most part, only activated when the regulator valve -C- is activated. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

2.2.3 Electrically-Driven A/C Compressor

Vehicles with a High-Voltage System (Hyperic System) (Hyp

If procedures are necessary near the components of the high-voltage system. Refer to \Rightarrow "1.5 Safety Precautions when Working near High-Voltage Components", page 3 in "Performing a visual inspection of the high-voltage components and cables" and \Rightarrow Electrical Equipment; Rep. Gr. 93; General Warnings for Working on High-Voltage Systems .

If working on high-voltage system components is necessary, denergize the high-voltage system. Refer to \Rightarrow Rep. Gr. 93 ; High-Voltage System, De-Energizing .

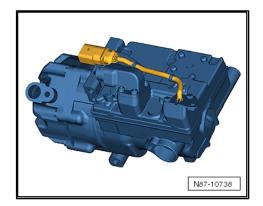
De-energizing the high-voltage system and re-energizing the high-voltage system. Refer to \Rightarrow Rep. Gr. 93 ; High-Voltage System, De-Energizing .

- Charge the vehicle battery, for example, using the Battery Charger - VAS5904- in the battery support mode to minimize the number of automatic starts during the test- and measuring procedures when the ready mode is active. Refer to ⇒ Electrical Equipment; Rep. Gr. 27; Battery; Charging the Battery and ⇒ Electrical Equipment; Rep. Gr. 93; General Notes for Working on the High-Voltage System .
- Move the selector level into position "P", activate the parking brake and arrange the necessary tools for testing and measuring procedures that require the ready mode to be active or that require the ignition to be on, so that they cannot come into contact with the turning components of the engine and so that they are not in the vicinity of the turning components of a running engine.

Electrically-Driven A/C Compressor

Risk of destroying the electrically-driven A/C compressor due to short circuit.

- Never touch the A/C compressor when the ignition is turned on or when the drive machines are activated.
- The A/C compressor extracts the refrigerant gas from the evaporator, compresses it and relays it to the condenser.



- The electric motor for the A/C compressor is supplied with voltage from the Electric Drive Power and Control Electronics
 JX1-. Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations.
- The A/C Compressor Control Module J842- integrated in the A/C compressor regulates the speed and thereby the A/C compressor output (Electrical A/C Compressor - V470-) according to request received via the data Bus. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C System and the battery control.
- There is no A/C Compressor Regulator Valve N280-Installed authorised by Copyright. Copying for private or commercial purposes, in part or in whole, is not in the electrically-driven A/C compressor.
- Check the attachment points on the A/C compressor and the bracket prior to installation. The contact surfaces must be clean and free of rust and grease. Otherwise service the contact surface using the Contact Surface Cleaning Set VAS6410-. Refer to ⇒ Electrical Equipment General Information; Rep. Gr. 97; Wire and Connector Repair and ⇒ Electrical Equipment General Information; Rep. Gr. 97; Contact Surface Cleaning Set VAS6410.

Note

- Check the amount of refrigerant oil in the new A/C compressor if the A/C Compressor Control Module - J842- is faulty. The refrigerant circuit does not always have to be cleaned (flushed) with R1234yf.
- The A/C Compressor Control Module J842- and the Electrical A/C Compressor - V470- are one component and are currently not able to be separated.
- ◆ There is no A/C Compressor Regulator Valve N280- installed in the electrically driven A/C compressor. The A/C compressor output is regulated externally by the A/C compressor speed. Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the a/c system and the battery regulation.
- The electrically-driven A/C compressor functions according to the principle of a spiral charger (similar to a G-charger).
- The A/C compressor contains refrigerant oil, which can be mixed with refrigerant R1234yf at any temperature.
- The type plate lists the type of refrigerant required for the A/C compressor.
- The installed electronics are controlled by the speed of the A/ C compressor power output (and the pressure on the low pressure side) within the specified range (control characteristic).
- The engine should only be started if the refrigerant circuit is completely assembled.
- 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 electrically-driven A/C compressor has a relief valve like the mechanically-driven A/C compressor.
- Electric or hybrid drive on vehicles with battery cooling is only possible with a fully charged A/C system in which there are no

stored errors. Refer to Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the a/c system and the battery regulation.

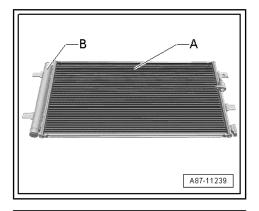
- ♦ After the installation of the electrically-driven A/C compressor and the subsequent filling of the refrigerant circuit, start the A/ C compressor for the first time using the "compressor intake" function for the basic setting. The A/C compressor may otherwise become damaged if refrigerant oil was improperly stored in the A/C compressor compression chamber before installation. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for A/C System and Battery Regulator.
- Only activate the electrically-driven A/C compressor when the refrigerant circuit is filled. The A/C compressor may become damaged if the A/C compressor is run while the refrigerant circuit is empty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

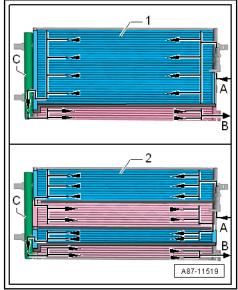
2.2.4 Condenser

- The condenser -A- conducts heat from compressed refrigerant gas to the surrounding air.
- This condenses the refrigerant gas to fluid.



- ◆ Depending on the refrigerant circuit design, the receiver/dryer is installed (integrated) either on the condenser or inside the condenser. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- The condenser is available in different versions and can be out differentiated only by the part number on the outside. For version -1-, the condenser is divided into two areas "2 way condenser". For version -2-, the condenser is divided into four areas "4 way condenser".
- This illustration shows a condenser with the receiver/dryer -C- installed.
- The gaseous refrigerant enters at the connection -A- into the condenser. The refrigerant is then cooled inside the condenser and becomes fluid.
- The liquid refrigerant collects in the receiver/dryer -C- (with dryer) and flows through the lower cooling area towards the connection -B-.
- ◆ Depending on the design of the condenser (interior volumes, delivery flow, etc.), the refrigerant capacity in a refrigerant circuit may vary. For this reason always pay attention to the correct version and allocation of the condenser. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Tech-





nical Data (vehicle-specific repair manual) and the Parts Catalog.

2.2.5 Evaporator

The evaporator is available in different versions. Depending on the design and the function, the heat energy of the flowing air needed (for example, an evaporator in the heater and A/C Unit or in the battery cooling module) or flowing coolant needed (for example near the high-voltage battery heat exchanger) is extracted for refrigerant evaporation. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



Two versions of the evaporator are described.

Evaporator in the Heater and A/C Unit (or in the Battery Cooling Module)

- The liquid refrigerant evaporates in the evaporator pipe -A-. The heat required for this is extracted from the air flowing on the evaporator ribbing -B-. The air cools off. Refrigerant evaporates and is extracted with the absorbed heat by the A/C compressor
- A definite quantity or refrigerant is supplied to the evaporator through an expansion valve (a restrictor). In systems with an expansion valve, the flow rate is regulated so that only gaseous refrigerant escapes the evaporator outlet.
- With the introduction of the refrigerant R1234yf the evaporator is adapted to the refrigerant, for this reason pay attention to the version. Refer to the Parts Catalog.

Evaporator/High-Voltage Battery Heat Exchanger (Chiller)

The liquid refrigerant evaporates in the evaporator (heat exchanger). The heat required for this is extracted from the flowing coolant in the evaporator. The coolant cools, the refrigerant evaporates and is extracted with the absorbed heat by the A/C compressor.

A defined amount of refrigerant is supplied to the evaporator by a restrictor (or expansion valve) and a shut off valve. The flow rate of the refrigerant (or the coolant) is regulated so that only gaseous refrigerant escapes the evaporator outlet. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

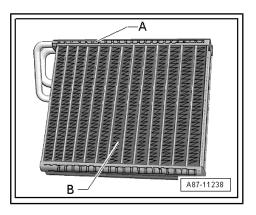
2.2.6 Reservoir

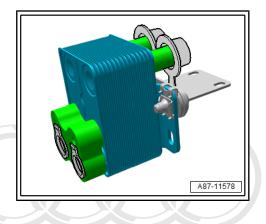




Only installed on A/C systems with a restrictor, at this time this type of A/C system is not installed.

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- The reservoir collects the vaporized and gaseous mixture coming from the evaporator to ensure the compressor only receives gaseous refrigerant. Gaseous refrigerant is formed from the vapor.
- The refrigerant oil flowing in the circuit is not retained in the reservoir as it has an oil drilling.
- Moisture which has entered the refrigerant circuit during assembly is collected by a filter (desiccant bag) in the reservoir.
- Gaseous refrigerant is extracted with oil by the A/C compressor.
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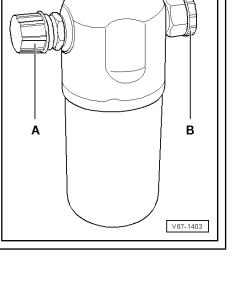
- ◆ Replace the reservoir if refrigerant circuit has been open for a long time (beyond the normal repair time) and moisture has penetrated inside, or if required due to a specific complaint. Refer to ⇒ "2.5 Components, Replacing", page 71.
- Only remove the plugs -A and B- just before installing.
- A desiccant bag in an unsealed reservoir is saturated with moisture after a short period of time and unusable.
- When installing, note the arrow for the direction of flow if necessary.

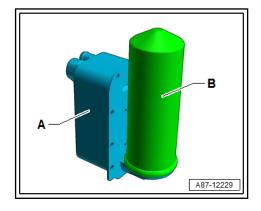
2.2.7 Heat Pump Operation Heater Core

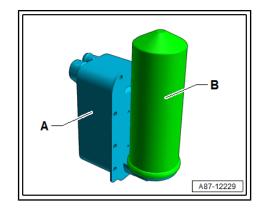
The gaseous or vaporous refrigerant that is compressed by the A/C compressor becomes a liquid in the heater core -A-. At the same time, the heat that is released is transferred to the coolant flowing by. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

2.2.8 Fluid Collector

In some operating conditions (for example heat pump operation) the receiver/dryer (for example on the condenser) is not incorporated in the refrigerant circuit. The fluid collector -B- collects the refrigerant, and stores it temporarily if a certain amount of refrigerant is not needed, and then directs it in an uninterrupted stream to the expansion valve (in front of the evaporator in the heater and A/C unit) or to the heat exchanger in the high-voltage system coolant circuit. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).







2.2.9 Restrictor

Restrictor in Front of the Evaporator



At there time there are no A/C systems with a restrictor installed before the evaporator.

◆ The restrictor creates a constriction. This restriction reduces the flow and creates high and low pressure sides in the refrigerant circuit. The refrigerant in front of the restrictor is under a higher pressure and is warm. The refrigerant behind the restrictor is under lower pressure and is cool. Before the restriction tion there is a strainer for contaminants and after the restriction in the there is a strainer to atomize the refrigerant before it reaches the evaporator.



- Arrow -A- on the restrictor points to the evaporator.
- Replace after each opening the refrigerant circuit.
- There are different versions, so pay attention to the different customer service information sources. Refer to the Parts Catalog.

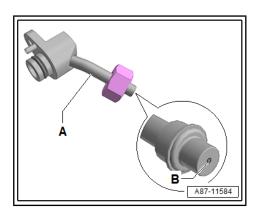
Restrictor in front of the High-Voltage Battery Heat Exchanger (Chiller)

The restrictor creates a constriction. This restriction reduces the flow and creates high and low pressure sides in the refrigerant circuit. The refrigerant in front of the restrictor is under a higher pressure and is warm. The refrigerant behind the restrictor is under lower pressure and is cool.



- This illustration shows a refrigerant line -A- with a permanently installed restrictor -B- (without screen)
- The diameter of the illustrated restrictor hole -B- is approximately 0.7 mm. Depending on the version of the refrigerant line this constriction is either installed fixed in the refrigerant line or only inserted. A screen to separate floating deposits may be installed on the inserted version, which can be blocked by the restrictor hole.
- Before installing check for debris and clean or replace if necessary.
- ◆ Pay attention to the different versions. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

2.2.10 Receiver/Dryer



N87-0337

А

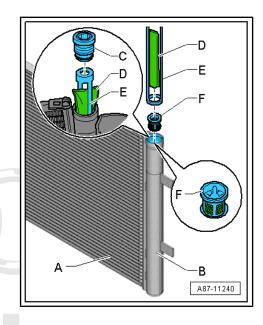
- The receiver/dryer collects -B- the fluid drops and then directs them in an uninterrupted stream to the expansion valve. Moisture which has entered the refrigerant circuit during repairs will be collected by the dryer -D- in the receiver/dryer -B-.
- ◆ Depending on the design of the refrigerant circuit and the version of the condenser -A- receiver/dryer -B- can be installed on the condenser -A- or installed in the condenser (integrated) -A-. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- In the receiver/dryer -B- a dryer (for example a desiccant bag -D-) and a screen -F- (which retains small containments) are installed.



- ◆ There are different versions of the receiver/dryer -B- and with different designs. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- Replace the receiver/dryer -B- or the plastic screw (with seals)
 -C- the dryer cartridge -D-, the filter carrier -E- and the screen
 -F-, if the refrigerant circuit has been open for a long time and moisture has entered or if required due to a specific complaint coses, in part or in whole, is not Refer to ⇒ "2.5 Components" Replacing ", blade 71^{DI} AG does not guarantee or accept any liability Refer to ⇒ "2.5 Components" Replacing ", blade 71^{DI} AG does not guarantee or accept any liability Refer to ⇒ "2.5 Components" Replacing ", blade 71^{DI} AG does not guarantee or accept any liability Refer to ⇒ "2.5 Components" Replaced on the corrections of monator in this document. Copyright by AUDI AG.
- Remove the receiver/dryer sealing plugs immediately prior to installation as a desiccant bag in a non-sealed receiver/dryer will quickly become saturated with moisture and become unusable.
- Keep the dryer cartridge sealed in its air-tight packaging as long as possible. Open the package just before inserting the dryer cartridge -D- in the receiver/dryer -B- of the condenser. The dryer cartridge absorbs moisture from the surrounding air in a very short time and becomes unusable.
- When installing, note the arrow for the direction of flow if necessary.
- ◆ The procedure is different for each concern depending on the version of the receiver/dryer and the dryer cartridge. If the receiver/dryer, for example, is attached to the condenser, then it can be replaced completely with the dryer cartridge. If the receiver/dryer, for example, is inside the condenser, then the dryer cartridge, and any possible additional filters, can be replaced separately, on most versions. If the receiver/dryer is integrated inside the condenser and it is not possible to replace the receiver/dryer or dryer cartridge separately, the entire condenser may need to be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- ◆ Depending on the design of the refrigerant circuit the receiver/ dryer (with desiccant bag or dryer cartridge) are also integrated in the refrigerant circuit (it doesn't always have to be installed on the condenser). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehiclespecific repair manual) and the Parts Catalog.

2.2.11 Expansion Valve with and without Shut-Off Valve

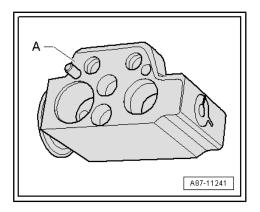
Expansion Valve without Shut-Off Function



The expansion valve -A- atomizes the streaming refrigerant and controls the flow rate so that the vapor is gaseous only at the evaporator outlet, depending on the heat transmission.



- With the introduction of the refrigerant R1234yf the expansion valves are adapted to the refrigerant (different characteristic curve), for this reason pay attention to the version. Refer to the Parts Catalog.
- Different versions of the expansion valve due to different characteristic curves that must be adapted to the refrigerant circuit. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- Be sure to use the correct part number when replacing the expansion valve. Refer to the Parts Catalog
- Depending on the A/C compressor version, there may be a valve installed on the high pressure side of the A/C compressor, which prevents the liquid refrigerant from flowing back into the compressor once the A/C is turned off. If an A/C compressor with this valve is installed in a vehicle with a refrigerant circuit having an expansion valve, then it may take some time until the pressure in the high pressure side decreases (the expansion is cold and the pressure in the low pressure side quickly increases after it is turned off, the expansion valve closes and the refrigerant flows slowly into the low pressure side). If the A/C compressor is switched on, the pressure on the low pressure side reduces, the expansion valve opens and the refrigerant can flow to the low pressure side. Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability authorized by AUDI AG. AUDI AG does not guarantee or accept any liability



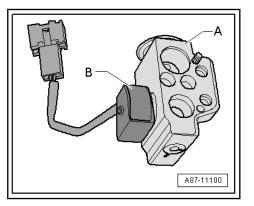


Expansion Valve with Refrigerant Shut-Off Valve with respect to the correctness of information in this document. Copyright by AUDI AG.



There are different versions of the shut-off valve with different functions and with different names. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- The expansion valve -A- with shut-off valve -B- atomizes the streaming refrigerant and regulates the refrigerant flow rate to the evaporator in the battery cooling module for the hybrid battery unit so that the vapor becomes gaseous only at the evaporator output, depending on the heat transmission.
- If the shut-off -B- is activated by the electronics, it is open and lets the refrigerant flow through to the expansion valve -A-.
- If the shut-off valve -B- is open and the expansion valve -Alets the refrigerant flow according to its control characteristic to the evaporator or the heat exchanger. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- The solenoid coil -B- on the expansion valve -A- is activated by different control modules depending on the vehicle. Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- If, for a vehicle with two evaporators (one in the heater and A/ C unit and one in the battery cooling module, for example on



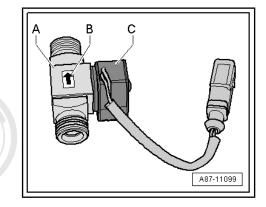
the Q5 Hybrid), the measured temperature on one of the evaporators corresponds to the specified value or the specified value falls short, but does not reach the required specified value on the other evaporator, the following adjustment is per-formed: the corresponding control module (Battery Regulation Control Module - J840-) activates the electric A/C compressor with increased speed (thereby increasing the A/C system cooling output and decreasing the pressure on the low pressure side as well as the evaporator temperature) via (for example the Electric Drive Power and Control Electronics - JX1-) and the A/C Compressor Control Module - J842-. If in a evaporator the specified value for the temperature is different, the respective control module activated the cosponsoring shut-off valve (for example the Battery Regulation Control Module - J840- of the Hybrid Battery Refrigerant Shut-Off Valve 1 - N516- or the Hybrid Battery Refrigerant Shut-Off Valve 2 - N517-) so that no more refrigerant flows through the evaporator which is too cold. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

2.2.12 Refrigerant Shut-Off Valves

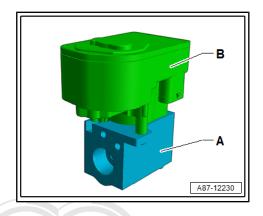
Shut-Off Valve with Two Switching States (Open or Closed).

- ◆ There are different versions of the shut-off valve with different functions and with different names. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If the shut-off -A- is not activated by the electronics, it is open and lets the refrigerant flow through.
- The shut-off valve -A- is installed on vehicles with a high-voltage system. It is activated when no A/C system operation is desired for the passenger compartment or for the Hybrid Battery Unit - AX1-, but is necessary for battery cooling.
- Observe the arrow -B- attached to the shut-off valve -A-, which shows the flow direction of the refrigerant (from the condenser to the evaporator in the heater and A/C unit)
- ◆ The solenoid coil -C- installed on the shut-off valve -A- is activated depending on the vehicle from different control modules. Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
- ♦ If, for a vehicle with two evaporators (one in the heater and A/ by AUDIAG. C unit and one in the battery cooling module, for example on the Q5 Hybrid), the measured temperature on one of the evaporators corresponds to the specified value or the specified value falls short, but does not reach the required specified value on the other evaporator, the following adjustment is performed: The respective control module activates the electric A/C compressor with increased speed (thereby increasing the A/C system cooling output and decreasing the pressure on the low pressure side as well as the evaporator temperature). If in an evaporator the specified value for the temperature is different, the respective control module activates the shut-off valve so that no more refrigerant flows through the evaporator which is too cold. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

Shut-Off Valve, which is Regulated via the Characteristic Curve



- The shut-off valve -A- is activated via a step motor -B- from the respective control module via the characteristic curve (opened or closed).
- If the shut-off valve works as a regulator valve (for example, on the Audi Q7 as Refrigerant Expansion Valve 1 - N636-), it is opened just enough so that the temperature for the heater core is reached. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual.
- ◆ Shut-off valves activated by stepper motors do not have a specified resting position. Therefore they must be set to a certain position (open or closed) before performing work on the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ Depending on the refrigerant circuit design, multiple shut-off valves may be combined in one valve block (for example, on the e-Golf or Audi Q7 e-tron). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ The stepper motor is adapted and activated via the data wires (LIN Bus) by the respective control module according to its component location. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



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- 2.2.13 Refrigerant Line with it Innertomeat Tex-of information in this document. Copyright by AUDI AG. AUDI AG does not guarantee or accept any liability AUDI AG. changer
- In this refrigerant line, the hot fluid refrigerant on the high pressure side flows to the flowing gaseous or vaporous cold refrigerant on the low pressure side to increase the efficiency of the A/C system.

i Note

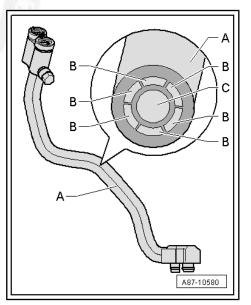
This illustration shows a refrigerant line with an inner heat exchanger as it is installed on for example the Golf 7, the Audi A4 from MY 2008 and on the Audi A5 Coupe from MY 2008. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

A - Refrigerant Line with Inner Heat Exchanger

B - Channel inside the refrigerant line in which the warm fluid refrigerant flows to the evaporator (refrigerant circuit high pressure side)

C - Channel inside the refrigerant line in which the gaseous or vaporous cold refrigerant flows to the A/C compressor (refrigerant circuit low pressure side)

2.2.14 Quick-Release Coupling Connections on Refrigerant Lines





- ◆ This illustration shows the quick-release coupling connections with a refrigerant line with an inner heat exchanger as it is installed for example on the Audi A4 from MY 2008 and on the Audi A5 Coupe from MY 2008. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ To remove the refrigerant line -D- the retaining ring -A- must be opened for example with the refrigerant line release ring (Air Conditioner Couplings Release Tool - T40149- or Retaining Ring - T40232-) Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehiclespecific repair manual).
- ◆ The quick-release coupling connections -B and G- are to be replaced after removing the respective refrigerant line with the corresponding support ring -E or H- and the corresponding seal -F or J-. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

A - Retaining ring (in the quick-release coupling connection, high pressure side)

B - Quick-release coupling connection with "high pressure side" retaining ring as authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

C - Refrigerant Line with Inner Heat Exchanger

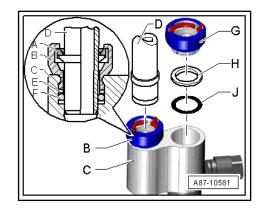
- D "High Pressure Side" Refrigerant Line
- E "High Pressure Side" Support Ring
- F "High Pressure Side" Seal

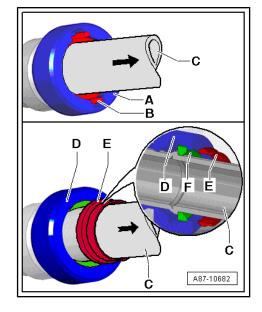
G - Quick-Release Coupling Connection with "Low Pressure Side" Retaining Ring

- H "Low Pressure Side" Support Ring
- J "Low Pressure Side" Seal



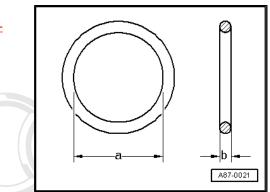
- ◆ There are different quick-release coupling versions -A and D-. On both versions of this quick-release coupling the refrigerant lines -C- can be released and remove in the same way for example with the Air Conditioner Couplings Release Tool - T40149/1-. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- On the quick-release coupling -A- version the check pins -Bbecome visible after the refrigerant line -C- is installed, if the locked refrigerant line -C- is pulled in the direction of the -arrow-.
- ♦ On the quick-release coupling -D- version the refrigerant line -C- is installed in the same manner as quick-release coupling -A-. If the refrigerant line -C- is pulled in the direction of the -arrow- after assembling, the ring -E- will come out of the quick-release coupling -D- and will show that the retaining ring -F- is completely latched to the refrigerant line -C-. Then the ring -E- can be removed from the refrigerant line -C-.





2.2.15 Seals

The seals seal off the connection points between individual refrigerant circuit components. Refer to \Rightarrow "3.2 Refrigerant Circuit Seals", page 8.



2.2.16 **Refrigerant Circuit Pipes and Hoses**

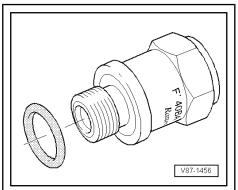
- In the right state refrigerant R1234vf is chemically stable and does not damage iron, aluminum and corresponding developed and suitable plastic. Mixing refrigerant oil and refrigerant R1234yf can damage specific metals (for example alloys with copper) and can damage and dissolve specific hose materials. and plastics. For this reason use only original parts permitted hiess authorised by AUDI AG. AUDI AG does not guarantee or accept any liability the Parts Catalog. with respect to the correctness of information in this document. Copyright by AUDI AG.
- Make exclusive use of components which are resistant to refrigerant R1234vf and the related refrigerant oils. Do not use any components (such as seals and hoses that are made of plastic) which were not clearly assigned. Refer to the Parts Catalog.
- The pipes and the hoses are held together with bolts or by special connections. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Replace the sealing components (for example seals) between the components. Refer to the Parts Catalog.
- Note the tightening specification on threaded connections, for ٠ connectors use the corresponding release tools. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manuals.

2.2.17 Pressure Relief Valve

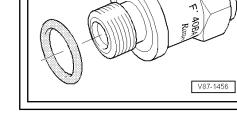
The pressure relief valve is installed on the A/C compressor or receiver/dryer.

At a pressure of approximately 38 bar (551 psi) positive pressure, the valve opens and closes again once pressure has dissipated (at approximately 35 bar (508 psi)).

Refrigerant does not escape completely.







- Note
- Depending on the version, a transparent plastic washer -Bmay be installed on the pressure relief valve -A-, which breaks off as soon as the valve is activated.
- Depending on the pressure relief valve version -A-, an additional cover -C- can be slid onto the pressure relief valve -A-. If the pressure in the refrigerant circuit does rise above the pressure relief valve -A- opening pressure and the pressure relief valve opens, the refrigerant does not escape in one direction, but rather it is distributed through the openings -Dunder the cover -C-.

If it is necessary to replace a pressure relief valve -A- pay attention to the tightening specification when installing (depending on the manufacturer of the A/C compressor and the version). On "Denso", "Sanden" and "Valeo" A/C compressors an O-ring is installed (tightening specification currently 10 Nm on "Denso" and "Zexel- / Valeo" as well as 15 Nm on "Sanden" A/C compressor). On "Delphi" A/C compressor for example a seal is installed (tightening specification is currently 15 Nm).

Replace the seals (seal or O-ring). Refer to the Parts Catalog.

If the seals (seal or O-ring) that are installed on the pressure relief valve are not available as a replacement part, the removed seals may be used as an exception (check for damage before installing). If the removed seal is damaged or deformed if necessary replace with a commercially available component. Refer to the Parts Catalog.

After charging the refrigerant circuit check the installed pressure relief valve for leaks for example using an electronic leak detector.

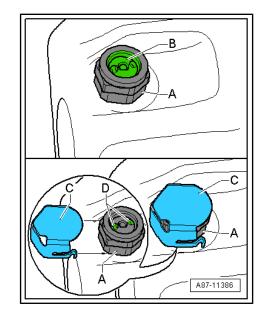
2.2.18 Check Valves

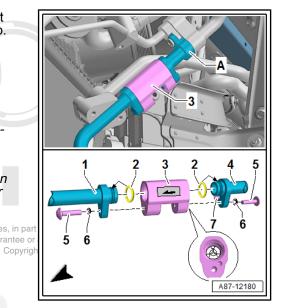
The check valves disconnect in different areas of the refrigerant circuit. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



- ◆ The illustrated check valve -3- is installed for example on a Audi Q7 e-tron. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- The check valves in the refrigerant circuit in the flow direction have a specified residual pressure (approximately 0.1 bar or 100 mbar (1.45 psi)). So that the refrigerant circuit can be completely evacuates (residual pressure less than 5 mbar (72.5 psi)) all electrically activated valves must be opened.^{ses, in par}
- Depending on the version the flow direction can be marked. Co using a sticker.

2.2.19 Quick-Release Coupling Connections on Refrigerant Circuit





Service Connections with Schrader Valve (Needle Valve or Push Pin)

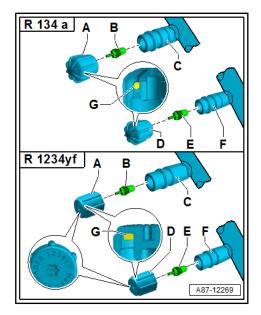
- Only valves and connections that are resistant to refrigerant R1234yf and refrigerant oil must be installed.
- The service connections -C and F- on a R1234yf refrigerant circuit are designed so that the service connections from a R134a refrigerant circuit designed service couplings cannot be connected.
- Different connections (outer diameter) for high pressure and low pressure side -C and F-.
- Discharge the refrigerant circuit before removing valves or valve inserts -B and E-.
- Always install the closure caps -A and D- with the seal -G-.

Allocation in the vehicle. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- Extract the refrigerant before removing the valves.
- Low pressure side service connection -F-
- High pressure side service connection -C-
- Valve insert (Designation: Schrader valve or needle valve)
- Closure cap: low pressure side service connection with seal -A-
- Closure cap: high pressure side service connection with seal -D-

i Note

- After connecting, install the hand wheel for the service coupling just far enough into the quick-release coupling adapter until the valve is securely opened inside the service connection (pay attention to the pressure gauge, do not put too much pressure on the valve).
- The service connections on a R1234yf refrigerant circuit are designed so that the service connections from a R134a refrigerant circuit designed service couplings cannot be connected.
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not The service connections are for example soldered into a detess authorised by AUDI AG. AUDI AG does not guarantee or accept any liability frigerant line and therefore cannot be replaced separately pect to the correctness of information in this document. Copyright by AUDI AG.
- To remove and install the valve insert when the refrigerant circuit is discharged, use, for example, an adapter from the Refrigerant Sockets - T10364-.
- Tighten the valve insert very carefully because the tightening specification is very small.
- ◆ There are different versions of these valves and therefore there are different tightening specifications. Valve insert -Cwith a VG5 (5.2 x 0.7 mm, tire valve) thread has a tightening specification of 0.4 Nm ± 0.1 Nm; a valve insert with a M6 x 0.75 mm thread has a tightening specification of 0.9 Nm ± 0.1 Nm, and a valve insert with a M8 x 1.0 mm thread has a tightening specification of 2.0 Nm ± 0.2 Nm.
- There are different versions of these valve caps, which means there are different tightening specifications. A valve cap with an M8 x 1 mm or M10 x 1 mm thread has a tightening specification of 0.4 Nm ± 0.1 Nm.





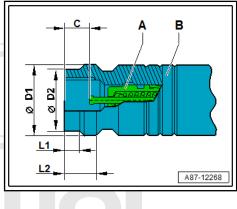


There are different versions of these valves, valve inserts and their caps. Make sure the version of the valve inserts and the allocation of the closure caps is correct. Refer to the Parts Catalog.

Service Connection Measurements

- Valve insert -A- (different versions) ٠
- Service connection -B- (depending on the refrigerant, there are different versions on the high and low pressure side)

Service Connection Dimensions -B-	Refrigera Service C tion			nt R1234yf Connection
	High Pressure Side	Low Pres- sure Side	High Pressure Side	Low Pressure Side
Outer diameter -D1-	16.0 mm	13.0 mm	17.0 mm	14.0 mm
Outer diameter -D2-	14.0 mm	11.0 mm	13.0 mm	12.0 mm
Section -L1-	4.6 mm	6.15 mm	nermitte	d unless authoris
Section -L2-	8.16 mm	9.16 mm	12.5 mm	7.2 mm cor
Valve installation po- sition (not actuated) -C-	6.1 to 7.1 mm	6.1 to 7.1 mm	8.3 to 9.3 mm	8.3 to 9.3 mm



Service Connections with Primary Sealing Valve (Ball Valve)

- This type of service connections is currently not used on VW/ Audi refrigerant circuits.
- Only valves and connections that are resistant to refrigerant ٠ R1234yf and refrigerant oil must be installed.
- The service connections on a R1234yf refrigerant circuit are designed so that the service connections from a R134a refrigerant circuit designed service couplings cannot be connected.
- ٠ Different connections (outer diameter) for high pressure and low pressure side.
- Discharge the refrigerant circuit before removing valves or ٠ valve inserts.
- Always install the closure caps with a seal.

Allocation in the vehicle. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Connection with High-Pressure Valve

- 1 Socket with internal thread (soldered in)
- 2 Seal (version and identification: black or colored. Refer to the Parts Catalog)
- 3 Valve with an external thread and groove for the Seal (identification: ball valve)
- 4 Closure Cap Seal
- 5 Closure Cap

i Note

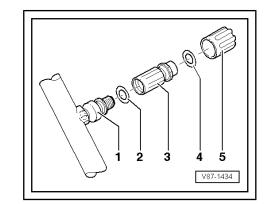
- After connecting, install the hand wheel for the service coupling just far enough into the quick-release coupling adapter until the valve is securely opened inside the service connection (pay attention to the pressure gauge, do not put too much pressure on the valve).
- For removing and installing the valve -3 when the refrigerant DI AG. AUDI AG does not guarantee or accept any liability circuit is evacuated, for example, use an adapter from the Re- of information in this document. Copyright by AUDI AG. frigerant Sockets T10364-
- There are different versions of these valves (with internal or external threads). Therefore the tightening specifications can also differ. The valves -3- with an M12 x 1.5 mm external thread have a tightening specification of 9 Nm ±1 Nm.
- There are different versions of these valves and their caps. Make sure the valve version and the closure cap allocation are correct. Refer to the Parts Catalog.

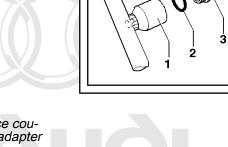
Connection with Low-Pressure Valve

- 1 Socket with an External Thread and Groove for Seal (soldered in)
- 2 Seal (version and identification: black or colored. Refer to the Parts Catalog)
- 3 Valve with an internal thread
- 4 Closure Cap Seal
- 5 Closure Cap

i Note

- Install the hand wheel for the service coupling just far enough into the quick-release coupling adapter until the valve is securely opened inside the service connection (pay attention to the pressure gauge, do not put too much pressure on the valve).
- For removing and installing the valve -3- when the refrigerant circuit is evacuated, for example, use an adapter from the Refrigerant Sockets - T10364-.
- There are different versions of these valves (with internal or external threads). Therefore the tightening specifications can also differ. The currently used valves -3- with an M10 x 1.25 mm internal thread have a tightening specification of 9 Nm ± 1 Nm.





 There are different versions of these valves and their caps. Make sure the valve version and the closure cap allocation are correct. Refer to the Parts Catalog.

2.2.20 Refrigerant Circuit Connections with Valve for Switches



Note

Switching pressures, removing and installing switches as well as switch arrangement and version. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- Different threads for switch on high pressure and low pressure sides.
- Only valves and seals that are resistant to refrigerant R1234yf and refrigerant oil must be installed. Refer to the Parts Catalog.
- A Connection (soldered in)
- B Seal
- C Valve (with Seal)



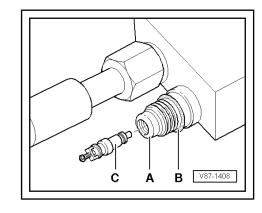
- ◆ To remove and install the valve insert -C- when the refrigerant circuit is discharged, use, for example, an adapter from the Refrigerant Sockets - T10364- (Tightening specification. Refer to ⇒ "2.2.19 Quick-Release Coupling Connections on Refrigerant Circuit", page 51).
- ◆ There are different versions of these valves and therefore there are different tightening specifications. Valve insert -Cwith a VG5 (5.2 x 0.7 mm, tire valve) thread has a tightening specification of 0.4 Nm ± 0.1 Nm; a valve insert with a M6 x 0.75 mm thread has a tightening specification of 0.9 Nm ± 0.1 Nm, and a valve insert with a M8 x 1.0 mm thread has a tightening specification of 2.0 Nm ± 0.2 Nm.

2.2.21 Pressure Sensor and Switch on Refrigerant Circuit

I Note

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- ◆ There are different versions of the pressure sensor and switch with different functions and with different names. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ♦ Switching pressures, removing and installing switches as well as switch arrangement and version. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



- ◆ The high pressure sensor shown is installed for example on a Golf 7 and Audi A3. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ♦ When voltage is applied, a version of the pressure sensor generates a square-wave signal , this signal changes along with the pressure in the system. The other version of the pressure sensor when voltage is applied it exchanges information with the control module via the data Bus (for example via the "LIN Bus") with the cosponsoring control module. Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations and use the Vehicle Diagnostic Tester in the A/C system "Guided Fault Finding" function. For this reason pay attention to the correct version of the pressure sensor.
- ◆ There are different versions of the pressure sensor, their exterior currently only differs in part number, for this reason pay attention to the allocation when replacing. Refer to the Parts Catalog for the correct part number. Reason: These sensors produce different signals that can only be evaluated by the respective control modules. Use the Vehicle Diagnostic Tester "Guided Fault Finding" function for the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- One version of the pressure sensor only transmits the measured value for the refrigerant circuit pressure to the connected control module. The other version transmits the measured value for the refrigerant circuit pressure and the measured temperature to the connected control module, for this reason pay attention to the version. Refer to the Parts Catalog, naviable.
- ◆ The downstream control modules use this signature and to callate the refrigerant circuit pressure and activate the the radiator fan and the motor, the A/C Clutch N25- correspondingly or to change the activation of the A/C Compressor Regulator Valve N280- using the Vehicle Diagnostic Tester in the A/C system "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

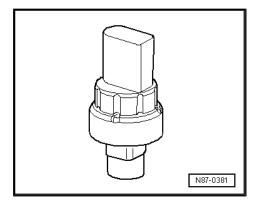
2.2.22 A/C Pressure/Temperature Sensor

Danger or frostbite due to refrigerant coming out under pressure.

Frostbite on the skin and other parts of the body is possible.

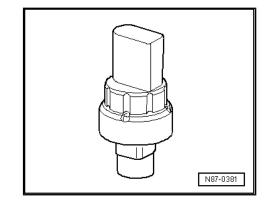
- Wear safety gloves.
- Wear protective eyewear.
- Extract refrigerant and open the refrigerant circuit immediately.
- If more than 10 minutes elapse after extracting the refrigerant and the refrigerant circuit was not opened, extract the refrigerant again. Pressure can develop in the refrigerant circuit due to evaporation.

Sensor for a Connection with the Valve on the Refrigerant Circuit





- ♦ Switching pressures, removing and installing switches as well as switch arrangement and version. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ There are different versions of this sensor with different functions and with different names. For example, the following illustrated A/C Pressure/Temperature Sensor - G395- is installed on a Golf GTE Audi A4, Audi Q5, and Audi Q5 hybrid. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ Before loosening the sensor threaded connection, check the version. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- On a sensor for the connection on the refrigerant circuit without a valve. The refrigerant must be extracted before loosening the threaded connection. If sensor is not removed within 10 minutes after extraction, pressure may build up in refrigerant circuit by renewed evaporation. Extract the refrigerant again.
- ◆ There are various designations, depending on the function and the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ The A/C pressure/temperature sensor is installed for example instead of the high pressure sensor or the refrigerant circuit pressure sensor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ The A/C pressure/temperature sensor, the refrigerant circuit pressure sensor and the high pressure sensor are available in different versions. currently the sensor's only exterior difference is the parts number. Therefore, make sure that the part numbers are correctly allocated when replacing them (part number Parts Catalog). Reason: These sensors produce different signals that can only be evaluated by the respective control modules. Use the Vehicle Diagnostic Tester "Guided Fault Finding" function for the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- When voltage is applied, the a/c pressure/temperature sensor (and the refrigerant circuit pressure sensor exchange information via the data Bus (for example via the "LIN Bus") with the corresponding control module. The relevant control module uses this information to calculate the pressure (and temperature) in the refrigerant circuit and any faults detected are signaled to the control module. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- The A/C pressure/temperature sensor transmits the measured value for the refrigerant circuit pressure and the measured temperature to the connected control module. The refrigerant circuit pressure sensor only transmits the measured value for the refrigerant circuit pressure to the connected control module. Even if only the pressure signal is evaluated on most vehicles, no other pressure sensor is or will be installed on art or in whole, is not vehicle in which a A/C pressure /temperature sensor is or will be installed on accept any liability signed. Refer to the Parts Catalog.
- The temperature measured by the A/C pressure/temperature sensor differs from the actual refrigerant temperature in the



refrigerant circuit because of the sensor version and its component location. Therefore it is not currently evaluated by all control modules and is not used to regulate the A/C system. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

♦ With this information the corresponding control modules calculate the refrigerant circuit pressure and activates the downstream control modules (radiator fan control module, engine control module etc.) via the data Bus. These control modules then active for example the A/C Clutch - N25-, the radiator fan and the engine. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" for the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Sensor for a Connection without the Valve on the Refrigerant Circuit



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- ◆ There are different versions of this sensor with different func-^{ept any liability} tions and with different names. For example, the following illustrated A/C pressure/temperature sensor is installed on an Audi Q7 e-tron. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ There are various designations, depending on the function and the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

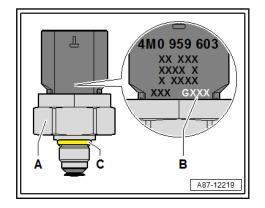
Possible Names for this Sensor

- A/C Pressure/Temperature Sensor G395- (for example on e-Golf and Audi Q7 e-tron)
- A/C Pressure/Temperature Sensor 2 G826- (for example on Audi Q7 e-tron)
- A/C Pressure/Temperature Sensor 3 G827- (for example on Audi Q7 e-tron)

There are different versions of this sensor -A-. Depending on the version, their exterior currently only differs in part number, or in imprinted designation with the same part number -B-. Therefore pay attention to the correct allocation, part number and designation when replacing. Refer to the Parts Catalog and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

This sensor exchanges the information with the respective control module via the data Bus (for example via the "LIN Bus") when creating tension. The relevant control module uses this information to calculate the pressure (and temperature) in the refrigerant circuit and any faults detected are signaled to the control module. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

The respective control module uses this information to calculate the refrigerant circuit pressure and to activate the control modules or components downstream (radiator fan control module, pumps, valves etc.) via the data Bus according to the specifications. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



2.2.23 A/C Compressor Regulator Valve - N280-

Note

Switching pressures, removing and installing switches as well as switch arrangement and version. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- ◆ The regulator valve is installed in the A/C compressors. It is to in which activated for example by the A/C Control Module J301^{Le}, the cept and Front A/C Display Control Head E87- or the Climatronic Con-trol Module J255- (depending on the vehicle, possibly via the data Bus and an additional control module). Use the Vehicle Diagnostic Tester in the A/C system "Guided Fault Finding" function. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Pressure on the low pressure side is influenced via the regulator valve and thus regulates the temperature in the evaporator.



The A/C Compressor Regulator Valve - N280- is a component of the A/C compressor and cannot be replaced separately on all A/C compressors. Refer to the Parts Catalog and \Rightarrow "2.5.9 A/C Compressor Regulator Valve N280, Removing and Installing and Replacing", page 83.

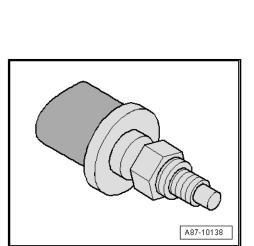
2.2.24 Refrigerant Temperature Sensor

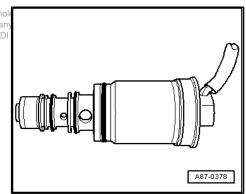
Note

- A refrigerant temperature sensor (a temperature sensor without pressure evaluation) is currently not installed in Volkswagen/Audi.
- ♦ Switching pressures, moving and installing switches as well as switch arrangement and version. Use the Vehicle Diagnostic Tester in the A/C system "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- The refrigerant temperature sensor (with temperature-dependent resistance) is installed, for example, in the high pressure line in vicinity of the A/C compressor.
- ♦ In the refrigerant circuit, there is a direct correlation between temperature and pressure. Should there be too little refrigerant in the refrigerant circuit, the temperature in the refrigerant circuit increases more steadily on the high pressure side than intended for this pressure when the A/C system is operating.



The cosponsoring control modules for example the Front A/C Display Control Head - E87- or the Climatronic Control Module -





J255- evaluates the pressure and temperature in the refrigerant circuit and switches the A/C compressor off if the temperature exceeds the value that was stored for this pressure. Use the Vehicle Diagnostic Tester in the A/C system "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

2.3 Possible Concerns

- ⇒ "2.3.1 Requirements to Identify a Concern", page 60
- ⇒ "2.3.2 Possible Concerns", page 60
- \Rightarrow "2.3.3 Odor from the Heater and A/C Unit", page 61

2.3.1 Requirements to Identify a Concern

- Fault finding on the electrical equipment, vacuum system and air duct fault-finding has not revealed any faults. use the Vehicle Diagnostic Tester A/C system "Guided Fault Finding" function (and the battery regulation). Refer to ⇒ Wiring diagrams, Troubleshooting & Component locations and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- The OBD in the A/C system "Guided Fault Finding" function (for example using the Vehicle Diagnostic Tester in the A/C system "Guided Fault Finding" function) does not identify any fault status for a concern.
- In the A/C system control module measured values no shutoff condition for the A/C compressor is shown. Use the Vehicle Diagnostic Tester in the A/C system "Guided Fault Finding" function.
- 2.3.2 Possible Concerns



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- ♦ With all complaints marked with *. Refer to ⇒ <u>"3.14 Pressures,</u> <u>Checking", page 170</u>.
- If a malfunction occurs at only one evaporator in vehicles with two evaporators, also check the pressures in the refrigerant circuit. Refer to <u>⇒ "3.14 Pressures, Checking", page 170</u>.
- Total cooling system failure.*
- Insufficient cooling output at all vehicles speeds or engine speeds.*
- None or insufficient cooling after driving a few miles.*
- No cooling or insufficient cooling at one or both evaporator(s) (on vehicles with two heater and A/C units/evaporators).*
- ◆ The activation of the A/C compressor (via the A/C Clutch -N25- or the A/C Compressor Regulator Valve - N280-) is switched off by the corresponding control module (for example the Front A/C Display Control Head - E87-, the A/C Control Module - J301- or the Climatronic Control Module - J255-) due to high or too low refrigerant circuit pressure*. Use the Vehicle Diagnostic Tester in the A/C system "Guided Fault Finding" function.
- The Electrical A/C Compressor V470- is activated by the A/ C Compressor Control Module - J842- due to too high or too low pressure*. Use the Vehicle Diagnostic Tester in the A/C

system "Guided Fault Finding" function and the battery regulation.

 No or sharp decrease in fresh-air supply after driving several miles (evaporator iced up).* Use the Vehicle Diagnostic Tester in the A/C system "Guided Fault Finding" function.

From These, the Following Complaints May Also Occur:

The A/C compressor makes noises

- Tighten compressor securing bolts and compressor bracket using a torque wrench. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Check the routing of the refrigerant lines they must not contact other components and must be installed without tension (adjust if necessary). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Noise (refrigerant hammer) occurring immediately after switching on air conditioner and/or when cornering or braking:

Discharge, evacuate and charge refrigerant circuit (too much refrigerant or refrigerant oil in the circuit). Refer to <u>⇒ "3 Work-ing with A/C Service Station", page 134</u> and <u>⇒ "3.14 Pressures, Checking", page 170</u>.



Too much refrigerant oil in the circuit could also cause this problem. This could occur if the amount of refrigerant oil was not adjusted when replacing the A/C compressor. Refer to \Rightarrow <u>"2.5 Components, Replacing", page 71</u>.

Water sprays out of vents (in dash panel or footwell) although air conditioning system is otherwise functioning properly:

- Check the condensation water drain is routed properly it must not be crushed or kinked. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Front Heater and A/C Unit (vehicle-specific repair manual).
- Check condensation drain valve, it must not be clogged by wax or underbody sealant and must close properly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Front Heater and A/C Unit (vehicle-specific repair manual).
- Check the plenum chamber cover, it must not be damaged and must be properly installed (no water may enter the evaporator). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual).
- Check the plenum chamber water drains they must not be closed (for example by leaves). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual).



Component location and additional for these components. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual).

2.3.3 Odor from the Heater and A/C Unit

Refer to <u>⇒ page 62</u>

Refer to ⇒ page 63

Refer to <u>⇒ page 63</u>

Odor from Evaporator or Heat Exchanger?

- ٠ Fishy smell
- From leak at cooling system of engine or of A/C system heater core.

Note

If the fishy smell gets weaker when the temperature is set to "cold" and stronger when it is set to "warm", then check the heat exchanger for leaks.

- Smells like a burned clutch
- Evaporation from floor mats, decorative seat covers foetcrate or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

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Musty smell

Due to various contaminants, such as leaves, pine needles, etc. collecting.

Note

Plenum Chamber, Cleaning

Due to water that cannot drain out of the plenum chamber.



Note

Plenum Chamber Water Drains, Checking

Odor from the heater and A/C unit



Odors originating in the heating and A/C unit can mainly be detected in fresh air mode and recirculated air mode.

Due to too much condensation water in the heater and A/C unit

Note

Condensation Water Drain, Checking.

- Due to an old or heavily contaminated dust and pollen filter.



Check the dust and pollen filter.

Due to deposits on evaporator fins.



- Clean the evaporator using either of the following tools and the cosponsoring spray lance:
- ◆ Refer to <u>⇒ page 63</u> for Ultrasound A/C cleaner.
- Refer to \Rightarrow page 63 for suction feed spray gun.

Ultrasound A/C Cleaner

 The ultrasound A/C cleaner is placed in the front passenger footwell and sprays the cleaning solution Aero-Clean. Aero-Clean neutralizes microbes and bacteria inside the heater and A/C unite Refercto the Heating Ventilation and Air Conditioning; Rep. Gr. 87; Front Heater and A/C Unit (vehicle-specific repair manual).

The unit comes with Operating Instructions.

Current devices. Refer to the Parts Catalog.

Evaporator, Spraying with Pressure Cup Gun and Spray Nozzle

Spray off the evaporator directly with the cleaning solution using a spray lance (approximately 10 bar (145 psi)). This cleaning solution neutralizes microbes and bacteria directly on the evaporator.

To make it possible to access the evaporator, some pre-work and different spray nozzles are needed. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; General Information (vehicle-specific repair manual) and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Front Heater and A/C Unit (vehicle-specific repair manual).

An instruction booklet is included with the evaporator cleaning solution. Refer to the Parts Catalog.

2.4 Leaks, Finding

 \Rightarrow "2.4.1 General Information for Finding Leaks on the Refrigerant Circuit", page 63

 \Rightarrow "2.4.2 Refrigerant Circuit, Finding Leaks using Electronic Leak Detector", page 64.

⇒ "2.4.3 Leaks, Finding with UV Leak Detection System", page <u>65</u> .

 \Rightarrow "2.4.4 Leaks, Determining using Vacuum Test with A/C Service Station ", page 69

 \Rightarrow "2.4.5 Leaks, Determining with a Pressure Test, with Nitrogen or Compressed Air", page 70

2.4.1 General Information for Finding Leaks on the Refrigerant Circuit



- Minor leaks can be detected using an electronic leak detector or UV leak detector lamp.
- This repair manual describes two different methods for detecting leaks in the refrigerant circuit. These methods have been tested and result in success when used correctly.

- Many methods for detecting leaks in the refrigerant circuit are offered in the open market. These methods do not always have clear results and if they are not performed exactly to the specification may show several components in the refrigerant circuit as having leaks which do not. Also, refrigerant circuit components can be damaged by some methods.
- Do not repair components with leaks; always replace them.
- Do not charge a leaking refrigerant circuit with refrigerant for this reason evacuate the refrigerant circuit and check it for leaks at the same time before charging. Refer to \Rightarrow "3.5 Refrigerant Circuit, Evacuating", page 144.



Note

- VW/Volkswagen/Audi does not approve the use of chemicals to seal leaks in the refrigerant circuit (leak stop additives).
- 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).
- Chemical materials to seal leaks in the refrigerant circuit react with air or the moisture in the air and form deposits in the refrigerant circuit (and the A/C service station) that lead to malfunctions in the valves and other components that come into contact with such chemicals. These deposits cannot be removed completely from the components, even by cleaning/ flushing. It is only possible to service the refrigerant circuit by replacing all the components which come in contact with this material.

2.4.2 Refrigerant Circuit, Finding Leaks using Electronic Leak Detector

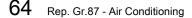
Special tools and workshop equipment required

Electronic Leak Detection Device or Commercially Available

Note

- Leaks on the R1234vf refrigerant circuit can only be determined using electronic leak detectors, which were designed for refrigerant R1234yf.
- The various refrigerants have differing molecular compositions. The electronic leak detector sensors are set up to detect these molecules. If an electronic leak detector is used, which is not specifically designed to detect refrigerant R1234yf, it will not respond to the refrigerant R134a or will only do so when there is a larger concentration of refrigerant R1234yf in the area of the leak. For this reason electronic leak detectors which were only designed for refrigerant R134a cannot be used for leak detection on R1234yf refrigerant circuits.
- Depending on the version of the heater and A/C unit, an evaporator leak can also be determined either by holding the leak detector test probe over the glove compartment cooling con-nection in the heater and A/C unit, or by holding the test probe on an operior metric heater and A/C unit, of by holding protected protected protected heater and A/C unit. Copying for private or commercial purposes, in part or in whole, is not performed and a protected heater and A/C unit. Copying for private or commercial purposes, in part or in whole, is not performed and a performance of a disconnected heater and A/C unit. condensation water hose. with respect to the correctness of information in this document. Copyright by AUDI AG.

Perform a Leak Detection Test to Locate the Leak While the Refrigerant Circuit Is Completely Empty:



i Note

To prevent more refrigerant than is necessary for the leak test from venting into the air with the refrigerant circuit completely empty, proceed as follows:

 Evacuate the refrigerant circuit using the A/C service station. Refer to <u>⇒ "3.5 Refrigerant Circuit, Evacuating", page 144</u>.



- If a larger leak is found during evacuation, find and it and repair it as described. Refer to ⇒ "3.5 Refrigerant Circuit, Evacuating", page 144.
- If no leak is found during evacuation or there is a leak that is so small that the location cannot be found with the vacuum test, proceed as follows.
- If the refrigerant circuit is completely empty, fill approximately 10% of the capacity with refrigerant and perform the leak detection the same way as on a refrigerant circuit filled with refrigerant. Refer to <u>⇒ page 65</u>.

Perform a Leak Detection Test on a Refrigerant Circuit That is Filled with Refrigerant:

- On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.
- Switch off the ignition.
- Start up the leak detector in line with relevant operating instructions.
- Always hold the test probe underneath the suspected leak.

Depending on the model, leak detection is indicated by an increase in clicking rate or a warning tone. Refer to the Leak Detection Device Owner's Manual.



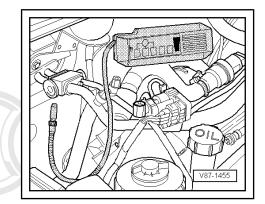
- Currents of air quickly disperse refrigerant gas. Drafts must therefore be avoided during leak detection.
- Refrigerant gas is heavier than air and will escape.

2.4.3 Leaks, Finding with UV Leak Detection System

Special tools and workshop equipment required

- Leak Detection System. Refer to the Parts Catalog.
- A/C Service Station (ability to add UV-leak detection^{it}additive^{authorised} by AUDI AG. AUDI AG does not guarantee or accept any liability in the refrigerant circuit). Refer to the Parts Catalog.
- Approved Leak Detection Additive. Refer to the Parts Catalog.





- Certain leaks cannot or only with difficulty be found using an electric leak detection unit. To find these leaks a leak detection can be performed using the leak detection system. Refer to the Parts Catalog.
- Refrigerant and refrigerant oil escape when there is a leak in the refrigerant circuit. Generally, this oil remains in the vicinity of the leaking area. A small amount of fluorescent fluid must be added into refrigerant circuit so that this oil becomes visible under UV light. This fluid (PAG oil with an additive that lights up under UV light) is added into the refrigerant circuit and distributes itself with the refrigerant oil when the A/C system is switched on.
- A/C system must be operated for a minimum of 60 minutes so that the additive distributes itself in the entire refrigerant circuit (compressor must be running). Depending on the size of the leak, it may become visible under UV light within that time.
- Refrigerant oil with additive that lights up under UV-light can be added directly with an open circuit or be pumped into a empty circuit using the A/C service station via the service connection.
- If a leak detection additive is added via the service connection in the refrigerant circuit a small quantity of leak detection adoses, in part or in whole, is not ditive remains in the service connection A Carefully remove the arantee or accept any liability residual amount so that upon later leak detection ai leak is not. Copyright by AUDI AG. incorrectly determined.
- If a component in which leak detection additive has been added is being replaced on a circuit, always clean connection areas to other components thoroughly after assembling refrigerant circuit. This residue may be detected erroneously as leaking areas upon later leak detection.
- Refrigerant oil and with it leak detection additive gets into the A/C service station when evacuating a refrigerant circuit. The refrigerant oil is separated from refrigerant in the oil separator from the A/C service station and removed from the A/C service station via the draining device. The refrigerant oil drained off must not be poured back in. It must be replaced with new refrigerant oil.
- If leak detection fluid was filled already in a refrigerant circuit for an earlier repair, note the following: only add new leak detection additive if the refrigerant oil will be replaced. If only a portion of refrigerant oil was replaced, only top-off with a corresponding amount of leak detection fluid as well. For example, if 100 ml of refrigerant oil was replaced in a vehicle with 250 ml, add only 1 ml (cm³) of leak detection additive.
- Certain materials and their connections (for example, oxidation products on aluminum components, corrosion protection growth, etc.) also light up under UV-light.
- Depending on the version of your A/C service station leak detective can also be added directly using it, to do so pay attention to the notes in your A/C service station Owner's Manual. Refer to A/C service station Owner's Manual.

Leak Detection on an Empty Leaking Refrigerant Circuit

- To prevent more refrigerant than is necessary for the leak test from venting into the air with the refrigerant circuit completely empty, proceed as follows:
- Evacuate the refrigerant circuit using the A/C service station. Refer to \Rightarrow "3.5 Refrigerant Circuit, Evacuating", page 144.

i Note

If a larger leak is found during evacuation, find it and repair it as described. Refer to \Rightarrow "2.4.4 Leaks, Determining using Vacuum Test with A/C Service Station ", page 69, \Rightarrow "3.5 Refrigerant Circuit, Evacuating", page 144 and \Rightarrow "2.4.5 Leaks, Determining with a Pressure Test, with Nitrogen or Compressed Air", page 70.

If no leak is found during evacuation or there is a leak that is so small that the location cannot be found by evacuating, proceed as follows:



- Only use UV-leak detection additive which approved for refrigerant R1234yf. Refer to the Parts Catalog.
- The the major part of UV-leak detection additive is refrigerant oil, because for refrigerant R1234yf special refrigerant oil is required only UV-leak detection additive may be used in which this oil is the carrier liquid. The UV-leak detection additive developed for refrigerant R134a is not suitable for this reason.
- For refrigerant circuits with refrigerant R1234yr and R134a ment. Copyright by AUDI AG. different refrigerant oils (PAG oils) are used for this reason pay attention to the correct allocation of the leak detection additive (PAG oil with an additive that lights up under UV light).
- Add the UV-leak detection additive to the refrigerant circuit using the A/C service station. Refer to <u>⇒ page 67</u>.

Add the UV-Leak Detection Additive to the Refrigerant Circuit Using the A/C Service Station.

 Fill the UV-leak detection additive and the specified refrigerant quantity in the refrigerant circuit using the A/C service station. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).

i Note

- ◆ The quantity of UV-leak detection additive which is filled on a refrigerant circuit with a refrigerant oil quantity up to 150 cm³ is 3.0 ⁺/₋ 0.5 ml (cm³). If the refrigerant oil capacity in the refrigerant circuit is larger, then more UV leak detection additive must be added accordingly (for example, 5.0 ± 0.5 (cm³) for a refrigerant circuit with a refrigerant oil capacity of 250 cm³. When filling the UV-leak detection additive using an A/C service station the set quantity in the A/C service station can vary for this reason pay attention to the corresponding Owner's Manual. Refer to A/C service station Owner's Manual.
- ◆ The actual refrigerant oil quantity in the refrigerant circuit can be found in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- If UV-leak detection additive was filled already in a refrigerant circuit for an earlier repair, note the following: only add new UV-leak detection additive if the refrigerant oil will be replaced. If only a portion of the refrigerant oil was replaced, only add a proportionate amount of the UV-leak detection additive. For

example, if 50 ml of refrigerant oil was replaced in a vehicle with 150 ml, add only 1.0 ml (cm³) of UV-leak detection additive.

The leak detection system has the following components:

- Cleaning Solution -3-
- UV Leak Detection Lamp -4-
- Protective Eyewear -5-
- Sticker -6-
- Safety Gloves -8-

i Note

Ignore items -1, 2 and 7- in the image.

- Evacuate the refrigerant circuit according to the procedure and fill with UV-leak detection additive and refrigerant. Refer to ⇒
 <u>"3.5 Refrigerant Circuit, Evacuating", page 144</u> and ⇒
 <u>"3.6 Refrigerant Circuit, Charging", page 149</u>.
- Wait until the pressure in the high and low pressure side have equalized.
- Disconnect and the A/C service station from the refrigerant circuit and turn it off. Refer to ⇒ "3.8 A/C Service Station, Switching off and Disconnecting from Refrigerant Circuit", page 154.
- Apply a label near the service connections stating that UV-leak detection additive was added to the refrigerant circuit.
- Remove the residual UV-leak detection additive for example with absorbent paper from the service connection and the surrounding area and clean using Leak Detection Kit - Cleaning Solution - VAS6201/3-.
- Seal the service connection using closure caps.
- Star Preserved Convicinit Copying for private or commercial purposes, in part or in whole, is not permitted unessigned by AUDI AG. AUDI AG does not guarantee or accept any liability
- Operate the A/C system for at least 60 minutes with the A/C AG. compressor switched on.
- Check for leaks on the refrigerant circuit using UV lamp. Refer to <u>⇒ page 68</u>.

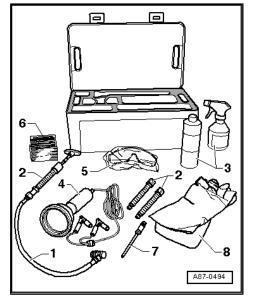
Check for Leaks on the Refrigerant Circuit Using UV Lamp.

🚹 WARNING

Risk or photokeratitis to the eyes by UV light.

- Wear protective eyewear.
- Never look into the UV lamp.
- Never point the UV lamp at another person.
- On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.
- Switch off the ignition.





- A/C system must be operated for a minimum of 60 minutes so that the additive distributes itself in the entire refrigerant circuit (compressor must be running). Depending on the size of the leak, it may become visible under UV light within that time.
- Depending on the size and location of the leak, it can now last up to several days until enough refrigerant oil with UV-leak detection additive flows out to clearly determine the leaking area.
- With leaks on the evaporator, leak detection additive is possibly washed off with condensation and flows out via evaporator drain. Since the evaporator is not easily accessible on most vehicles, checking the evaporator drain may indicate if the evaporator is leaking. However, it is necessary for this purpose that leak detection additive has already been in the refrigerant circuit for a long period of time (for example, a few days).
- The protective goggles do not only serve as eye protection but also amplify the illumination of leak detection additive under UV light.
- Depending on the accessibility of the refrigerant circuit components, it may be necessary to remove some vehicle components such as the bumper or air filter.
- ◆ Only a little refrigerant oil will get onto certain places on the refrigerant circuit when A/C is being used (for example, on the top cover of the receiver/dryer attached to the condenser). If there is a leak at this spot, it may take longer until enough refrigerant with refrigerant oil and additive start to leak out, which then can be viewed under UV light. It may be useful to use an electronic leak detector at these locations to find a leak. Refer to ⇒ "2.4.2 Refrigerant Circuit, Finding Leaks using Electronic Leak Detector", page 64.
- Move vehicle into a slightly darker area of the workshop (with daylight or bright lighting the effect of the UV light is diminished).
- Check the accessibility of the various refrigerant circuit components and remove any components in the refrigerant circuit area that block access to the refrigerant circuit components (for example noise insulation and the bumper).
- Protect the eyes by wearing protective eyewear.
- Connect the UV lamp to a 12 V bulb (vehicle battery). At the same time make sure the polarity of the connections is correct.
- Turn on the UV lamp and light the refrigerant circuit components. Locations where refrigerant, refrigerant oil and UV-leak detection additive has leaked out light up under fluorescent UV light.

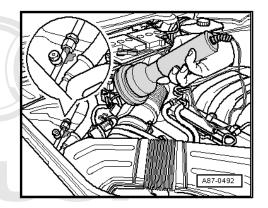
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2.4.4 Leaks, Determining using Vacuum Test with A/C Service Station

Determining leaks using the vacuum test with the A/C Service Station . Refer to \Rightarrow "3.5 Refrigerant Circuit, Evacuating", page 144.



 Small leaks (less than 100 g (3.5 oz) of refrigerant loss per year) are not often detected with the vacuum test or with the pressure test. The incoming air or the amount of nitrogen flow-





ing out is too small to be able to locate the faulty location based on noise.

- Leaks on the refrigerant circuit that are greater than 100 g (3.5 oz) of refrigerant loss each year are also not always detectable with the vacuum test or with the pressure test, depending on the ambient conditions (ambient noise, leak location etc.). The incoming air and the quantity of air or nitrogen flowing out is currently too small to detect any noise and locate the faulty location.
- ◆ Larger leaks on the refrigerant circuit (for example an impact from a rock on the condenser, greater than 100 g (3.5 oz) of pt any liability seeping refrigerant per year) can be detected for example from UDI AG. noise, using the vacuum test or the pressure test. Refer to <u>⇒</u> <u>"3.5 Refrigerant Circuit, Evacuating", page 144</u>.
- Perform a vacuum test. Refer to ⇒ page 147.

2.4.5 Leaks, Determining with a Pressure Test, with Nitrogen or Compressed Air

◆ Determining leaks using the vacuum test with the A/C Service Station . Refer to ⇒ "3.5 Refrigerant Circuit, Evacuating", page 144 . If leaks are determined but the leaking locations cannot be determined perform an additional leak test with nitrogen or compressed air. Refer to ⇒ page 147 .

Note

- Small leaks (less than 100 g (3.5 oz) of refrigerant loss per year) are not often detected with the vacuum test or with the pressure test. The incoming air or the amount of nitrogen flowing out is too small to be able to locate the faulty location based on noise.
- Leaks on the refrigerant circuit that are greater than 100 g (3.5 oz) of refrigerant loss each year are also not always detectable with the vacuum test or with the pressure test, depending on the ambient conditions (ambient noise, leak location etc.). The incoming air and the quantity of nitrogen flowing out is currently too small to detect any noise and locate the faulty location.
- ◆ Larger leaks on the refrigerant circuit (for example an impact from a rock on the condenser, greater than 100 g (3.5 oz) of refrigerant loss per year) can be detected for example from noise, using the vacuum test or the pressure test. Refer to <u>⇒</u> <u>"3.5 Refrigerant Circuit, Evacuating", page 144</u>.
- A large leak can be identified if a maximum of pressure of 15 bar (217.55 psi) can be generated in the refrigerant circuit using clean, dry compressed air or nitrogen. Refer to <u>⇒</u> "2.6.10 Refrigerant Circuit, Flushing with Compressed Air or Nitrogen", page 130. If the leak is large enough, the sound of escaping air or gas can be heard at the location of the leak.

Tools Required:



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- Quick-release coupling adapter -A- (a quick-release coupling adapter can for example also be removed from the A/C Service Station and used).
- Filler hose -A- (for example with M12 x 1.5 -6G thread according to SAE J639) depending on the threads on the quick-release coupling adapter (segmented) with the fitting adapter -B- (to connect the workshop compressed-air system or a nitrogen pressure regulator)
- Combined fine filter unit for compressed-air system with oil-dirt and water separator (so that the refrigerant circuit pressure is only generated with clean oil-free dry air) for the leak test with compressed air.
- ◆ Use the pressure gauge set with pressure reducer for nitrogen (maximum reduction pressure: 15 bar (217.55 psi)) -1- a compressed gas cylinder filled with nitrogen -3- and a filler hose -2- (connected for example a M12 x 1.5 -6G threads according to SAE J639 on a quick-release coupling adapter for the service connections) for the leak test with nitrogen.
- Perform a pressure test. Refer to <u>⇒ page 147</u>.

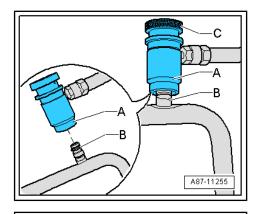
2.5 Components, Replacing

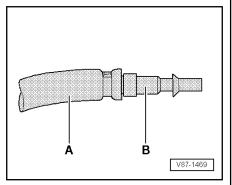
 \Rightarrow "2.5.1 General Information for Replacing Components", page <u>72</u>

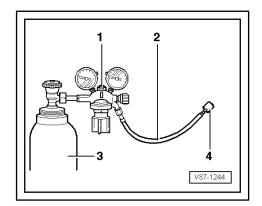
⇒ "2.5.2 Leaking or Damaged Areas, Replacing, Empty Refrigerant Circuit except A/C Compressor and Receiver/Dryer", page $\overline{73}$

 \Rightarrow "2.5.3 Leaking or Damaged Areas, Replacing, Full Refrigerant Circuit except A/C Compressor and Receiver/Dryer", page 75

 \Rightarrow "2.5.4 A/C Compressor, Replacing without the Need for Flushing Refrigerant Circuit", page 76.







<u>"2.5.5 Compressor, Replacing on Account of Leakage or Inter-</u> nal Damage", page 78

⇒ "2.5.6 Dryer Cartridge/Receiver/Dryer. Replacing after Cleaning Refrigerant Circuit", page 79

#2.5.7 Receiver/Dryer, Replacing without the Need for Flushing Refrigerant Circuit", page 81

#2.5.8 Dryer Cartridge and Desiccant Bag, Replacing Without the Need for Flushing Refrigerant Circuit", page 82

⇒ "2.5.9 A/C Compressor Regulator Valve N280, Removing and Installing and Replacing", page 83

2.5.1General Information for Replacing Components

- Any refrigerant circuit components submitted for quality observation must be sealed (use the original caps from the replacement part).
- Replace damaged or leaking refrigerant circuit components. Refer to <u>⇒ "2.5 Components, Replacing", page 71</u>.
- To date, the replacement parts A/C compressor, receiver/dryer, 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).
- When the refrigerant circuit is empty, the A/C compressor with less authorised by AUDI AG. AUDI AG does not guarantee or accept any liability A/C Compressor Regulator Valve N280- (without A/C Clutch - N25-) is switched to internal lubrication with the result that only a minimal amount of oil is pumped from the compressor into the circuit.

Note

- The following replacement part (A/C compressor, reservoir, evaporator and condenser) can be filled with nitrogen gas, this filling is not always present. Therefore little or no pressure equalization is noticeable when unscrewing plugs from replacement parts.
- Depending on the storage location and storage time components which were filled with nitrogen gas from the manufacturer little or no pressure equalization is noticeable when unscrewing plugs the first time, so it is not possible to make a prediction about the presents of leaks in the components. So for example can the nitrogen gas which was filled via the shaft seal from a replacement part A/C compressor flow out over time via the shaft seal although the A/C compressor does not have any leaks.
- As 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 spare part numbers). Sealing caps at replacement part connections are therefore to be removed carefully and the nitrogen gas allowed to escape slowly.
- In the refrigerant circuit there are one or two expansion valve and a receiver/dryer or dryer vessel installed. Refer to ⇒



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Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- Replace the dryer cartridge or components with desiccant bag (receiver/dryer) after cleaning (flushing with refrigerant R1234yf) the refrigerant circuit at the same time hold sealed as long as possible so that the absorption of moisture is as little as possible. Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning",</u> <u>page 86</u>.
- ◆ The dryer cartridge or components with desiccant bag (receiver/dryer) are to be replaced if it is required for certain repair manual operations or if the refrigerant circuit has been open for a lengthy period and moisture has penetrated (for example, following an accident). Refer to ⇒ "2.5.2 Leaking or Damaged Areas, Replacing, Empty Refrigerant Circuit except A/C Compressor and Receiver/Dryer", page 73.
- ◆ The period of time which a refrigerant circuit may be left open without having to replace a component with the desiccant bag (receiver/dryer) depends on ambient influences to a large extent. Given a high ambient temperature and a high humidity level or if the vehicle, for example, has been standing in the open or driven (in wet, foggy weather conditions), the period will be considerably shorter than for a vehicle which has been standing in a heated dry area. The size of the opening through which moisture may ingress into the circuit also influences the period for which a refrigerant circuit can be left open without having to replace the component with the desiccant bag. Refer to ⇒ "2.5.2 Leaking or Damaged Areas, Replacing, Empty Refrigerant Circuit except A/C Compressor and Receiver/Dryer", page 73.
- Seal open connections and pipes (to prevent absorption of moisture).

Note

Dispose of dirty or used oils of unknown origin paying attention to local regulations.

2.5.2 Leaking or Damaged Areas, Replacing, Empty Refrigerant Circuit except A/C Compressor and Receiver/Dryer

The Refrigerant Circuit Was Completely Empty (for Example with Larger Leak or Cracked Hose)

◆ Pay attention to the general information for replacing components. Refer to ⇒ "2.5.1 General Information for Replacing Components", page 72.

[i]	Note

- In the event of only a minor leak with slow escape of refrigerant (for example at a small leakage point), the amount of refrigerant oil lost and the amount of moisture penetrating after servicing is not sufficient to influence operation of the air conditioner.
- The operations marked* are only to be implemented in case of a major leak (for example following an accident) art or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Convrictly by AUDI AG
- Remove the faulty component.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86.

Electrically-Driven A/C Compressor

Remove the electrically-driven A/C compressor and clean (flush with refrigerant $\cancel{R}1234$ yf)*. Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86 and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).

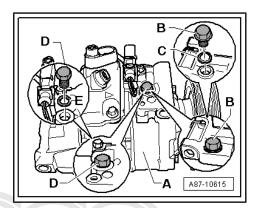
Mechanically Driven A/C Compressor

- Remove A/C compressor.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehiclespecific repair manual).
- Remove the oil drain plug -B / D- from the A/C compressor -A-.'



- The versions of the oil drain plug -B / D- and the seal -C / Eare different (depending on the manufacturer of the A/C compressor). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
- When installing the oil drain plug -B / D- note the tightening specification (depending on the manufacturer of the A/C compressor and the version of the oil drain plug) on "Denso" and "Delphi" A/C compressor is for example installed on the oil drain plug (tightening specification currently 30 Nm on "Denso" and 15 Nm on "Delphi" A/C compressor). On "Sanden" or "Zexel- / Valeo" A/Ċ compressors an oil drain plug or a seal is installed depending on the version on the oil drain plug (tightening specification currently 10 Nm).
- On Denso A/C compressors for example a seal -E- is installed on the oil drain plug -D-. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual) and the Parts Catalog for replacement.
- On Sanden A/C compressors for example a seal -C- is installed on the oil drain plug -B-. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle or private or commercial purposes, in part or in whole, is not specific repair manual) and the Parts Catalog for replacement. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual) for the tightening specification.
- If the seals (seal or O-ring) that are installed on the oil drain plug are not available as a replacement part, the removed seals may be used as an exception (check for damage before installing). If the removed seal is damaged or deformed if necessary replace with a commercially available component.
- After charging the refrigerant circuit check the installed oil drain plug for leaks for example using an electronic leak detector.
- To accelerate drainage of refrigerant oil, turn the A/C compressor via the belt pulley or the A/C clutch plate, for example.
- Drain the old refrigerant oil from the A/C compressor. Refer to "2.5.4 A/C Compressor, Replacing without the Need for Flushing Refrigerant Circuit", page 76

All Vehicles



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Fill the specified complete oil quantity in the A/C compressor or the circuit. Refer to ⇒ "2.5.4 A/C Compressor, Replacing without the Need for Flushing Refrigerant Circuit", page 76 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (The approved refrigerant oil and capacity for the refrigerant oil can be found in the vehicle-specific repair manual).

Note

- ◆ Then fill A/C compressor with quantity of new refrigerant oil corresponding to quantity of refrigerant oil in replacement A/C compressor.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
 Use the different refrigerant oils and quantities for the different by AUDI AG. AUDI AG does not guarantee or accept any liability A/C compressors. Refer to ⇒ Heating, Ventilation and Aircorrectness of information in this document. Copyright by AUDI AG. Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).
- ◆ To ensure compressor lubrication on start-up, at least 40 cm³ of refrigerant oil must be poured into the compressor. The remainder can be added to the new reservoir/receiver/dryer or a refrigerant line. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).
- If on an open refrigerant circuit dirt enters the A/C compressor (for example during an accident) the A/C compressor must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
- Clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>.
- Replace the dryer cartridge and receiver/dryer.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Assemble, evacuate and recharge the refrigerant circuit. Refer to <u>⇒ "3 Working with A/C Service Station", page 134</u>.

2.5.3 Leaking or Damaged Areas, Replacing, Full Refrigerant Circuit except A/C Compressor and Receiver/Dryer

Refrigerant Circuit Still Contains Refrigerant (for Example, with Minor Leak)

- Pay attention to the general information for replacing components. Refer to ⇒ "2.5.1 General Information for Replacing Components", page 72.
- Discharge the refrigerant circuit. Refer to \Rightarrow "3 Working with A/ <u>C Service Station", page 134</u>.
- Remove the malfunctioning component, flush with compressed air, collect escaping refrigerant oil.
- The new component is to be filled with the amount of refrigerant oil flushed out (positive 20 cm³ for evaporator, positive 10 cm³ for condenser, refrigerant pipes and refrigerant hoses) as fresh refrigerant oil fill.



Note

Dispose of old refrigerant oil (pay attention to local regulations).

- Assemble, evacuate and charge the refrigerant circuit. Refer to \Rightarrow "3 Working with A/C Service Station", page 134.
- 2.5.4A/C Compressor, Replacing without the Need for Flushing Refrigerant Circuit



Note

Cleaning the refrigerant circuit means flushing with refrigerant R1234yf. Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page</u> 86.

Pay attention to the general information for replacing components. Refer to = "2.5.1 General Information for Replacing" Components", page 72.

For Example, in the Event of External Damage Following an Accident

- Discharge the refrigerant circuit. Refer to <u>⇒ "2.6 Refrigerant</u> Circuit, Cleaning", page 86.
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not Remove the A/C compressor. Refer toper the toper the toper t and Air Conditioning; Rep. Gr. 87; A/C Compression (vehicle of information in this document. Copyright by AUDI AG. specific repair manual).

Electrically-Driven A/C Compressor

Flush the faulty electrically driven A/C compressor to remove the refrigerant oil (write down the quantity of refrigerant oil that was flushed out). Refer to <u>⇒ "3.11 Electrically Driven A/C</u> Compressor, Cleaning", page 157.



Note

- If more that 75% of the quantity of refrigerant oil is flushed out on a faulty A/C compressor, which corresponds to the amount in the replacement A/C compressor, do not flush the replacement A/C compressor (a small residual amount always remains in the A/C compressor and that the quantity of refrigerant oil in the refrigerant circuit can be disregarded).
- If less than 75% of the specified refrigerant oil quantity is flushed out of the defective A/C compressor, the remaining refrigerant oil is found in the refrigerant circuit components. To prevent overfilling with refrigerant oil, flush the refrigerant circuit or the electrically driven A/C compressor.
- Flush the refrigerant circuit or the new electrically driven A/C compressor to remove the refrigerant oil. Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86 and ⇒ "3.11 Electrically Driven A/C Compressor, Cleaning", page 157
- Dispose of the refrigerant oil removed from the defective and the new A/C compressor/refrigerant circuit (pay attention to local regulations).





The electrically driven A/C compressor is constructed in such a way that it must be flushed in order to remove the refrigerant oil (the refrigerant oil cannot be poured out by removing the draining plug as in the case for the mechanical A/C compressor). Refer to "2.5.2 Leaking or Damaged Areas, Replacing, Empty Refrigerant Circuit except A/C Compressor and Receiver/Dryer", page 73.

 Only fill the replacement A/C compressor with the amount of new refrigerant that corresponds with the amount removed (from the defective A/C compressor).

Note

- If, for example, 70 cm³ of refrigerant oil has been poured out of the defective A/C compressor and 140 cm³ out of the replacement A/C compressor (a small quantity of refrigerant oil remains in the A/C compressor and possibly in the A/C service station). Fill the A/C compressor to be installed, in this case, with 70 cm³ of refrigerant oil (do not use the refrigerant oil that was flushed out of the replacement compressor as it may have become contaminated while in the A/C service station).
- Use the different refrigerant oils and quantities for the different A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).
- If a greater quantity of refrigerant oil (more than approximately 40 cm³) has been flushed out the remaining refrigerant oil can also be added to the evaporator, a refrigerant line or the reservoir/receiver/dryer/inner heat exchanger. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).

Mechanically Driven A/C Compressor

Remove the oil drain plug from the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific reprised in antipath. Copying for private or commercial purposes, in part or in whole, is not permitted unless admorised by AUDI AG. AUDI AG does not guarantee or accept any liability

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There are different versions of the oil drain plug and its seal (it can be either a seal or a gasket; replace). Refer to \Rightarrow "2.5.2 Leaking or Damaged Areas, Replacing, Empty Refrigerant Circuit except A/C Compressor and Receiver/Dryer", page 73 and to the Parts Catalog.

- To accelerate drainage of refrigerant oil, rotate the A/C compressor by way of clutch plate of A/C clutch, for example.
- Drain the old refrigerant oil from the A/C compressor and dispose (pay attention to local regulations).
- Remove the oil drain plug from replacement A/C compressor, pour out refrigerant oil and only add a quantity of fresh refrigerant oil equal to the amount poured out of the malfunctioning A/C compressor. Refer to <u>⇒ "2.5.2 Leaking or Damaged Ar-</u> eas, Replacing, Empty Refrigerant Circuit except A/C Compressor and Receiver/Dryer", page 73.





i Note

- If, for example, 50 cm³ of refrigerant oil has been poured out of the defective A/C compressor and 100 cm³ out of the replacement A/C compressor (a small quantity of refrigerant oil remains in the A/C compressor). Fill the A/C compressor to be installed with 50 cm³ of refrigerant oil (use can be made of oil poured out of replacement A/C compressor).
- ◆ Use the different refrigerant oils and quantities for the different A/C compressors. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).
- If a greater quantity of refrigerant oil (more than approximately 50 cm³) has been poured out the remaining refrigerant oil can also be added to the evaporator or the reservoir/receiver/dry-er/inner heat exchanger. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).

All

- Replace the restrictor (only if there is one in this refrigerant circuit).
- Assemble, evacuate and charge the refrigerant circuit. Refer to ⇒ <u>"3 Working with A/C Service Station", page 134</u>.

2.5.5 Compressor, Replacing on Account of Leakage or Internal Damage

Pay attention to the general information for replacing components. Refer to ⇒ "2.5.1 General Information for Replacing Components", page 72.

Vehicles with a High-Voltage System (Hybrid Vehicles)

- Pay attention to the high-voltage system danger classification. Refer to ⇒ Rep. Gr. 00 ; High-Voltage System Danger Classification .
- Observe safety precautions when working on the high-voltage system. Refer to ⇒ "1.4 Safety Precautions when Working on <u>Vehicles with High-Voltage System", page 2</u>. Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
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 Pay attention to safety precautions when working/inear/high ← correctness of information in this document. Copyright by AUDI AG.
 voltage components. Refer to ⇒ "1.5 Safety Precautions when Working near High-Voltage Components", page 3.

All Vehicles

Replacing the A/C compressor for example due to noises from the A/C compressor or no A/C compressor output.

- Discharge the refrigerant circuit. Refer to <u>⇒ "3 Working with A/</u> <u>C Service Station", page 134</u>.
- Remove the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehiclespecific repair manual).
- Clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>.

i Note

- ◆ For internal damage (to the A/C compressor) check the refrigerant hoses and condenser for example shavings have penetrated clean refrigerant hoses and condenser (flush with refrigerant R1234yf) and if necessary replace the refrigerant hoses. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- ◆ On some vehicles (for example vehicles with two evaporators) the refrigerant oil quantity in the refrigerant circuit can be greater than the quantity which is in the replacement compressor. On these vehicles add the remaining refrigerant oil quantity to the refrigerant circuit if necessary. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).
- ◆ Do not flush the refrigerant circuit if there is a fault in the electronics in the electronically driven A/C compressor (for example the A/C Compressor Control Module J842- is defective). In this case, replace the A/C compressor / the refrigerant circuit without flushing it. Refer to ⇒ "2.5.4 A/C Compressor, Replacing without the Need for Flushing Refrigerant Circuit", page 76.

 Replace the desiccant bag/dryer cartridge (or reservoir/re-Protected ceiver/dryer) Refer to prime Heating, Ventilation and Air Condipermitted tioning, Rep. Gr.D.87. Refrigerant Circuit (vehicle-specific with respect to the corrections of information in his document. Copyright by AUDI AG.

- Examine the expansion valve for dirt or corrosion; replace if necessary. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Assemble, evacuate and charge the refrigerant circuit. Refer to ⇒ <u>"3 Working with A/C Service Station", page 134</u>.
- 2.5.6 Dryer Cartridge/Receiver/Dryer. Replacing after Cleaning Refrigerant Circuit

Note

In the receiver/dryer usually there is a dryer cartridge or a desiccant bag are installed (depending on the design of the refrigerant circuit). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Pay attention to the general information for replacing components. Refer to ⇒ "2.5.1 General Information for Replacing Components", page 72.



Cleaning the refrigerant circuit means flushing with refrigerant R1234yf. Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page <u>86</u>.

For example, on account of ingress of moisture (refrigerant circuit open for lengthy period) or contamination

- Discharge the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141.
- Remove the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehiclespecific repair manual).
- Eliminate the cause of the malfunction. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Clean the refrigerant circuit (flush with refrigerant R1234yf).
 Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>.

Electrically-Driven A/C Compressor

 Flush the old refrigerant oil out of A/C compressor. Refer to ⇒ <u>"3.11 Electrically Driven A/C Compressor, Cleaning", page</u> <u>157</u>.

Mechanically Driven A/C Compressor

 Remove the oil drain plug from the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/ C Compressor (vehicle-specific repair manual).

i Note

Replacing the different versions of the oil drain plugs and their corresponding seal. Refer to ⇒ <u>"2.5.2 Leaking or Damaged Areas, Replacing, Empty Refrigerant Circuit except A/C Compressor and Receiver/Dryer", page 73</u>, ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

- To accelerate drainage of refrigerant oil, turn the A/C compressor via the belt pulley or the A/C clutch plate, for example. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
- Pour old refrigerant oil out of A/C compressor. Refer to ⇒
 <u>"2.5.4 A/C Compressor, Replacing without the Need for Flushing Refrigerant Circuit", page 76</u>.

Note

Dispose of old refrigerant oil (pay attention for provide or commercial purposes, in part or in whole, is not with respect to the correctness of information in this document. Copyright by AUDI AG.

All A/C Compressors

- Examine the expansion valve for dirt or corrosion; replace if necessary. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Then add to the A/C compressor the new refrigerant oil quantity which matches the refrigerant oil quantity in the replacement compressor (or the specified refrigerant oil quantity in vehicles with two evaporators). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).



 Use the different refrigerant oils and quantities for the different A/C compressors. Refer to ⇒ Heating, Ventilation and Air



Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).

- ◆ To ensure compressor lubrication on start-up, at least 40 cm³ of refrigerant oil must be poured into the compressor. The remainder can be added to the refrigerant line or the new reservoir/receiver/dryer/inner heat exchanger. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- If on an open refrigerant circuit dirt enters the A/C compressor (for example during an accident) the refrigerant circuit must be cleaned and the A/C compressor must be replaced. Refer to ⇒ <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
- ◆ On vehicles with two evaporators the refrigerant oil quantity in the refrigerant circuit can be greater than the quantity which is in the replacement compressor add the remaining refrigerant oil quantity to the refrigerant circuit if necessary. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- Replace the desiccant bag/dryer cartridge (or receiver/dryer). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Assemble, evacuate and charge the refrigerant circuit. Refer to <u>⇒ "3 Working with A/C Service Station", page 134</u>.
- 2.5.7 Receiver/Dryer, Replacing without the Need for Flushing Refrigerant Circuit

Note

In the receiver/dryer usually there is a dryer cartridge or a desice or commercial purposes, in part or in whole, is not cant bag are installed (depending on the design of the remigerant AUDIAG does not guarantee or accept any liability circuit). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).

Pay attention to the general information for replacing components. Refer to ⇒ "2.5.1 General Information for Replacing Components", page 72.

I Note

Cleaning the refrigerant circuit means flushing with refrigerant R1234yf. Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page <u>86</u>.

- For example, no escape of refrigerant and no ingress of moisture and dirt into circuit.
- If it is determined at a gas analysis that contaminated refrigerant was in the circuit but there is no concern about the A/C system function. Refer to ⇒ "3.3 Refrigerant Gas Analysis, Performing", page 138.

- Discharge the refrigerant circuit. Refer to ⇒ "3 Working with A/ <u>C Service Station", page 134</u>.
- Remove the receiver/dryer. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Remove dirt from the receiver/dryer.
- Weigh the removed receiver/dryer.
- Add refrigerant oil to the new receiver/dryer until it is the same weight as the receiver/dryer that was removed.
- Install the new receiver/dryer. Refer to ⇒ Heating, Ventilation and Air ©onditioning; Rep: Gr: 87: Refrigerant ©ircuit (vehi-whole, is not cle-specific repairs and the by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
- Assemble, evacuate and charge the refrigerant circuit. Refer to ⇒ <u>"3 Working with A/C Service Station", page 134</u>.
- 2.5.8 Dryer Cartridge and Desiccant Bag, Replacing Without the Need for Flushing Refrigerant Circuit

i Note

The dryer cartridge / the desiccant bag depending on the design of the r are usually installed in the receiver/dryer. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

◆ Pay attention to the general information for replacing components. Refer to ⇒ "2.5.1 General Information for Replacing Components", page 72.



Cleaning the refrigerant circuit means flushing with refrigerant R1234yf. Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page <u>86</u>.

- For example, no escape of refrigerant and no ingress of moisture and dirt into circuit.
- If it is determined at a gas analysis that contaminated refrigerant was in the circuit but there is no concern about the A/C system function. Refer to ⇒ "3.3 Refrigerant Gas Analysis, Performing", page 138.
- Discharge the refrigerant circuit. Refer to ⇒ <u>"3 Working with A/</u> <u>C Service Station", page 134</u>.
- Replace the dryer cartridge/desiccant bag (or reservoir/receiver/dryer). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



If the dryer cartridge/the desiccant bag is securely installed in the component (for example in the receiver/dryer on the condenser) and cannot be separately replaced, replace the receiver/dryer or condenser. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- Assemble, evacuate and charge the refrigerant circuit. Refer to <u>⇒ "3 Working with A/C Service Station", page 134</u>.
- 2.5.9 A/C Compressor Regulator Valve -N280-, Removing and Installing and Replacing



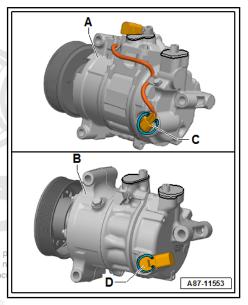
- Certain malfunctions at the A/C Compressor Regulator Valve - N280- (for example, a stuck valve or a short circuit in the coil) can lead to a complaint regarding the A/C compressor (A/C system is not cooling, the evaporator ices over, etc.). If the cause is with the A/C Compressor Regulator Valve - N280-(and not the A/C compressor itself), the A/C compressor can be serviced by replacing the A/C Compressor Regulator Valve - N280- -C and D-.
- The A/C Compressor Regulator Valve N280- -C and D- is not available as a replacement part for all A/C compressors. If the A/C Compressor Regulator Valve - N280- is not available as an individual A/C compressor part, then the entire A/C compressor must be replaced. Refer to the Parts Catalog.
- The A/C Compressor Regulator Valve N280- is available in different versions and settings. Refer to the Pars Catalog. On the A/C compressor -A- (shown is an A/C compressor manufactured by "Denso"), the connector for the vehicle wiring harness connection is attached with a short wiring harness to the A/C Compressor Regulator Valve N280- -C-. On the A/C compressor -B- (shown is an A/C compressor manufactured by "Sanden"), the connector for the vehicle wiring harness connection is mounted directly on the A/C Compressor Regulator Valve N280- -C-. The removal and installation of the A/C Compressor Regulator Valve N280- -C and D- on other A/C compressors (other type and manufacturer) is basically the same and only slightly deviates from the procedure described below.
- If the A/C Compressor Regulator Valve N280- malfunction was found to be caused by dirt, shavings or abraded A/C compressor material after the removal of the A/C Compressor Regulator Valve - N280-, clean the refrigerant circuit and replace the A/C compressor. Refer to ⇒ "2.5.5 Compressor, Replacing on Account of Leakage or Internal Damage", page 78 and ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.

Removing

 Discharge the refrigerant circuit. Refer to ⇒ "3.1 Working with A/C Service Station", page 134.

There is a risk of damaging the A/C compressor if the refrigerant circuit is empty.

- Never start the engine with the refrigerant circuit empty.
- Depending on the vehicle and component location of the A/C compressor, remove the components that prevent access to the A/C Compressor Regulator Valve N280-. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



For Vehicles Where at Least One of the Two Refrigerant Lines and the A/C Compressor Regulator Valve - N280- Cannot Be Disconnected and Removed While the A/C Compressor Is Attached to the Engine.

 Remove the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehiclespecific repair manual).

For a Vehicle Where at Least One of the Two Refrigerant Lines and the A/C Compressor Regulator Valve - N280- Can Be Disconnected and Removed While the A/C Compressor Is Attached to the Engine (the A/C Compressor Is Not Removed).

Extract refrigerant.

Danger or frostbite due to refrigerant coming out under pressure.

Frostbite on the skin and other parts of the body is possible.

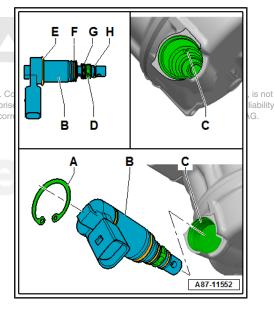
- Wear safety gloves.
- Wear protective eyewear.
- Extract refrigerant and open the refrigerant circuit immediately.
- If more than 10 minutes elapse after extracting the refrigerant and the refrigerant circuit was not opened, extract the refrigerant again. Pressure can develop in the refrigerant circuit due to evaporation.
- Check the pressure in the refrigerant circuit once more via the A/C service station pressure gauge.
- If the displayed pressure is larger than the ambient pressure (larger than approximately 1 bar (14.5 psi) absolute pressure), turn on the A/C service station and extract the refrigerant that is building up the pressure.
- Disconnect one of the two refrigerant lines from the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific repair manual).

All Vehicles

Note

This and the following images show the A/C Compressor Regulator Valve - N280- -B- on a "Sanden" A/C compressor type "6 SEU 14". On these A/C compressors the connector for the vehicle of the wiring harness connection is mounted directly on the A/C Come author pressor Regulator Valve - N280- -B-. The removal and installation of the A/C Compressor Regulator Valve - N280- -B- on other A/C compressors (other type and manufacturer, for example "Denso", the A/C Compressor Regulator Valve - N280- with a short wiring harness to the connector) can differ. The procedure is however the same, as described in the following for the A/C compressor manufactured by "Sanden" type "6 SEU 14".

If equipped, loosen the wire connection from the A/C Compressor Regulator Valve - N280- -B- to the connector to the vehicle wire harness from the A/C compressor.



Note

For an A/C compressor with an A/C Clutch - N25-, where the actuation of the A/C Clutch - N25- occurs via the same connector as the actuation of the A/C Compressor Regulator Valve - N280--B-, remove the corresponding wires from the connector. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).

- Clean the A/C compressor in the area of the A/C Compressor Regulator Valve - N280- -B-.
- Remove the circlip -A-.
- Carefully pull the A/C Compressor Regulator Valve N280--B- from the mount for the A/C compressor -C-.
- Check the removed A/C Compressor Regulator Valve N280--B- and A/C compressor mount -C- for dirt.



- If the strainer -D- on the A/C Compressor Regulator Valve -N280- -B- or the A/C compressor mount -C- are heavily contaminated (for example with shavings or dark, sticky abraded material), this indicates damage on the A/C compressor. In this case, the refrigerant circuit is to be cleaned and the A/C compressor is to be replaced. Refer to ⇒ "2.5.5 Compressor, Replacing on Account of Leakage or Internal Damage", page 78 and ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- If the strainer -D- on the A/C Compressor Regulator Valve -N280- -B- and the A/C compressor mount -C- are only lightly contaminated (with gray deposits from normal A/C compressor operation, for example), a malfunction at the A/C Compressor Regulator Valve - N280- -B- can cause the A/C

Protect **compressor malfunctioning** mercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Installing

 Check the mount from the A/C compressor -C- for contamination and if necessary carefully and thoroughly clean the with a clean lint-free towel.

Contamination in the open A/C compressor or damage to the sealing surfaces in the mount.

Risk of a new failure of the regulator valve or the A/C compressor.

- Carefully clean the A/C compressor mount using only a clean, lint-free cloth (do not use compressed air).
- Make sure while cleaning the mount that no dirt gets into the area underneath the sealing surface for the seal or the existing channels and none of the mount sealing surfaces become damaged.
- Check the A/C compressor mount -C- for damage (also pay attention to small scratches on the surface, if there is damage, replace the A/C compressor).
- Check the seal -E, F, G, and H- from the A/C Compressor Regulator Valve - N280- -B-.
- Carefully coat the seals -E, F, G, and H- from the A/C Compressor Regulator Valve N280- -B- lightly with refrigerant oil and check for correct seating.

- Insert the A/C Compressor Regulator Valve N280- -B- all the way into the A/C compressor mount -C-.
- Install locking ring -A-.
- Re-install all removed parts in the reverse order.
- Assemble, evacuate and recharge the refrigerant circuit. Refer to ⇒ <u>"3 Working with A/C Service Station", page 134</u>.
- Check the A/C system function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

2.6 Refrigerant Circuit, Cleaning

 \Rightarrow "2.6.1 General Information for Cleaning Refrigerant Circuit ", page 86

 \Rightarrow "2.6.2 Cleaning the Refrigerant Circuit, Preliminary Work (flushing with Refrigerant R1234yf)", page 88

⇒ "2.6.3 Refrigerant Circuit, Cleaning Process", page 90

 \Rightarrow "2.6.4 Connection Diagram for Cleaning (Flushing), Refrigerant Circuit with Expansion Valve and Receiver/Dryer", page 91

 \Rightarrow "2.6.5 Connection Diagram for Cleaning (Flushing), Refrigerant Circuit with Restrictor and Container (without High-Voltage System)", page 95

⇒ "2.6.6 Connection Diagram for Cleaning (Flushing), Vehicles with High-Voltage System (without Additional A/C System Functions)", page 98

⇒ "2.6.7 Connection Diagram for Cleaning (Flushing), Vehicles with High-Voltage System (with Additional A/C System Functions such as Heat Pump Operation)", page 98

⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99

⇒ "2.6.9 General Information on Blowing Through with Compressed Air or Nitrogen", page 128

<u>⇒ "2.6.10 Refrigerant Circuit, Flushing with Compressed Air or</u> <u>Nitrogen", page 130</u>

2.6.1 General Information for Cleaning Refrigerant Circuit



- Working on the refrigerant circuit with the A/C Service Station can normally be performed without needing to de-energize the high-voltage system.
- ◆ To clean (flush) the refrigerant circuit specific components must be removed, before beginning the procedures de-energize the high-voltage system. Refer to ⇒ Electrical System Hybrid; Rep. Gr. 93 ; High-Voltage System, De-Energizing.
- If it is suspected that chemicals were added to the refrigerant circuit to seal leaks, chemical substances to seal leaks in the refrigerant circuit (leak stop additive), do not connect the A/C service station and do not flush the refrigerant circuitart or in whole, is not permitted unless authorised by AUDI AG, AUDI AG does not guarantee or accept any liability
- Chemicals that seal leaks in the coolant circuit form deposits AG. 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 the customer that there are substances in the A/C system that are not approved by Volkswagen/Audi and for this reason the A/C system cannot be flushed or serviced.

All Vehicles



- Volkswagen/Audi does not approve the use of chemicals to seal leaks in the refrigerant circuit (leak stop additives).
- Chemical materials to seal leaks in the refrigerant circuit react with air or the moisture in the air and form deposits in the refrigerant circuit (and the A/C Service Station) that lead to malfunctions in the valves and other components that come into contact with such chemicals. These deposits cannot be removed completely from the components, even by flushing. It is only possible to service the refrigerant circuit by replacing all the components that have come into contact with this material.
- It is generally not possible to externally recognize chemical substances to seal leaks in the refrigerant circuit (leak stop additive), and the stickers that are supposed to come with them are usually not there. Therefore be careful when working with a vehicle if its service history is unknown.
- The refrigerant circuit may be flushed with an ACC Service AUDI AG does not guarantee or accept any liability Station for the refrigerant R134a and flushed with refrigerant on in this document. Copyright by AUDI AG. R1234yf if no A/C Service Station for the refrigerant R1234yf
- R1234yf if no A/C Service Station for the refrigerant R1234yf is available. Currently the use of refrigerant R134a for cleaning the refrigerant circuit is permitted. Refer to ⇒ Refrigerant R134a Servicing; Rep. Gr. 87; Refrigerant Circuit (Refrigerant R134a, Servicing; Refrigerant Circuit, Using Service Station).
- If it is determined by the gas analysis that the refrigerant R1234yf is contaminated with another gas, it must be extracted from the refrigerant circuit and be disposed of as a gas from an unknown composition according to the legal requirements. Refer to ⇒ VW / Audi ServiceNet and ⇒ "3.13 Contaminated Refrigerant, Filling in Recycling Container for Analysis, Processing, or Disposal", page 162.
- Due to contaminated refrigerant decomposition products can be created and accumulate in the refrigerant oil which cannot be extracted with the refrigerant. The contaminated refrigerant oil in this case is to be removed from the refrigerant circuit by flushing with refrigerant.
- The refrigerant circuit must be cleaned (flushed with refrigerant R1234yf) in order to force out moisture and other contaminants (for example abrasion from a faulty A/C compressor) as well as old refrigerant oil as efficiently as possible, without wasting refrigerant, without the need for extensive assembly work and without endangering the environment.

Clean the refrigerant circuit with refrigerant R1234yf (flush):

- If dirt or other contaminants are in the circuit.
- If the vacuum reading does not stay the same when evacuating a leak-free refrigerant circuit (pressure build-up due to moisture in the refrigerant circuit).
- The refrigerant circuit has been left open for longer than normal (for example, after a collision).
- Pressure and temperature measurements in the circuit indicate that there is moisture in the refrigerant circuit.







- If there is any uncertainty as to how much refrigerant oil is in the refrigerant circuit.
- Under certain circumstances when contaminated refrigerant R1234yf is filled in the refrigerant circuit. Refer to <u>⇒ "2.5 Components, Replacing", page 71</u> and <u>⇒ "3.3 Refrigerant Gas</u> <u>Analysis, Performing", page 138</u>.



If contaminated refrigerant is determined inner damage to the refrigerant circuit components is indicated (for example corrosion on the inside of the refrigerant lines or loosened inside layer of the refrigerant hose) flushing the refrigerant circuit may not be enough. If this is the case all refrigerant circuit components must be replaced (a gas was filled which massively damaged the components).

- A/C compressor had to be replaced due to internal damage (for example, noise or no output). Refer to ⇒ "2.5 Components, Replacing, page 71 Copying for private or commercial purposes, in part or in white, is not Replacing, page 71 Copying for purvate or commercial purposes, in part or in white, is not Replacing, page 71 Copying for purvate or commercial purposes, in part or in white, is not
- If it is stipulated by the vehicle-specific repair manual following the replacement of certain components.

Required Tools

- A/C Service Station with flushing device (for this A/C Service Station the auxiliary function "flush refrigerant circuit" and the refrigerant circuit flushing device required for it are present. Refer to the Parts Catalog.
- ◆ Passenger Vehicle Adapter Set Volkswagen/Audi . Refer to ⇒ <u>"2.6.8 Adapter for Assembling Flushing Circuit", page 99</u> and the Parts Catalog.



There is also a Fill Hose with connections 5/8 -18 UNF and large inner diameter in short version (commercially available) included in the Adapter Set for Passenger Vehicles .

2.6.2 Cleaning the Refrigerant Circuit, Preliminary Work (flushing with Refrigerant R1234yf)

- Discharge the refrigerant circuit. Refer to <u>⇒ "3.4 Refrigerant</u> <u>Circuit, Discharging", page 141</u>.
- Remove the A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Vehicle with Restrictor and Reservoir

- Remove the restrictor (vehicle-specific) and connect the lines back together. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Remove the reservoir (vehicle-specific) and connect the lines back to each other (to do so use the adapter and the Filler Hose from the Passenger Vehicle Adapter Set VW/Volkswagen/Audi). Refer to ⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

i Note

The reservoir could be flushed but because of its large internal volume it will take too much refrigerant, the reservoir would iceup too much when extracting the refrigerant, the refrigerant would evaporate too slowly and extraction would be extended too much.

Vehicle with expansion valve and receiver/dryer

If on this refrigerant circuit it is possible and necessary (see the notes) to remove the receiver/dryer of the dryer cartridge from the receiver/dryer (vehicle-specific) and connect the lines back with each other (to do so use the adapter and the Filler Hose from the Passenger Vehicle Adapter Set Volkswagen/ Audi). Refer to ⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Note

- ◆ The receiver/dryer can be flushed depending on the version (remove the dryer cartridge installed inside of it if necessary). Refer to ⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ The receiver/dryer attached to the condenser remains installed during flushing (it can be flushed due to its design and is only replaced after flushing). Refer to <u>⇒ "2.6.8 Adapter for</u> <u>Assembling Flushing Circuit", page 99</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If the receiver/dryer or dryer cartridge is integrated in the condenser, then they cannot be replaced separately or are not available as a single part, and the condenser must be replaced after flushing. In this case, replace the condenser with the receiver/dryer on these vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA).
- Depending on the version receivers/dryers where it is possible to replace the dryer cartridge separately have an additional filter element, which must also be replaced with the dryer cartridge if necessary.
- On vehicles with a dryer cartridge in the receiver/dryer on the condenser (vehicle-specific), remove the dryer cartridge and seal off the opening on the receiver/dryer. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) by copyright. Copying for private or commercial purposes, in part or in whole, is not circuit (vehicle-specific repair manual) by copyright. Copying for private or commercial purposes, in part or in whole, is not circuit (vehicle-specific repair manual).
- Remove the expansion valve (vehicle specific) and an adapter ion in this document. Copyright by AUDI AG. from the Passenger Vehicle Adapter Set Volkswagen/Audi may be installed. Refer to <u>⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



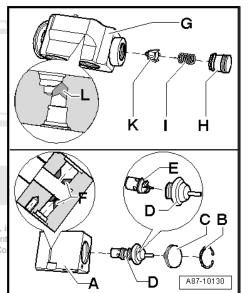


If there is no adapter suitable for the expansion valve in the Passenger Vehicle Adapter Set Volkswagen/Audi, the removed expansion valve can also be drilled open (the old expansion valve must be replaced in most cases and is therefore no longer required).

- The sealing surfaces of the expansion valve must not be damaged. By damaging the sealing surfaces refrigerant can leak out.
- Drill a hole for the expansion valve.

i Note

- Before drilling open, remove the regulating element and drill open the expansion valve for example using a suitable drill (drill bit diameter for example 6.0 mm).
- Before drilling depending on the version some individual parts of the expansion valve must be removed.
- Expansion valves are available in various versions and with different constructions. For version -A-, for example. parts -B, C and D- must be removed. Separate part -E- (regulating element) from component -D-. Then drill open the expansion valve in area -F- using a suitable drill.
- For version -G- for example, parts in Hopyling and in K-omust be in purposes, removed and then drill the open area -L+ using a suitable drill guaran with respect to the correctness of information in this document. C
- Clean the drilled open expansion valve of residue from the work (shavings).
- Install the parts -B, C and D- for version -A-, or the part -H- for version -G-.



Note

For vehicles with two evaporators, the circuit to the second evaporator must be disconnected from the circuit of the first evaporator and must be flushed in a separate work procedure. Refer to <u>⇒</u> <u>"2.6.8 Adapter for Assembling Flushing Circuit", page 99</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Clean the refrigerant circuit (flush). Refer to ⇒ <u>"3.12 Refriger-ant Circuit, Cleaning", page 160</u>.

2.6.3 Refrigerant Circuit, Cleaning Process

i Note

The progress takes place automatically according to the A/C Service Station program. Refer to the A/C Service Station Owner's Manual.

♦ After switching on the flushing circuit (refrigerant circuit with connecting hoses and the flushing circuit for the refrigerant circuit) is evacuated first and at the same time the refrigerant circuit is checked for leaks (depending on the A/C Service Station version, it is possible that manually switching to advance the program is required).

- After the refrigerant circuit is checked for seals after evacuating, the flushing circuit/refrigerant circuit is checked for correct assembly by filling a specific quantity of refrigerant.
- After a pressure test the refrigerant is extracted, the refrigerant circuit is evacuated if necessary and the cleaning (the flushing process) begins.
- ◆ A prescribed quantity of refrigerant (depending on the internal volume of the flushing circuit for example 3 kg) is filled into the refrigerant circuit via the high pressure side of the A/C Service Station (in opposite direction of normal flow when A/C system is in operation and also on the low pressure side of the vehicle refrigerant circuit), or, as much refrigerant is filled until refrigerant circuit and viewing glasses of refrigerant circuit flushing device are completely filled with fluid refrigerant (depending on version of A/C Service Station , recognized for example that refrigerant no longer flows over a certain time period).
- ◆ After the prescribed quantity of refrigerant has been filled, the heater for the refrigerant circuit flushing device is switched on, for example (only if the refrigerant is extracted in gaseous form from the refrigerant circuit flushing device), depending on the version of the A/C Service Station and refrigerant circuit flushing device.
- ◆ After the refrigerant was extracted, the heating of the flushing device for refrigerant circuits is switched off (if present), it may occur that the refrigerant circuit is shortly evacuated again, depending on its version. After evacuation, the refrigerant extracted from the refrigerant circuit is separated by the A/C Service Station.
- The sequence of charging, extracting (and evacuating) the refrigerant is repeated three times (performed a total of four times).
- After the fourth extraction, the flushing circuit is evacuated depending on the version of the A/C Service Station.

2.6.4 Connection Diagram for Cleaning (Flushing), Refrigerant Circuit with Expansion Valve and Receiver/Dryer

- With 1 or 2 evaporators
- Without or with high-voltage system



- The arrows in the following illustrations show the refrigerant flow direction during flushing (refrigerant flows in opposite direction of flow when A/C system is in operation while flushing, therefore the high pressure side of the A/C Service System is connected to the low pressure connection of the refrigerant circuit to the A/C compressor).
- This main wiring diagram shows a refrigerant circuit with expansion valve, receiver/dryer and second evaporator (optional equipment on certain vehicles).
- On vehicles with an expansion valve and receiver driver driver the source of the so
- On a vehicle with only one evaporator, components from item "16" are not present or are not needed.

2. Refrigerant Circuit 91

- Depending on the construction of the A/C Service Station, check valves may be installed between the refrigerant circuit and the A/C Service Station (to guarantee the correct direction of refrigerant flow during flushing).
- The adapter from the VW/Audi Passenger Vehicle Adapter Set are provided with 5/8" -18 UNF threads use additional adapters from the VW/Audi - Passenger Vehicle Adapter Set set so that the R1234yf - A/C Service Station filling hose can be attached. Refer to the Parts Catalog.
- On vehicles with a high-voltage system power-operated valves are installed in the refrigerant circuit, which must be removed to clean (flush) and replaced with hand shut-off valves or adapters. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

1 - A/C Service Station

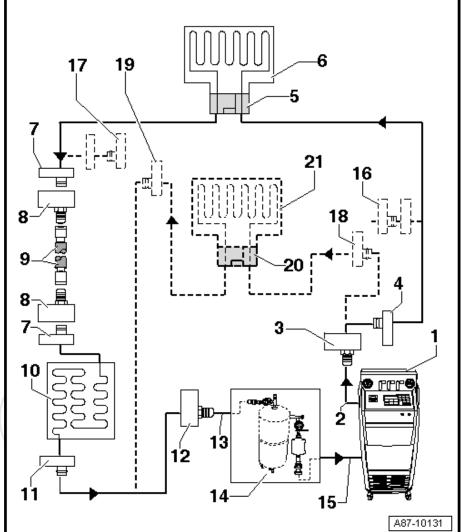
- With electronics and a flushing program, A/C Service Station with flushing device. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- If an A/C Service Station without a flushing program is used, the procedure must be performed manually (evacuate, flush four times with at least 3 kg refrigerant for each and extract the refrigerant again, evacuate).

2 - Refrigerant Hose for A/C Service Station

From the high pressure side of the A/C Service Station (mostly red colored) to the low pressure side connection of the A/C compressor on refrigerant circuit (larger diameter).

3 - Adapter to Connection for Low Pressure Side on Refrigerant Circuit

□ There are different versions depending on vehicle. Refer to ⇒ <u>"2.6.8 Adapter for Assembling Flushing Circuit", page 99</u>.



- Use the Refrigerant Circuits Adapter Set Adapter 48 VAS6338/48- between the refrigerant hose -2and the adapter -3-. Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
- From the VW/Audi Passenger Vehicle Adapter Science and a compared and the second and the se
- Depending on the version of the adapter an additional adapter is necessary to connect the A/C Service Station filling hose.

Note

- The A/C Service Station filler hose has a M12 x 1.5-6G external thread according to SAE J639 on the adapter to the connection for the low pressure side an 5/8 - 18 UNF external thread is available. An additional adapter is necessary so that both components can be connected. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- To reach a maximum possible flow speed, the service coupling is removed from the filler hose to flush (there are constrictions in the service coupling, which significantly reduces the flow speed velocity).

4 - Low Pressure Side Connection on Refrigerant Circuit

□ There are different versions depending on vehicle. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99.

5 - Adapter for Removed Expansion Valve

- □ There are different versions depending on vehicle. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- From the VW/Audi Passenger Vehicle Adapter Set . Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).

6 - Evaporator

7 - Connection to Receiver/Dryer

- □ There are different versions depending on vehicle. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- □ Not present on vehicles with a dryer cartridge in the receiver/dryer on the condenser or with a receiver/ dryer installed in the condenser. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

8 - Adapter for Bridging Removed Receiver/Dryer

- Not required for all vehicles.
- □ There are different versions depending on vehicle. Refer to ⇒ <u>"2.6.8 Adapter for Assembling Flushing Circuit", page 99</u> tected by copyright. Copying for private or commercial purposes, in part or in whole, is not
- From the VW/Audim Bassenger Vehicle Adapter Setocument. Copyright by AUDI AG.

9 - Refrigerant Filler Hose

□ Filler Hose (from the VW/Audi - Passenger Vehicle Adapter Set), for example. Refer to ⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99.

10 - Condenser

- If the receiver/dryer is attached directly to the condenser, the receiver/dryer must be removed and replaced only after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- □ If a receiver/dryer with dryer cartridge is installed on the condenser, the dryer cartridge must be removed (reseal the receiver/dryer at or in the condenser after removing). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



On certain vehicles the receiver/dryer is integrated inside the condenser and the dryer cartridge cannot be replaced separately and is not available as a single part. In this case, replace the condenser with the receiver/dryer / dryer cartridge after flushing on these vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

11 - High Pressure Side Connection on Refrigerant Circuit

□ There are different versions depending on vehicle. Refer to ⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99.

12 - Adapter to Connection for High Pressure Side on Refrigerant Circuit

- □ There are different versions depending on vehicle. Refer to ⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- General From the VW/Audi Passenger Vehicle Adapter Set .

13 - Charging Hose for Refrigerant Circuit Flushing Device

From the connection to the high pressure side of the A/C compressor on the refrigerant circuit (smaller diameter) to the input of the refrigerant circuit flushing device.

14 - Refrigerant Circuit Flushing Device

- There are different versions of the Refrigerant Circuit Flushing Device . Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- U With filter, viewing glass, safety valve, heater, refrigerant reservoir, etc. (depending on version).
- Depending on the construction of the A/C Service Station and of refrigerant circuit flushing device, a check valve may be installed at the output of the refrigerant circuit flushing device (to guarantee correct direction of refrigerant flow during flushing).
- Depending on the flushing device a 5/8 -18 UNF external thread a connection for a R134a or a R1234yf high pressure service coupling can be present on the output for the A/C Service Station.

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- So that the flushing device can thorised by AUDI AG. AUDI AG does not guarantee or accept any liability be connected on the A/C Service correctness of information in this document. Copyright by AUDI AG. Station on flushing devices with a 5/8 18 UNF external thread or a connection for a R134a low pressure side service connection an additional adapter is necessary to connect the R1234yf low pressure side service connection or a filler hose to the A/C Service Station (with a M12 x 1.5-6G external thread according to SAE J639) to the output of the flushing device.
- The filler hose from the A/C Service Station has a M12 x 1.5-6G external thread according to SAE J639. On the flushing device for the refrigerant circuit there can be a service connection for a low pressure side service connection according to SAE J639 for the refrigerant R1234yf, a M12 x 1.5-6G inner thread according to SAE J639, a service connection for a R134a low pressure side service connection or a 5/8 - 18 UNF external thread depending on the version. So that both components can be connected an additional adapter may be necessary. Refer to the Parts Catalog.

 So that the refrigerant with a lower flow speed can be extracted by the A/C Service Station the low pressure side service connection can be used here.

15 - Refrigerant Hose for A/C Service Station

□ From the low pressure side of the A/C Service Station (mostly blue colored) to the output of the refrigerant circuit flushing device.

16 - Adapter for Sealing Outlet to Second Evaporatorial purposes, in part or in whole, is not

- Only necessary on certain vehicles with optional equipment, second evaporator
- □ From the VW/Audi Passenger Vehicle Adapter Set .

17 - Adapter for Sealing Outlet to Second Evaporator

- Only necessary on certain vehicles with optional equipment "second evaporator"
- □ From the VW/Audi Passenger Vehicle Adapter Set .

18 - Low Pressure Side Connection on Refrigerant Circuit to Second Evaporator

- □ There are different versions depending on vehicle. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- Only present on certain vehicles with optional equipment "second evaporator"

19 - High Pressure Side Connection on Refrigerant Circuit to Second Evaporator

- □ There are different versions depending on the vehicle. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- Only present on certain vehicles with optional equipment "second evaporator"

20 - Adapter for Removed Expansion Valve on Second Evaporator

- □ There are different versions depending on the vehicle. Refer to <u>⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99</u>.
- Only necessary on certain vehicles with optional equipment "second evaporator"
- □ From the VW/Audi Passenger Vehicle Adapter Set .

21 - Second Evaporator

Only present on certain vehicles with optional equipment "second evaporator"

2.6.5 Connection Diagram for Cleaning (Flushing), Refrigerant Circuit with Restrictor and Container (without High-Voltage System)



- For vehicles with a restrictor and reservoir, the restrictor and reservoir are removed and the lines that were disconnected to remove the restrictor are reassembled. The pipe connections to the removed reservoir are connected with each other via two adapters and Filler Hose (from VW/Audi - Passenger Vehicle Adapter Set).
- Currently this assembly with restrictor and refrigerant circuit restrictor is currently not installed in Volkswagen/Audi.
- The arrows in the following illustrations show the refrigerant flow direction during flushing (refrigerant flows in opposite direction of flow when A/C system is in operation while flushing, therefore the high pressure side of the A/C Service System is connected to the low pressure connection of the refrigerant circuit to the A/C compressor).

- Depending on the construction of the A/C Service Station, check valves may be installed between the refrigerant circuit and the A/C Service Station (to guarantee the correct direction of refrigerant flow during flushing).
- The adapter from the VW/Audi Passenger Vehicle Adapter Set are provided with 5/8" -18 UNF threads use additional adapters from the VW/Audi - Passenger Vehicle Adapter Set so that the R1234yf - A/C Service Station filling hose can be attached.

1 - A/C Service Station

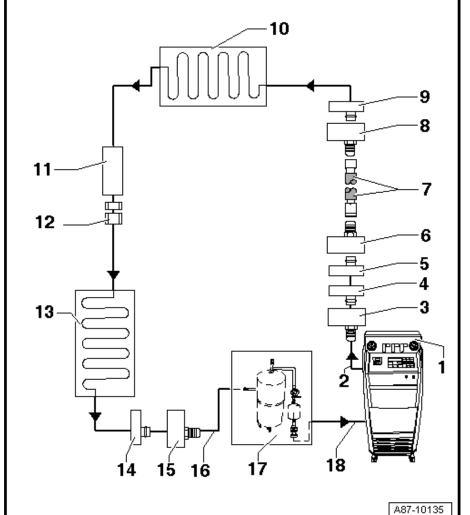
- With electronics and a flushing program for example A/C Service Station with flushing device. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- If an A/C Service Station without a flushing program is used, the procedure must be performed manually (evacuate, flush four times with at least 3 kg refrigerant for each and extract the refrigerant again, evacuate).

2 - Refrigerant Hose for A/C Service Station

From the high pressure side of the A/C Service Station (mostly red colored) to the low pressure side connection of the A/C compressor on refrigerant circuit (larger diameter).

3 - Adapter to Connection for Low Pressure Side on Refrigerant Circuit

□ There are different versions depending on vehicle. Refer to ⇒ <u>"2.6.8 Adapter for Assembling Flushing Circuit", page 99</u>.



- Use the Refrigerant Circuits Adapter Set Adapter 48 VAS6338/48- between the refrigerant hose -2and the adapter -3-.
- □ From the VW/Audi Passenger Vehicle Adapter Set .



The A/C Service Station filler hose has a M12 x 1.5-6G external thread according to SAE J639 on the adapter to the connection for the low pressure side an 5/8 -18 UNF external thread is available. So that both components can be connected an additional adapter is necessary. Refer to the Parts Catalog.

To reach a maximum possible flow speed, the service coupling is removed from the filler hose to flush (there are constrictions in the service coupling, which significantly reduces the flow speed velocity).

4 - Low Pressure Side Connection on Refrigerant Circuit

- □ There are different versions depending on vehicle. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- □ On the refrigerant line from the A/C compressor to the reservoir

5 - Connection to Reservoir

- □ There are different versions depending on vehicle. Refer to ⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- □ On the refrigerant line from the A/C compressor to the reservoir

6 - Adapter for Bridging Removed Reservoir

- □ There are different versions depending on vehicle. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- □ From the VW/Audi Passenger Vehicle Adapter Set .

7 - Refrigerant Filler Hose

□ For example Filler Hose (from the VW/Audi - Passenger Vehicle Adapter Set) for example. Refer to <u>⇒</u> <u>"2.6.8 Adapter for Assembling Flushing Circuit", page 99</u>.

8 - Adapter for Bridging Removed Reservoir

- □ There are different versions depending on vehicle. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- □ From the VW/Audi Passenger Vehicle Adapter Set .

9 - Connection to Reservoir

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10 - Evaporator

11 - Restrictor Component Location

- □ The restrictor is removed.
- □ Restrictor, Removing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

12 - Refrigerant Line Threaded Connection

□ Bolt together again after removing the restrictor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

13 - Condenser

14 - High Pressure Side Connection on Refrigerant Circuit

□ There are different versions depending on vehicle. Refer to ⇒ "2.6.8 Adapter for Assembling Flushing Circuit", page 99.

15 - Adapter to Connection for High Pressure Side on Refrigerant Circuit

- □ There are different versions depending on vehicle. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- $\hfill\square$ From the VW/Audi Passenger Vehicle Adapter Set .

16 - Charging Hose for Refrigerant Circuit Flushing Device

□ From the connection to the high pressure side of the A/C compressor on the refrigerant circuit (smaller diameter) to the input of the refrigerant circuit flushing device.

17 - Refrigerant Circuit Flushing Device

- There are different versions of the Refrigerant Circuit Flushing Device. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- With filter, viewing glass, safety valve, heater, refrigerant reservoir, etc. (depending on version).
- Depending on the construction of the A/C Service Station and of refrigerant circuit flushing device, a check valve may be installed at the output of the refrigerant circuit flushing device (to guarantee correct direction of refrigerant flow during flushing).
- Depending on the design of the refrigerant circuit flushing device, a connection for a refrigerant circuit service coupling may be located at the outlet (and possibly at the inlet) of the flushing device (instead of a 5/8-18 UNF external thread). If a service connection with a valve is installed on the outlet of the flushing device, this valve must be all the way open when the service coupling is attached (a complete valve creates a constriction). If there is a connection for a service coupling on the inlet of the flushing device, the inlet must be modified so that the refrigerant hose coming from the vehicle can be directly connected (a service coupling and a valve in the flushing device inlet create a constriction that impedes the flow of refrigerant from the vehicle to the flushing device and thus the flushing procedure).

18 - Refrigerant Hose for A/C Service Station

- From the low pressure side of the A/C Service Station (mostly blue colored) to the output of the refrigerant circuit flushing device.
- 2.6.6 Connection Diagram for Cleaning (Flushing), Vehicles with High-Voltage System (without Additional A/C System Functions)

Note

- The refrigerant circuit is cleaned in two flushing cycles (first the section with the evaporator in the front heater and A/C unit and then the section with the high-voltage battery heat exing for private or commercial purposes, in part or in whole, is not changer or the evaporator in the battery cooling module? The section of the evaporator in the battery cooling module? The section of the evaporator in the battery cooling module? The section of the evaporator in the battery cooling module? The section of the evaporator in the battery cooling module? The section of the evaporator in the battery cooling module? The section of the evaporator in the battery cooling module? The section of the evaporator in the battery cooling module? The section of the evaporator in the battery cooling module? The section of the evaporator in the battery cooling module? The section of the evaporator is the battery cooling module? <u>page</u> 99⁻
- For vehicles with two evaporators or an evaporator with a heat exchanger, disconnect the circuit to the second evaporator or to the heat exchanger from the circuit for the first evaporator using the manual shut-off valves and flush it in a separate work procedure. Refer to <u>⇒ "2.6.8 Adapter for Assembling Flushing</u> <u>Circuit", page 99</u> and ⇒ Heating, Ventilation and Air Conprocedure. Refer to <u></u> ditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- The design of the different flushing circuits for this vehicle is similar to a vehicle with two evaporators.
- 2.6.7 Connection Diagram for Cleaning (Flushing), Vehicles with High-Voltage System (with Additional A/C System Functions such as Heat Pump Operation)



The refrigerant circuit is cleaned in multiple flushing cycles. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99 and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).

- ◆ To flush, the circuit is divided into multiple sections and then cleaned during one flushing cycle at a time. It is divided by activating the installed electrically activated valves and using the installed manual shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).
- ◆ The design of the different flushing circuits for these vehicles is described in the respective vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit). Refer to ⇒ "2.6.4 Connection, Diagram for Cleaning DI AG does not guarantee or accept any liability (Flushing), Refrigerant Circuit with Expansion Valve and Rem in this document. Copyright by AUDI AG. ceiver/Dryer", page 91.

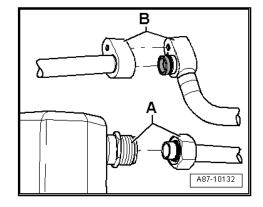
2.6.8 Adapter for Assembling Flushing Circuit

- The following table lists the different adapters necessary to connect the A/C Service Station to the refrigerant circuit, to flush and to bypass the removed receiver/dryer or reservoir and expansion valve (depending on the vehicle).
- The adapter from the VW/Audi Passenger Vehicle Adapter Set have 5/8" -18 UNF threads, so that the filling hose from the R1234y- A/C Service Station can be connected (M12 x 1.5-6G external thread according to SAE J639) an additional adapter from the set may be used (for example the Refrigerant Circuits - Adapter 48 - VAS6338/48-).
- Connect the two adapters that were installed when reservoir or receiver/dryer was removed (included in VW/Audi - Passenger Vehicle Adapter Set) with a fill hose with connections 5/8 -18 UNF (short version for example Filler Hose).
- If a flushed refrigerant circuit is not reassembled immediately after flushing, adapters remain at connections and seal the connections at the adapters using Refrigerant Circuits Adapter Set 1 - Adapter 30 - VAS6338/30- (from VW/Audi - Passenger Vehicle Adapter Set).
- ◆ Depending on the A/C compressor version and the date of manufacture, different connection and sealing techniques can be found on the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Block or Screw Connections

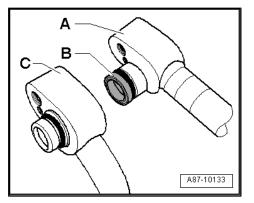
- Threaded connection -A-
- Block connection -B-

Block connections with different types of seals



- Block connection with radially sealed connection -A- (with plastic or metal guide -B-)
- Block connection with axial sealing connection -C-

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Audi A8 (4H) from MY 2010Refer to \Rightarrow page 114Audi A8 (4N) from MY 2018Refer to \Rightarrow page 116Audi A8 (4N_) TFSIe from MY 2019Refer to \Rightarrow page 128Audi Q2 (GA_) from MY 2017Refer to \Rightarrow page 102Audi Q3 (8U_ / 84_) from MY 2017Refer to \Rightarrow page 102Audi Q3 (F3_) from MY 2019Refer to \Rightarrow page 102Audi Q5 (8R_ / 83_) from MY 2017Refer to \Rightarrow page 109Audi Q5 (FY_) from MY 2017Refer to \Rightarrow page 107Audi Q5 TFSI e (FY_) from MY 2017Refer to \Rightarrow page 107Audi Q7 (4M_) from MY 2016Refer to \Rightarrow page 120Audi Q8 (4M_) from MY 2017Refer to \Rightarrow page 122Audi Q8 (4M_) from MY 2017Refer to \Rightarrow page 120Audi Q8 (4M_) from MY 2017Refer to \Rightarrow page 120Audi Q8 (4M_) from MY 2017Refer to \Rightarrow page 120Audi Q8 (4M_) from MY 2017Refer to \Rightarrow page 120Audi R8 (4S_) from MY 2017Refer to \Rightarrow page 120Audi R8 (4S_) from MY 2017Refer to \Rightarrow page 120Audi TT (FV_) from MY 2017Refer to \Rightarrow page 124Audi TT (FV_) from MY 2017Refer to \Rightarrow page 102	Audi A7 (4K) from MY 2018	Refer to <u>⇒ page 111</u>	
Audi A8 (4N) from MY 2018Refer to \Rightarrow page 116Audi A8 (4N_) TFSIe from MY 2019Refer to \Rightarrow page 102Audi Q2 (GA_) from MY 2017Refer to \Rightarrow page 102Audi Q3 (8U_ / 84_) from MY 2017Refer to \Rightarrow page 102Audi Q3 (F3_) from MY 2019Refer to \Rightarrow page 102Audi Q5 (8R_ / 83_) from MY 2017Refer to \Rightarrow page 107Audi Q5 (FY_) from MY 2017Refer to \Rightarrow page 107Audi Q5 (FY_) from MY 2017Refer to \Rightarrow page 107Audi Q5 (FY_) from MY 2017Refer to \Rightarrow page 107Audi Q5 (FY_) from MY 2017Refer to \Rightarrow page 120Audi Q7 (4M_) from MY 2016Refer to \Rightarrow page 122Audi Q8 (4M_) from MY 2018Refer to \Rightarrow page 122Audi R8 (4S_) from MY 2017Refer to \Rightarrow page 124Audi TT (FV_) from MY 2017Refer to \Rightarrow page 102	Audi A7 TFSI e (4K) from MY 2018	Refer to <u>⇒ page 112</u>	
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Audi Q5 TFSI e (FY_) from MYRefer to \Rightarrow page 107Audi Q7 (4M_) from MY 2016Refer to \Rightarrow page 120Audi Q7 e-tron (4M_) from MY 2017Refer to \Rightarrow page 122Audi Q8 (4M_) from MY 2018Refer to \Rightarrow page 120Audi R8 (4S_) from MY 2017Refer to \Rightarrow page 124Audi TT (FV_) from MY 2017Refer to \Rightarrow page 102	Audi Q5 (8R_ / 83_) from MY 2017	Refer to <u>⇒ page 109</u>	
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Audi Q7 e-tron (4M_) from MY 2017Refer to \Rightarrow page 122Audi Q8 (4M_) from MY 2018Refer to \Rightarrow page 120Audi R8 (4S_) from MY 2017Refer to \Rightarrow page 124Audi TT (FV_) from MY 2017Refer to \Rightarrow page 102		Refer to <u>⇒ page 107</u>	
Audi Q8 (4M_) from MY 2018Refer to \Rightarrow page 120Audi R8 (4S_) from MY 2017Refer to \Rightarrow page 124Audi TT (FV_) from MY 2017Refer to \Rightarrow page 102	Audi Q7 (4M_) from MY 2016	Refer to <u>⇒ page 120</u>	
Audi R8 (4S_) from MY 2017Refer to \Rightarrow page 124Audi TT (FV_) from MY 2017Refer to \Rightarrow page 102	Audi Q7 e-tron (4M_) from MY 2017	Refer to <u>⇒ page 122</u>	
Audi TT (FV_) from MY 2017 Refer to \Rightarrow page 102	Audi Q8 (4M_) from MY 2018	Refer to <u>⇒ page 120</u>	
	Audi R8 (4S_) from MY 2017	Refer to <u>⇒ page 124</u>	
Audi e-tron (GE_) from MY 2019 Refer to \Rightarrow page 126		Refer to <u>⇒ page 102</u>	
	Audi e-tron (GE_) from MY 2019	Refer to <u>⇒ page 126</u>	



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Audi A1 from MY 2017

Vehicle Required Adapters for the Connections to A/C Compressor		Adapters Necessary for the Connections to the Reservoir or Re- ceiver/Dryer	Miscella- neous
Audi A1 (8X_) from MY 2017	 Compressor manufacturer "Denso", "Sanden" or "Delphi/ Mahle" 	Different versions – Version 1 (the re- ceiver/dryer is inte- grated on the con- denser): the adapter is not need- ed, the desiccant bag is removed from the receiver/	The ex- pansion valve is re- moved and the Refrig- erant Cir- cuits Adapter Set 1 -

hicle Required Adapters for the Connections to A/C Compresso	Adapters Necessary for the Connections to the Reservoir or Re- ceiver/Dryer	Miscella- neous
 Low pressur side Refriger ant Circuits Adapter Set - Adapter 12 VAS6338/12 connected with the A/C Service Sta- tion and the Refrigerant Circuits Adapter Set Adapter 48 - VAS6338/48 High pres- sure side Refrigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- or Refrigerant Circuits Adapter Set - Adapter 2 - VAS6338/2- (depending on the ver- sion of the A C compres- sor and its refrigerant line 	 dryer on the condenser and opening is closed again for flushing. Version 2 (receiver/dryer attached to the condenser): the adapter is not needed, the receiver/dryer remains installed (it will be replaced after flushing) 	Adapter 34 - VAS6338/ 34- or Re- frigerant Circuits Adapter Set 1 - Adapter 39 - VAS6338/ 39- (see the note below) is installed (or the re- moved ex- pansion valve is drilled for flushing and in- stalled again). Re- fer to <u>⇒</u> page 90.

i Note

- ◆ The receiver/dryer may be attached to or integrated in their commercial purposes, in part or in whole, is not condenser on the Audi A1 / S1; depending on the version of AG does not guarantee or accept any liability the condenser. A dryer cartridge is installed in the integrated receiver/dryer and can be replaced separately. An attached receiver/dryer (introduction TBD) must be replaced after the flushing. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ There are different versions of the A/C unit (different heater core and sears different expansion valve etc.) depending on time period of production and from the VIN number on Audi A1 / S1. Refer to the ⇒ Electronic Parts Catalog (ETKA). Vehicles with the type keys "8X1" and "8XA" in the VIN have an expansion valve installed, where both refrigerant lines are attached at the top. This is where the Refrigerant Circuits Adapter Set 1 Adapter 34 VAS6338/34- fits. For vehicles with the type key "8XF" and "8XK" in the VIN number an expansion valve is installed, on those where both refrigerant pipes are attached below, here the Refrigerant Circuits Adapter Set 1 Adapter 39 VAS6338/39- fits. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit; Expansion Valve, Removing and Installing (vehicle-specific repair manual).

· · · · · ·	Audi Q3 from MY 2017			
Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters Necessary for the Connections to the Reservoir or Re- ceiver/Dryer	Miscella- neous	
Audi Q3 (8U_ / 84_) from MY 2017	 Compressor manufacturer for the Audi Q3: "Sanden", "Denso", "Delphi/ Mahle" or "Zexel / Va- leo" Low pressure side Refriger- ant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- connected to the A/C Ser- vice Station and the Re- frigerant Cir- cuits Adapter Set - Adapter 48 - VAS6338/48- High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- 	 No adapter need- ed, the receiver/ dryer remains in- stalled Depending on the condenser version remove the dryer cartridge from the receiver/dryer on the condenser be- fore flushing and then seal the open- ing again (see note). 	Expansion valve re- move and installed with the Refriger- ant Circuits P/Adapterg for 18 ^{tborised by A} VAS6338/ st 18- (or a drilled open ex- pansion valve. Re- fer to <u>⇒</u> <u>page 90</u> .)	

Note

- ◆ The version of the receiver/dryer on the Audi Q3 will differ depending on the manufacturer of the condenser. On some versions for example the receiver/dryer is integrated in the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. Therefore, if there is a complaint regarding a vehicle with a condenser with an integrated receiver/dryer, it may be necessary to replace the entire condenser after correcting the complaint. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Audi Q2 from MY 2017, Audi A3 from MY 2017, Audi Q3 from MY 2019, Audi TT from MY 2017, Audi A1 (GB) from MY 2019, Audi A3 from MY 2021

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters Necessary for the Connections to the Reservoir or Re- ceiver/Dryer	Miscella- neous
Audi Q2 (GA_) from MY 2017 Audi A3 (8V_/ 85_) from MY 2017 Audi TT (FV_) from MY 2017 Audi Q3 (F3_) from MY 2019 Audi A1 (GB) from MY 2019 Audi A3 (8Y_) from MY 2021	 Low pressure side: Refrig- erant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- connected to the A/C Ser- vice Station and the Re- frigerant Cir- cuit Adapter Set - Adapter - VAS6338/48- High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- 	 Receiver/dryer (different versions) No adapter necessary, the receiver/dryer remains installed (or is integrated in the condenser). Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note). 	Expansion valve re- move and installed with the Refriger- ant Circuits - Adapter 38 - VAS6338/ 38- (or a drilled open ex- pansion valve. Re- fer to <u>⇒</u> page 90 .)



Note

- Depending on the condenser manufacturer, the receiver/dryer version is different. On some versions for example the receiver/dryer is integrated in the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. Therefore, if there is a complaint regarding a vehicle with a condenser with an integrated receiver/dryer, it may be necessary to replace the entire condenser after correcting the complaint. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

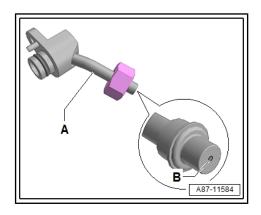
Audi A3 e-tron

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters Necessary for the Connections to the Reservoir or Re- ceiver/Dryer	Miscella- neous
Audi A3 (8V_/ 85_) from MY 2017	 "Denso", "Delphi/ Mahle"portited un "Sanden"ith resp compressor manufacturer Low pressure side Refriger- ant Circuits 	dryer remains in- stalled (or is inte- grated in the con-	 Expansion valve remove or in whole, is not AG dcand, installed, accept any liability n this with the Re-ight by AUDLAG. frigerant Cir- cuits - Adapter 38 - VAS6338/38- (or a drilled open expan-

Vehicle	Required Adapters for the Connections to A/C Compressor		Miscella- neous	
	Adapter Set 1 - Adapter 12 - VAS6338/12- connected to the A/C Ser- vice Station and the Re- frigerant Cir- cuits Adapter Set - Adapter 48 - VAS6338/48- I High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3-	receiver/dryer on the condenser be- fore flushing and then seal the open- ing again (see note). Refrigerant Circuits Adapter Set - Shut- Off Valve - VAS6338/42-	 and High Voltage tery Hea Core Re erant Sh Off Valv N542- re moved a Shut-Off Valve - VAS633 installed fer to the notes be Replace Heater a A/C Unit frigerant Shut-Off Valve - Nand High Voltage tery Hea Core Re erant Sh Off Valv N542- a flushing. The rest in the re erant lin the high age batt heat ex- changer moved o refrigera line is du (refer to b 	 .) nd Re- 541- Bat- ter frig- uut- e - nd a 8/42- (re- low). the nd Re- 541- Bat- ter frig- uut- e - ter frig- ter ter frig- ter <li< td=""></li<>
	Required adapter / lines for the connections to the electrically driven A/C com- pressor (to flush the A/C com- pressor). Electri- cally-Driven A/C Compressor, Flushing. Refer		 The refriant oil is moved by flushing the flow rection f electrica driven A compress (becaus) the instational 	re- y in di- or ly- /C sors e of lled

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters Necessary for the Connections to the Reservoir or Re- ceiver/Dryer	Miscella- neous	
	to ⇒ "3.11 Elec- trically Driven A/ C Compressor, Cleaning", page		possible flush aga the flow o rection).	inst
	<u>157</u> .		 To flush, range the C compressors of the sor so that the connection for the refrigerar line on the high press sure side as low as possible. 	e A/ es- at ec- ne nt ie S- e is

- On the Audi A3 e-tron the refrigerant circuit is flushed in two sections. In the first flushing cycle, the adapter, which is installed for the Heater and A/C Unit Refrigerant Shut-Off Valve -N541-, is opened and the adapter, which is installed for the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve -N542- is closed. Thus the refrigerant circuit with the evaporator in the A/C unit is flushed. In the second flushing cycle, the adapter, which is installed for the Heater and A/C Unit Refrigerant Shut-Off Valve -N541-, is closed and the adapter, which is installed for the Heater and A/C Unit Refrigerant Shut-Off Valve -N541-, is closed and the adapter, which is installed for the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve -N542- is opened. The refrigerant circuit with the evaporator in the high-voltage battery heat exchanger is flushed as a result. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- The Heater and A/C Unit Refrigerant Shut-Off Valve N541and the High-Voltage Battery Heater Core Refrigerant Shut-Off Valve - N542- must be replaced after flushing.
- This illustration shows a refrigerant line -A- with a permanently installed restrictor -B- (without screen). This refrigerant line is drilled with a suitable drill 5.0 mm to flush the refrigerant circuit (an inserted restrictor is removed) and cleaned in the flushing circuit before installing. The refrigerant line or an inserted restrictor must be replaced after flushing. Refer to Parts Catalog.
- The diameter of the illustrated restrictor hole -B- is approximately 0.7 mm. Depending on the version of the refrigerant line, this constriction is either permanently installed in the refrigerant line or is only inserted. A screen to separate floating deposits may be installed on the inserted version, which can block the restrictor hole.
- ◆ The version of the receiver/dryer on the Audi A3 will differ depending on the manufacturer of the condenser. The receiver/dryer is, for example, inside the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. If there is a complaint regarding a vehicle with this condenser, it may be necessary to replace the entire condenser after correcting the complaint. Refer to the Parts Catalog and ⇒ Heating, Ventilation and Air Condition-



ing; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

◆ Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Audi A4 (8K_) from MY 2017

Vehicle	Required Adapters for the Connections to A/C Compressor	Adapters Necessary for the Connections to the Reservoir or Re- ceiver/Dryer	Miscella- neous	
Audi A4 (8K_) from MY 2017	 Low pressure side Refriger- ant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- connected with the A/C Service Sta- tion and the Refrigerant Circuits Adapter Set - Adapter 48 - VAS6338/48- High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3rötecttr VAS6338/3- 	dryer remains in- stalled		Deses, in part or in whole, is no uarantee or accept any liabilit nt. Copyright by AUDI AG.

Note

Depending on the condenser manufacturer, the receiver/dryer version for the Audi A4 (8K_) from MY 2017 varies. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA). The receiver/dryer may be attached to or integrated in the condenser, depending on the version of the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. In the event there is a complaint on a vehicle with this condenser, the condenser must be completely replaced. Refer to the Parts Catalog.

- ◆ Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- ◆ The Audi A4 (type 86_ for China) from MY 2017 currently only offered with refrigerant R134a. If necessary the in refrigerant circuit refrigerant R1234yf can also be used as described for the Audi A4 (8W_) from MY 2017, which for this vehicle is flushed with the adapter described. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



Vehicle		the Reservoir or Re-	Miscella2vrigi Miscella2vrigi Neouspect to the	It. Copying for private or commercial purposes, in part or in whole, is no norised by AUDI AG. AUDI AG does not guarantee or accept any liability correctness of information in this document. Copyright by AUDI AG.
Audi A5 (F5_) from MY 2016 Audi Q5 (FY_) from MY 2017 Audi A4 (8W_) from MY 2017	 "Denso", "Delphi/ Mahle" or "Sanden" compressor manufacturer Low pressure side Refriger- ant Circuits Adapter Set 1 Adapter Set 1 Adapter Set 1 Adapter 12 - VAS6338/12- connected to the A/C Ser- vice Station and the Re- frigerant Cir- cuits Adapter Set - Adapter 48 - VAS6338/48- High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- 	 No adapter re- quired, dryer is re- moved from receiv- er/dryer on con- denser and the opening is sealed. 	The ex- pansion valve is re- moved and Refriger- ant Circuits Adapter Set 1 - Adapter 44 - VAS6338/ 44- is in- stalled (or an old ex- pansion valve is drilled on and in- stalled as an adapter. Refer to <u>⇒</u> <u>page 90</u> and the Parts Cat- alog.	

Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehiclespecific repair manual) and the Parts Catalog.

Audi Q5 TFSI e (FY_) from MY 2019

Vehicle	Required Adapters for the Connections to A/C Compressor	Necessary Adapter for the Connections to the Receiver/Dry- er / for the Check Valves and Shut-Off Valves	Miscella- neous
Audi Q5 TF- SI e (FY_) from MY 2019	 Compressor manufacturer "Sanden" (blo ck connec- tions with ra- dial sealing) Low pressure side: Refrig- erant Circuits Adapter Set 1 Adapter Set 1 Adapter Set 1 Adapter Set 2 VAS6338/12- connected to the A/C Ser- vice Station and the Re- frigerant Cir- cuit Adapter Set - Adapter High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- 	removed from receiver/dryer on	The expan- sion valve is removed and Refrigerant Circuits Adapter Sett or in whole, is no 1 ∩ Adapter Sett or in whole, is no 2 ∩ Adapter Sett or in whole, is no 2 ∩ Adapter Sett or in whole, is no 1 ∩ Adapter Sett or in whole, is no 2 ∩ Adapter
		Check Valves – The four check valves are re- moved and in- stalled for the shut-off valves (two -6338/47-1- and two -6338/47-2-) from the Shut-off Valves - 6338/47	The shut-off valves in- stalled for the check valves are opened or closed ac- cording to the area to be flushed. Refer to ⇒ Heating, Ventilation and Air Con- ditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehi- cle-specific repair manu- al).
		Shut-off valve – Remove the Re- frigerant Shut- Off Valve -V424- and install a Shut-off Valve - VAS6338/42- for it.	Then open or close the shut-off valve in- stalled for the shut-off

Vehicle	Connections to	Necessary Adapter for the Connections to the Receiver/Dry- er / for the Check Valves and Shut-Off Valves	Miscella- neous
			Replace the Refrigerant Shut-Off Valve - V424- after flushing.

- ♦ On the Audi Q5 TFSIe, the refrigerant circuit is flushed in four steps (flushing cycles). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- ◆ So that the entire refrigerant circuit can be flushed, not only the installed shut-off valve must be positioned correctly (opened or closed) on the Audi Q5 TFSIe, Additionally the electric activated valves (in the valve block) must be positioned correctly. The activation of the electric valves takes place via different routines, which are stored in the respective control module (for example in the Thermal Management Control Module - J1024-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- ◆ To flush, the circuit on the Audi Q5 TFSIe is divided into multiple sections and then cleaned respectively in a flushing cycle. The division takes place by activating the installed electrically activated valves and via the installed manually activated hand shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning) use the ⇒ Vehicle diagnostic tester in the "Guided Fault Finding" function.
- ◆ The design of the different flushing circuits for the Audi Q5 TFSIe is described in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- ◆ Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- ◆ After flushing, the refrigerant receiver on the heat exchanger for heat pump operation must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit.
- ◆ The Refrigerant Shut-Off Valve by V424¹ Converted a replaced affectal purposes, in part or in whole, is not flushing. Refer to ⇒ Heating, Ventilation and Ait Conditioning locument. Copyright by AUDI AG. Rep. Gr. 87; Refrigerant Circuit.

Audi A5 Coupe and Sportback from MY 2017, Audi Q5 from MY 2017, Audi A5 Cabriolet from MY 2016

Vehicle	Adapters Neces- sary for the Con- nections to the Reservoir or Re- ceiver/Dryer	Required Adapters for the Connections to Re- ceiver/Dryer	Miscella- neous
permitted u	 Compressor manufacturer "Denso" Low pressure side Refriger- ant Circuits Adapter Set 1 Adapter Set 1 Adapter Set 1 Adapter Set 1 Connected with the A/C Service Sta- tion and the Refrigerant Circuits Adapter Set - Adapter Set - Adapter 48 - VAS6338/48- High pres- sure side: Re- vonfrigerant Circuit 	 Receiver/dryer (different versions) No adapter needed, the receiver/dryer remains installed Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note). 	accept any fiability

- ◆ Depending on the condenser manufacturer, the receiver/dryer version for these vehicles varies. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). The receiver/dryer may be attached to or integrated in the condenser, depending on the version of the condenser. The integrated receiver/dryer has a dryer cartridge that is no longer available as a replacement part. In the event there is a complaint on a vehicle with this condenser, the condenser must be completely replaced. Refer to the Parts Catalog.
- ◆ Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Audi A6 (4G_ oder 4X_ for China) from MY 2017, Audi A7 (4G_ oder 4X_ for China) from MY 2017

Vehicle	Adapters Neces- sary for the Con- nections to the Reservoir or Re- ceiver/Dryer	Required Adapters for the Connections to Re- ceiver/Dryer	Miscella- neous
Audi A6 (4G_ / 4X_) from MY 2017 Audi A7 (4G_ / 4X_) from MY 2017	 Compressor manufacturer "Denso" Low pressure side Refriger- ant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- connected with the A/C Service Sta- tion and the Refrigerant Circuits Adapter Set - Adapter 48 - VAS6338/48- High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- 	 Receiver/dryer (different versions) No adapter needed, the receiver/dryer remains installed Depending on the condenser version, remove the dryer cartridge from the receiver/dryer on the condenser before flushing and then seal the opening again (see note). 	The ex- pansion valve is re- moved and the Refrig- erant Cir- cuits Adapter 18 - VAS6338/ 18- (or the removed expansion valve is drilled for flushing and in- stalled again (re- fer to <u>⇒</u> page 90)).

- The type designation 4X_ is used instead of the type designation 4G_ for specific versions in China
- ◆ Depending on the condenser manufacturer, the receiver/dryer version for these vehicles varies. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- ◆ Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- ◆ The Audi A6 e-tron is currently only manufactured in China and not filled with refrigerant R1234yf there (there it will be continued to be filled with refrigerant R134a). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Audi A6 (4A) from MY 2019, Audi A7 (4K) from MY 2018

Vehicle	sary for the Con-	Required Adapters for the Connections to Re- ceiver/Dryer	Miscella- neous
Audi A6 (4A)	 Compressor manufacturer "Denso" 	 No adapter re- quired, dryer is re- moved from receiv- er/dryer on con- 	The ex- pansion valve is re- moved and Refriger-

ial purposes, in part or in whole, is not es not guarantee or accept any liability document. Copyright by AUDI AG.

Vehicle		Required Adapters for the Connections to Re- ceiver/Dryer		
from MY 2019 Audi A7 (4K) from MY 2018	side Refriger- ant Circuits Adapter Set 1	opening is sealed.	ant Circuits Adapter Set 1 - Adapter 44 - VAS6338/ 44- is in- stalled (or an old ex- pansion valve is drilled on and in- stalled as an adapter). Refer to ≥ <u>page 90</u> and the Parts Cat- alog.	

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Condensers with an integrated receiver/dryer or dryer cartridge the correctness of information in this document. Copyright by AUDI AG. that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

Audi A7 TFSIe (4K_) from MY 2019

Vehicle	Required adapters for the connections to A/C compressor	Necessary adapter for the connections to the receiver/dry- er / for the check valves and shut-off valves	Miscella- neous
Audi A7 TFSIe (4K_) from MY 2019	 Compressor manufacturer "Sanden" (blo ck connec- tions with ra- dial sealing) Low pressure side: Refrig- erant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- connected to the A/C Ser- vice Station and the Re- frigerant Cir- cuit Adapter 	Receiver/Dryer – No adapter re- quired, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expan- sion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44 - is installed (or an old ex- pansion valve is drilled on and installed as an adapter). Refer to <u>⇒</u> <u>page 90</u> and the Parts Catalog.

Vehicle	Required adapters for the connections to A/C compressor	Necessary adapter for the connections to the receiver/dry- er / for the check valves and shut-off valves	Miscella- neous
	Set - Adapter		
	VAS6338/48-		
	 High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- 		
		Check Valves – The four check valves are re- moved and in- stalled for the shut-off valves (two -6338/47-1- and two -6338/47-2-) from the Shut-off Valves - 6338/47	The shut-off valves in- stalled for the check valves are opened or closed ac- cording to the area to be flushed. Refer to ⇒ Heating, Ventilation and Air Con- ditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehi- cle-specific repair manu- al).
		Shut-off valve – Remove the Re- frigerant Shut- Off Valve -V424- and install a Shut-off Valve - VAS6338/42- for it.	Then open or close the shut-off valve in- stalled for the shut-off valve ac- cording to the area to be flushed. Replace the Pofrigorant
	ermitted unless authorised	ing for private or commercial pu by AUDI AG. AUDI AG does no ness of information in this docur	Refrigerant whole, is not Shut≖Off accept any liability Valveyright by AUDI AG. V424- after flushing.

- ♦ On the Audi A7 TFSIe, the refrigerant circuit is flushed in four steps (flushing cycles). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- So that the entire refrigerant circuit can be flushed, not only the installed shut-off valve must be positioned correctly (opened or closed) on the Audi Q5 TFSIe, Additionally the

electric activated valves (in the valve block) must be positioned correctly. The activation of the electric valves takes place via different routines, which are stored in the respective control module (for example in the Thermal Management Control Module - J1024-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).

- ◆ To flush, the circuit on the Audi A7 TFSIe is divided into multiple sections and then cleaned respectively in a flushing cycle. The division takes place by activating the installed electrically activated valves and via the installed manually activated hand shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning) use the ⇒ Vehicle diagnostic tester in the "Guided Fault Finding" function.
- ◆ The design of the different flushing circuits for the Audi A7 TF-Sle is described in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- ◆ Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- ◆ After flushing, the refrigerant receiver on the heat exchanger for heat pump operation must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit.
- The Refrigerant Shut-Off Valve V424- must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit.

Vehicle	Adapters Neces- sary for the Con- nections to the Reservoir or Re- ceiver/Dryer	Adapters necessary for the connections to the reservoir or receiv- er/dryer	Miscella- neous	
Audi A8 [4H_) rom MY 2010	 Compressor manufacturer "Denso" (bloc k connections with radial sealing) Low pressure side Refriger- ant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- connected with the A/C Service Sta- tion and the Refrigerant Circuits Adapter Set - Adapter 48 - VAS6338/48- High pres- sure side: Re- 	bag is removed from receiver/dryer on the condenser and the opening is sealed again for flushing.	The ex- pansion valve is re- moved and the Refrig- erant Cir- cuits Adapter 18 - VAS6338/ 18- (or the removed expansion valve is drilled for flushing and in- stalled again (re- fer to ⇒ page 90)).	aying for private or commercial purposes, in part or in who d by AUDI AG. AUDI AG does not guarantee or accept a

Audi A8 (4H_) from MY 2010

Vehicle	sary for the Con- nections to the Reservoir or Re- ceiver/Dryer	Adapters necessary for the connections to the reservoir or receiv- er/dryer	Miscella- neous	
	frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3-			
with t	ehicle wo orators zone	To flush the circuit with the evaporator in the front A/C unit ◆ Refrigerant Circuits Adapter Set 1 - Adapter 5 - VAS6338/5- for sealing the "low pressure side" con- nection ((to the sec- ond evaporator).		g for private or commercial purposes, in part or in whol
		 Refrigerant Circuits Adapter Set 1 - Adapter 11 - VAS6338/11- for sealing the "high pressure side" con- nection ((to the sec- ond evaporator). 	nless authorised b	y AUDI AG. AUDI AG does not guarantee or accept any ess of information in this document. Copyright by AUDI
		 The adapter may need an additional hole (see below) so that the refrigerant pipes can be cov- ered with the Re- frigerant Circuits Adapter Set 1 - Adapter 5 - VAS6338/5- and Refrigerant Circuits Adapter Set 1 - Adapter 11 - VAS6338/11 		
		To flush the second evaporator and corre- sponding lines ◆ Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3- for connecting the A/C service station to the "low-pressure side" connection (to the second evapo- rator).	Adapter 18 -	
		 Refrigerant Circuits Adapter Set 1 - Adapter 4 - VAS6338/4- for connecting the A/C service station to the "high-pressure 	VAS6338/ 18- is in- stalled (or the old re- moved ex- pansion valve is drilled for flushing and rein-	

Vehicle	sary for the Con-	Adapters necessary for the connections to the reservoir or receiv- er/dryer	Miscella- neous
		 side" connection (to the second evaporator). It may be necessary to rework the adapter (see below) so that the refrigerant pipe can be attached to the Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3 	stalled (re- fer to <u>⇒</u> page 90)).

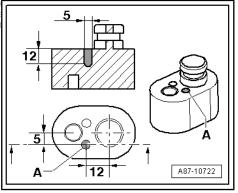
Note

- In vehicles with two evaporators, the refrigerant circuit is flushed in two work steps.
- Currently the front and rear expansion valves have the same connections (only the control characteristics are different)

Drill an additional hole in the Refrigerant Circuits Adapter Set 1 - Adapter 5 - VAS6338/5- and Refrigerant Circuits Adapter Set 1 - Adapter 11 - VAS6338/11- .

 Drill a hole -A- in addition to the care adv existing mole (the dis, in part mensions in the illustration are given in one), ation in this document. Copyright

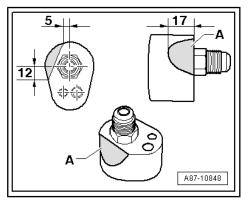
Rework the Refrigerant Circuits Adapter Set 1 - Adapter 3 - VAS6338/3-



 Grind off or file off the Refrigerant Circuits Adapter Set 1 -Adapter 3 - VAS6338/3- near -A- without bending the refrigerant line (dimensions in the illustration are in mm).

Audi A8 (4N) from MY 2018

Vehicle		Required adapters for connections to receiv- er/dryer / to second evaporator	Miscella- neous
Audi A8 (4N) from MY 2018	 Compressor manufacturer "Denso" (bloc k connections with radial sealing) Low pressure side Refriger- 	 No adapter re- quired, dryer is re- moved from receiv- er/dryer on con- denser and the opening is sealed. 	The ex- pansion valve is re- moved and Refriger- ant Circuits Adapter Set 1 - Adapter 44



Vehicle	Adapters Neces- sary for the Con- nections to the Reservoir or Re- ceiver/Dryer	Required adapters for connections to receiv- er/dryer / to second evaporator	Miscella- neous
evapo	ne Adapter Set 1 pratorAdapter 12 - VAS6338/12- connected with the A/C Service Sta- tion and the Refrigerant Circuits Adapter Set - Adapter 48 - VAS6338/48-		- VAS6338/ 44- is in- stalled (or an old ex- pansion valve is drilled on and in- stalled as an adapter. Refer to <u>⇒</u> page 90
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 Additi on vel with tv evapo (four z A/C sy tem) 	hicles vo rators zone	To flush the circuit with the evaporator in the front A/C unit Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- and Refrigerant Circuits Adapter 43 - VAS6338/43- (to seal the refrigerant circuit to the second evaporator)	Expansion valve is re- moved from the evaporator in the front of the A/C unit and Refriger- ant Circuits Adapter Set 1 - Adapter 44 - VAS6338/ 44- is in- stalled. Ex- pansion valve is re- moved from the refrigerant lines to the evaporator in the back of the A/C unit and Refriger- ant Circuits Adapter Set 1 - Adapter 43 - VAS6338/ 43- is in-
		To flush the second evaporator and corre- sponding lines	stalled. Expansion valve is re- moved from the evaporator in the front

Vehicle Adapters sary for nections Reservo ceiver/D	ir or Re- evaporator ryer	
		atte or commercial purposes, in part or in whole, is Atte or commercial purposes, in part or in whole, is Atte or commercial purposes, in part or in whole, is Atte or commercial purposes, in part or in whole, is Atte or commercial purposes, in part or in whole, is attended to be a commercial purposes of the part

- In vehicles with two evaporators, the refrigerant circuit is flushed in two work steps.
- On vehicles with two evaporators, the refrigerant circuit with the evaporator in the front of the A/C unit is flushed first. So that the refrigerant flows in a fixed direction when flushing, the refrigerant circuit to the second evaporator (in rear of A/C unit) must be blocked off. This is done by removing the expansion valve in the refrigerant lines to the second evaporator and installing the Refrigerant Circuits Adapter Set 1 - Adapter 43 -VAS6338/43- (closed adapter). After the refrigerant circuit with the evaporator is flushed, switch both adapters Refrigerant Circuits Adapter Set 1 - Adapter 43 -VAS6338/43- and Refrigerant Circuits Adapter Set 1 - Adapter 44 -VAS6338/44- and flush the refrigerant circuit with the evaporator in the rear of the A/C unit.

Audi A8 (4N_) TFSIe from MY 2019

Vehicle		Necessary Adapter for the Connections to the Receiver/Dry- er / for the Check Valves and Shut-Off Valves	Miscella- neous
Audi A8 (4N_) TFSIe	 Compressor manufacturer "Sanden" (blo ck connec- 		The expan- sion valve is removed and Refrigerant

Vehicle	Required Adapters for the Connections to A/C Compressor	Necessary Adapter for the Connections to the Receiver/Dry- er / for the Check Valves and Shut-Off Valves	Miscella- neous
	 tions with ra- dial sealing) Low pressure side: Refrig- one erant Circuits prate/dapter Set 1 Adapter 12 - VAS6338/12- connected to the A/C Ser- vice Station and the Re- frigerant Cir- cuit Adapter Set - Adapter VAS6338/48- High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- 	receiver/dryer on condenser and the opening is sealed.	Circuits Adapter Set 1 - Adapter 44 - VAS6338/44 - is installed (or an old ex- pansion valve is drilled on and installed as an adapter). Refer to ≥ page 90 and the Parts Catalog.
permitted u	r copyright. Copying for privines authorised by AUDI A ect to the correctness of inf	Check Valves - The four check valves are re- moved and in- stalled for the shut-off valves (-6338/47-1- and -6338/47-2-) ate of communication G. Alfrom the Shut-off ormal Valves coursent. Copy 6338/47	The shut-off valves in- stalled for the check valves are opened or closed ac- cording to the area to be flushed Heating, Ventilation and Air Con- ditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehi- cle-specific repair manu- al).
		Shut-off valve – Remove the Re- frigerant Shut- Off Valve -V424- and install a Shut-off Valve - VAS6338/42- for it.	Then open or close the shut-off valve in- stalled for the shut-off valve ac- cording to the area to be flushed. Replace the Refrigerant Shut-Off Valve -

Vehicle	Connections to	Necessary Adapter for the Connections to the Receiver/Dry- er / for the Check Valves and Shut-Off Valves	neous
			V424- after flushing.

- ♦ On the Audi A8 TFSIe, the refrigerant circuit is flushed in four steps (flushing cycles). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- ◆ So that the entire refrigerant circuit can be flushed, not only the installed shut-off valve must be positioned correctly (opened or closed) on the Audi A8 TFSIe, Additionally the electric activated valves (in the valve block) must be positioned correctly. The activation of the electric valves takes place via different routines, which are stored in the respective control module (for example in the Thermal Management Control Module - J1024-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- ◆ To flush, the circuit on the Audi A8 TFSIe is divided into multiple sections and then cleaned respectively in a flushing cycle. The division takes place by activating the installed electrically activated valves and via the installed manually activated hand shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning) use the ⇒ Vehicle diagnostic tester in the "Guided Fault Finding" function.
- ◆ The design of the different flushing circuits for the Audi A8 TF-Sle is described in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- ◆ Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; RepveGr. 87; Refrigerant, part or in whole, is not Circuit (vehicle-specific repair manual) and the Parts Catalogue or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
- ♦ After flushing, the refrigerant receiver on the heat exchanger for heat pump operation must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit.
- ◆ The Refrigerant Shut-Off Valve V424- must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit.

Audi Q7 (4M_) from MY 2016, Audi Q8 (4M_) from MY 2018

Vehicle	Adapters Neces- sary for the Con- nections to the Reservoir or Re- ceiver/Dryer	Required adapters for connections to receiv- er/dryer / to second evaporator	Miscella- neous
Audi Q7 (4M_)	 Compressor manufacturer "Denso" (bloc k connections 	moved from receiv-	The ex- pansion valve is re- moved and Refriger-

Vehicle	sary for the Con- nections to the Reservoir or Re- ceiver/Dryer	Required adapters for connections to receiv- er/dryer / to second evaporator	Miscella- neous	
(4M_) from MY 2018 ♦ Vehic with o	 with radial sealing) Low pressure side Refrigerant Circuits Adapter Set 1 Adapter Set 12 - Ne VAS6338/12- ratoronnected to the A/C Service Station and the Refrigerant Circuits Adapter Set - Adapter Set - Adapter Set - Adapter 48 - VAS6338/48- High pressure side: Refrigerant Circuits Adapter Set 1 - Adapter 3 - A	denser and the opening is sealed.	ant Circuits Adapter Set 1 - Adapter 44 - VAS6338/ 44- is in- stalled (or an old ex- pansion valve is drilled on and in- stalled as an adapter). Refer to ≥ page 90 and the Parts Cat- alog.	
 Addition velocities with two evapores (four 2 A/C system) 	hicles vo rators cone	To flush the circuit with the evaporator in the front A/C unit ◆ Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- and Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- (toopy) seal the refrigerant circuit to the second evaporator)	pansion valve is re- moved from the evaporator in the front of the A/C unit and Refriger- ant Circuits Adapter	ivate or commercial purposes, in part or in whole, is not AG. AUDI AG does not guarantee or accept any liability nformation in this document. Copyright by AUDI AG.
			- VAS6338/ 44- is in- stalled. Ex- pansion valve is re- moved from the refrigerant lines to the evaporator in the rear A/C unit and Refrig- erant Cir- cuits Adapter Set 1 - Adapter 43 - VAS6338/	
			VAS6338/ 43- is in- stalled.	

Vehicle	Required adapters for connections to receiv- er/dryer / to second evaporator	Miscella- neous	
	To flush the second evaporator and corre- sponding lines ◆ Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44- and Refrigerant Circuits Adapter Set 1 - Adapter 43 - VAS6338/43- (to seal the refrigerant circuit to the evapo- rator in the front of the A/C unit)	evaporator in the front A/C unit	

- In vehicles with two evaporators, the refrigerant circuit is flushed in two work steps.
- On vehicles with two evaporators, the refrigerant circuit with ٠ the evaporator in the front of the A/C unit is flushed first. So that the refrigerant flows in a fixed direction when flushing, the refrigerant circuit to the second evaporator (in rear of AC unit) authorised by AUDI AG. AUDI AG does not guarantee or accept any liability must be blocked off. This is done by removing the expansion the correctness of information in this document. Copyright by AUDI AG. valve in the refrigerant lines to the second evaporator and installing the Refrigerant Circuits Adapter Set 1 - Adapter 43 -VAS6338/43- (closed adapter). After the refrigerant circuit with the evaporator is flushed, switch both adapters Refrigerant Circuits Adapter Set 1 - Adapter 43 -VAS6338/43- and Refrigerant Circuits Adapter Set 1 - Adapter 44 -VAS6338/44- and flush the refrigerant circuit with the evaporator in the rear of the A/C unit.

Audi Q7 (4M_) e-tron from MY 2017



Vehicle	Adapters Neces- sary for the Con- nections to the Reservoir or Re- ceiver/Dryer	Necessary adapter for the connections to the receiver/dry- er / for the check valves and shut-off valves	Miscella- neous
	 Compressor manufacturer "Sanden" (blo ck connec- tions with ra- dial sealing) Low pressure le side Refriger- one ant Circuits orat&dapter Set 1 - Adapter 12 - VAS6338/12- connected to the A/C Ser- vice Station and the Re- frigerant Cir- cuits Adapter Set - Adapter 48 - VAS6338/48- 	Receiver/Dryer - No adapter re- quired, dryer is removed from receiver/dryer on condenser and the opening is sealed.	The expan- sion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44 - is installed (or an old ex- pansion valve is drilled on and installed as an adapter). Refer to ≥ page 90 and the Parts Catalog.
	 High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- 		
permitted	by copyright. Copying for p unless authorised by AUDI spect to the correctness of i		the area to
		Shut-off valve – Remove the Re- frigerant Shut- Off Valve - V424- and install a Shut-off Valve - VAS6338/42- for it.	Then open or close the shut-off valve in- stalled for the shut-off valve ac- cording to the area to be flushed.

Vehicle	sary for the Con- nections to the	Necessary adapter for the connections to the receiver/dry- er / for the check valves and shut-off valves	Miscella- neous
			Replace the Refrigerant Shut-Off Valve - V424- after flushing.

- On the Audi Q7 e-tron the refrigerant circuit is flushed in four steps (flushing circuit). Refer to > Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).
- So that the entire refrigerant circuit can be flushed, on the Audi Q7 e-tron not only the installed shut-off valve must be positioned correctly (opened or closed). Additionally the electric private or commercial purposes, in part or in whole, is not activated valves (in the valve block) must be positioned core and a does not guarantee or accept any liability rectly. The activation of the electric valves takes place via different routines which are stored in the respective control module (for example in the Thermal Management Control Module - J1024-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).
- To flush on the Audi Q7 e-tron the refrigerant circuit is divided into multiple sections and then cleaned respectively in a flushing cycle. The division takes place by activating the installed electrically activated valves and via the installed manually activated hand shut-off valves. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit) use the \Rightarrow Vehicle diagnostic tester in the "Guided Fault Finding" function.
- The design of the different flushing circuits for the Q7 e-tron is described in the respective vehicle-specific repair manual. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (Cleaning the A/C system refrigerant circuit).
- Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after flushing (with the dryer cartridge installed). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- After flushing, the refrigerant receiver on the heat exchanger for heat pump operation must be replaced. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit .
- The Refrigerant Shut-Off Valve V424- must be replaced after flushing. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit.

Audi R8 (4S_) from MY 2017

Vehicle	Adapters Neces- sary for the Con- nections to the Reservoir or Re- ceiver/Dryer	Required adapters for the connections to the receiver/dryer (with dryer)	Miscella- neous	
Audi R8 (4S_) from MY 2017	 Compressor manufacturer "Denso" (bloc k connections with radial sealing) Low pressure side Refriger- ant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- connected with the A/C Service Sta- tion and the Refrigerant Circuits Adapter Set - Adapter 48 - VAS6338/48- High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- 	with radial sealing at input and output Refrigerant Circuits Adapter Set 1 - Adapter 45 - VAS6338/45- (2 re- quired)	rimite and a share out	t. Copying for private or commercial purposes, in part or in whole, is torised by AUDI AG. AUDI AG does not guarantee or accept any lial correctness of information in this document. Copyright by AUDI AG.

• Depending on the engine, the A/C compressor can only be removed when the engine is removed on the Audi R8. To flush the refrigerant circuit, the refrigerant lines can be removed

when the A/C compressor is installed. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). With the A/C compressor installed the refrigerant oil quantity in the A/C compressor cannot be determined, for this reason flushing the refrigerant circuit with the A/C compressor installed would not be productive.

- Both installed condensers are flushed in opposite direction of the refrigerant flow direction.
- A short version of the filler hose is also included in the Refrigerant Circuits Adapter Set 1 - VAS6338/1-.
- The receiver/dryer could potentially be flushed but it will take too much refrigerant because of its large internal volume; the receiver/dryer would ice-up too much when extracting the refrigerant, the refrigerant would evaporate too slowly and extraction would be prolonged too much.

Audi e-tron (GE_) e-tron from MY 2019

Vehicle	Required Adapters for the Connections to A/C Compressor	Necessary Adapter for the Connections to the Receiver/Dry- er / for the Check Valves and Shut-Off Valves	Miscella- neous	
perr	 Compressor manufacturer "Sanden" (blo ck connec- tions with ra- dial sealing) Low pressure side Refriger- ant Circuits Adapter Set 1 - Adapter 12 - VAS6338/12- connected to the A/C Ser- vice Station and the Re- frigerant Cir- cuits Adapter VAS6338/48- High pres- sure side: Re- frigerant Cir- cuits Adapter Set 1 - Adapter 3 - VAS6338/3- 	Receiver/Dryer - No adapter re- quired, dryer is removed from receiver/dryer on condenser and the opening is sealed. for private or commercial purpor AUDI AG. AUDI AG does not gu s of information in this document	The expan- sion valve is removed and Refrigerant Circuits Adapter Set 1 - Adapter 44 - VAS6338/44 - is installed (or an old ex- pansion valve is drilled on and installed as an adapter). Refer to ⇒wood page 90 and the Parts AUDI Catalog.	liability
		Check Valves – The four check valves are re- moved and in- stalled for the shut-off valves (-6338/47-1- and -6338/47-2-) from the Shut-off	The shut-off valves in- stalled for the check valves are opened or closed ac- cording to the area to be flushed. Refer to ⇒ Heating,	

Vehicle	Required Adapters for the Connections to A/C Compressor	Necessary Adapter for the Connections to the Receiver/Dry- er / for the Check Valves and Shut-Off Valves	Miscella- neous	
		Valves - 6338/47	Ventilation and Air Con- ditioning; Rep. Gr. 87; Refrigerant Circuit (vehi- cle-specific repair manu- al).	
		Shut-off valve – Remove the Re- frigerant Shut- Off Valve - V424- and install a Shut-off Valve VAS6338/42 it.	shut-off valve in- stalled for the shut-off	for private or commercial purposes, in part or in whole, is in AUDI AG. AUDI AG does not guarantee or accept any liab is of information in this document. Copyright by AUDI AG.

- On the Audi e-tron, the refrigerant circuit is flushed in four steps (flushing cycles). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- ♦ So that the entire refrigerant circuit can be flushed, not only the installed shut-off valve must be positioned correctly (opened or closed) on the Audi e-tron. Additionally the electric activated valves (in the valve block) must be positioned correctly. The activation of the electric valves takes place via different routines, which are stored in the respective control module (for example, in the Thermal Management Control Module - J1024-). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- ◆ To flush, the refrigerant circuit on the Audi e-tron is divided into multiple sections and then cleaned respectively in a flushing cycle. The division takes place by activating the installed electrically activated valves and via the installed manually activated hand shut-off valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning) use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- ◆ The design of the different flushing circuits for the Audi e-tron is described in the vehicle-specific repair manual. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (A/C System Refrigerant Circuit, Cleaning).
- Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or is not available as a replacement part, the condenser must be replaced after

flushing (with the dryer cartridge installed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.

- ◆ After flushing, the refrigerant receiver on the heat exchanger for heat pump operation must be replaced. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit.
- ◆ The Refrigerant Shut-Off Valve V424- must be replaced after flushing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit.

2.6.9 General Information on Blowing Through with Compressed ALLORA Set of guarantee or accept any liability gen with respect to the correctness of information in this document. Copyright by AUDI AG.

Compressed air and nitrogen are to be used in order to force out moisture and other contaminants as well as old refrigerant oil as efficiently as possible, without wasting refrigerant. Clean the refrigerant circuit using refrigerant R1234yf (flushing with refrigerant R1234yf). Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page <u>86</u>.

Blowing through the refrigerant circuit with compressed air and nitrogen if for example to be used then only individual components are to be cleaned.



- Only blow through the refrigerant circuit with compressed air and then with nitrogen if there is no possibility of flushing the refrigerant circuit or the amount of work to flush individual components becomes excessive (for example minor contaminants and moisture can also be blown out of the removed refrigerant lines in a short period of time).
- For the most part, blowing through the entire refrigerant circuit with compressed air and nitrogen requires significantly more work than cleaning (flushing) with refrigerant R1234yf. As flushing with refrigerant R1234yf cleans the components more efficiently, always flush in case of a complaint (blowing through should only be used for certain complaints and individual components).
- Under certain conditions, it can be enough to blow out specific components (for example individual refrigerant lines or refrigerant hose) with compressed air (for example to push out old refrigerant oil from individual removed components) or with compressed air (to dry individual components).
- ◆ Certain contaminants cannot or can only be insufficiently removed from the refrigerant circuit with compressed air, these contaminants can be removed, for example by cleaning (flushing) with refrigerant R1234yf. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- When blowing through (with compressed air or nitrogen), the maximum work pressure of 15 bar must not be exceeded (corresponding to pressure that is reached in a filled refrigerant circuit with an ambient temperature of approximately 60 °C, if necessary use pressure reducer also for compressed air)
- If it is determined by the gas analysis that the refrigerant R1234yf is contaminated with another gas, it must be extracted from the refrigerant circuit and be disposed of as a gas from an unknown composition according to the legal requirements.

Refer to ⇒ VW / Audi ServiceNet and <u>⇒ "3.13 Contaminated</u> Refrigerant, Filling in Recycling Container for Analysis, Processing, or Disposal", page 162.

- ◆ Due to contaminated refrigerant decomposition products can be created and accumulate in the refrigerant oil which cannot be extracted with the refrigerant. The contaminated refrigerant oil in this case is to be removed from the refrigerant circuit by flushing with refrigerant. Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>.
- ◆ The refrigerant circuit may be cleaned (flushed) with an A/C Service Station for the refrigerant R134a and flushed with refrigerant R1234yf if no A/C Service Station for the refrigerant R1234yf is available. Currently the use of refrigerant R134a for cleaning the refrigerant circuit is permitted. Refer to ⇒ Refrigerant R134a Servicing; Rep. Gr. 87; Refrigerant Circuit (Refrigerant R134a, Servicing; Refrigerant Circuit, Using Service Station).

Risk of injury due to nitrogen flowing under high pressure.Use a pressure reducer for the nitrogen container.

- Always clean (flush with refrigerant R1234yf) components in direction opposite to refrigerant flow or blow through.
- Extract from the components the escaping mixture of refrigerant, refrigerant oil, compressed air or nitrogen via an extracting system.



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

 The dryer cartridge must be removed on condensers that have a dryer cartridge in the integrated receiver/dryer.



- If the receiver/dryer or dryer cartridge is integrated in the condenser, then they cannot be replaced separately and the condenser must be replaced after cleaning (flushing).
- Depending on the version, there may be an additional filter element on receiver/dryers where the dryer cartridge can be replaced separately. This filter element must be replaced with the dryer cartridge if necessary.
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
 First blow but refrigerant oil and dirt with compressed air ablowny liability through the connected components with nitrogen (clean by blowing out or removing old refrigerant oil).
- Adapter for sealing off the pressure hose to the refrigerant circuit VW/Audi - Passenger Vehicle Adapter Set . Refer to the Parts Catalog.

Note the following points to prevent the oil and moisture from the compressor unit from entering the refrigerant circuit.

The compressed air must be routed through a compressed air cleaning device for cleaning and drying. For this reason use the filter and dryer for the compressed air (included in delivery package as a tool for paint work). Refer to the Parts Catalog.

- ♦ On refrigerant lines with thread or union nut on the connection, use the adapter from the A/C Adapter Set - V.A.G 1785- (A/ C Adapter Set - Adapter 1 - V.A.G 1785/1- through A/C Adapter Set - Adapter 8 - V.A.G 1785/8-) to connect charge hoses 5/8" -18 UNF (a section of this adapter is also contained in the Refrigerant Circuits Adapter Set 1.
- On refrigerant lines without thread or union nut on the connection (for connecting adapters), use adapter from Refrigerant Circuits Adapter Set 1 or a standard blower pistol with rubber mouthpiece.

Compressed air or nitrogen coming out of components is to be extracted via an appropriate system (for example, workshop extraction system).

The circuit (or individual components) must be blown through (if there is no possibility for flushing or flushing is not recommended):

- In the event dirt or other contaminants are located in individual components of the circuit.
- If the vacuum reading does not stay the same when evacuating a leak-free refrigerant circuit (pressure build-up due to moisture in the refrigerant circuit).
- The refrigerant circuit has been left open for longer than normal (for example, after a collision).
- Pressure and temperature measurements in the circuit indicate that there is moisture in the refrigerant circuit horised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
- It is stipulated by the vehicle-specific repair manual following the replacement of certain components. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit.

Note

Certain contaminants and old refrigerant oil cannot or can only be insufficiently removed from the refrigerant circuit with compressed air or nitrogen, these contaminants can be removed for example by flushing with refrigerant R1234yf. Refer to \Rightarrow <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>.

- Refrigerant circuit, flushing with compressed air or nitrogen. Refer to ⇒ "2.6.10 Refrigerant Circuit, Flushing with Compressed Air or Nitrogen", page 130
- 2.6.10 Refrigerant Circuit, Flushing with Compressed Air or Nitrogen



For vehicles that have refrigerant lines with no threads for connecting the A/C Adapter Set - V.A.G 1785-. Use, for example, an air blow gun with a rubber mouth piece or an adapter from the Refrigerant Circuits Adapter Set 1 for blowing through the individual components. When using an air blow gun with a rubber mouthpiece, take special care not to damage the connections (bending or scratching).

- Evaporator is to be blown out via the connection for low pressure line (large diameter) with the expansion valve or restrictor removed.
- Always blow through components in direction opposite to refrigerant flow (or flush with refrigerant R1234yf)
- Check the expansion valve and replace if dirty or corroded.
- Locate any components on which dark, sticky deposits cannot be removed with compressed air and either flush them using refrigerant R1234yf or replace them.
- Thin, light gray deposits on the inside (of pipes) do not impair the function of the components.
- After blowing through the receiver/dryer (dryer cartridge) or reservoir and restrictor. Replace the dryer cartridge on connectal purposes, in part or in whole, is not densers that have one installed in the integrated receiver/G does not guarantee or accept any liability dryer.
- ◆ Condensers with an integrated receiver/dryer or dryer cartridge that cannot be replaced separately or are not available as a replacement part must be replaced after flushing the refrigerant circuit. Refer to the ⇒ Electronic Parts Catalog (ET-KA) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Depending on the version, there may be an additional filter element on receiver/dryers where the dryer cartridge can be replaced separately. This filter element must be replaced with the dryer cartridge if necessary.

After blowing through the refrigerant circuit:

- Replace these vehicle-specific components (restrictor and reservoir, expansion valve and receiver/dryer or dryer cartridge). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- Depending on the concern replace the A/C compressor (refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the ⇒ Electronic Parts Catalog (ETKA)) or let the remaining refrigerant oil flow out of the removed A/C compressor (refer to <u>⇒</u> <u>"2.5 Components, Replacing", page 71</u>) and re-fill the prescribed quantity of fresh refrigerant oil. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).

i Note

- ◆ There is a specific prescribed amount of refrigerant oil in the replacement A/C compressor. On vehicles with two evaporators if necessary install an additional certain amount of refrigerant oil in the circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If the A/C compressor will not be replaced, replace the refrigerant oil quantity in the A/C compressor to the specified capacity (pour out the refrigerant oil and refill the prescribed quantity into the A/C compressor or refrigerant circuit). Refer to ⇒ "2.5 Components, Replacing", page 71, ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data;

Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehiclespecific repair manual).

- Completely reassemble the refrigerant circuit again. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Evacuate and fill the refrigerant circuit according to the procedure. Refer to ⇒ "3.5 Refrigerant Circuit, Evacuating", page 144 and ⇒ "3.6 Refrigerant Circuit, Charging", page 149.
- Start up the A/C system according to specification. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and <u>⇒ "3.7 A/</u> <u>C System, Operating after Charging", page 152</u>.

2.7 Pressure, Checking with Pressure Gauge

⇒ "2.7.1 Pressure Gauge Display", page 132

<u>⇒ "2.7.2 Pressure Gauge Uses", page 132</u>

2.7.1 Pressure Gauge Display

- 1 Temperature scale for Refrigerant R1234yf (CF₃ CF = CH₂) in °C
- 2 Pressure scale in bar pressure

i Note

- Pressure is measured in different units: 1 MPa (mega Pascal) corresponds to 10 bar (145 psi) positive pressure. 1 bar (14.5 psi) absolute pressure corresponds to 0 bar (0 psi) positive pressure and thus to the ambient pressure (atmospheric pressure).
- This illustration shows the pressure gauge which shown the pressure on the low pressure side, the display here is in bar pressure gauge (can be recognized by the display "-1").

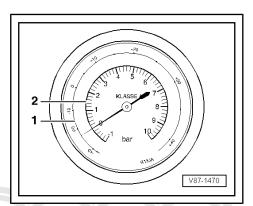
The pressure gauge may have one or more temperature scales next to the pressure scale. The R1234yf scale values are allocated respectively in the vapor pressure table. Since various refrigerants create different vapor pressures at the same temperature, each temperature scale is identified for the respective refrigerant.

◆ The pressure gauges make is possible to perform the following projected by copyright. Copying for private or commercial purposes, in part or in whole, is not checks and measurements. Refer to ⇒ "2.7.2 Pressure Gauge authorised by AUDI AG. AUDI AG does not guarantee or accept any liability Uses", page 132.

2.7.2 Pressure Gauge Uses

Pressure and Temperature Measurement at Refrigerant Circuit

- High pressure gauge measures pressure and temperature, which expand uniformly from outlet of A/C compressor via the condenser up to constriction (restrictor, or expansion valve) with A/C system switched on.
- Low pressure gauge measures pressure and temperature, which expand uniformly from constriction (restrictor, or expansion valve) via evaporator up to input of A/C compressor with A/C system switched on.







The relationship between pressure and temperature indicated on the gauges only exists in a refrigerant circuit that contains liquid or vapor, but not gas. In a gaseous state, the temperature is approximately 10 to 30 °C (50 to 86 °F) higher than indicated on the gauge.

Verification of Refrigerant in a Closed Vessel

Refrigerant R1234yf is present in a closed vessel or in a refrigerant circuit when temperature indicator on the pressure gauge matches the refrigerant temperature (standing fluid adopts the ambient temperature).

A closed vessel or a refrigerant circuit which has been switched off is empty when temperature indication on the pressure gauge is below the temperature of the refrigerant.



- The relationship between pressure and temperature indicated on the gauges no longer applies if no liquid is present and the pressure is built up solely by gas.
- ◆ The pressure of the refrigerant R1234yf and R134a are very close over a very large temperature range, they cannot be differentiated by a pressure measurement. Distinguishing is possible for example using a gas analysis. Refer to <u>⇒ "6.2.16 Refrigerant R1234yf Analysis", page 25</u>.



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3 Working with A/C Service Station

⇒ "3.1 Working with A/C Service Station", page 134

 \Rightarrow "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136

⇒ "3.3 Refrigerant Gas Analysis, Performing", page 138

⇒ "3.4 Refrigerant Circuit, Discharging", page 141

⇒ "3.5 Refrigerant Circuit, Evacuating", page 144

⇒ "3.6 Refrigerant Circuit, Charging", page 149

⇒ "3.7 A/C System, Operating after Charging", page 152

 \Rightarrow "3.8 A/C Service Station, Switching off and Disconnecting from Refrigerant Circuit", page 154

⇒ "3.9 Refrigerant, Filling in Reservoir", page 156

⇒ "3.10 A/C Service Station, Discharging", page 156

⇒ "3.11 Electrically Driven A/C Compressor, Cleaning", page 157

⇒ "3.12 Refrigerant Circuit, Cleaning", page 160

⇒ "3.13 Contaminated Refrigerant, Filling in Recycling Container for Analysis, Processing, or Disposal", page 162

⇒ "3.14 Pressures, Checking", page 170

3.1 Working with A/C Service Station

i Note

- If it is suspected that chemicals were added to the refrigerant circuit to seal leaks, chemical substances to seal leaks in the refrigerant circuit (leak stop additive), 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.
- More the customer aware that there are substances in their A/ C system which are not approved by Volkswagen/Audi and for this reason this A/C system cannot be discharged and serviced.
- The chemical materials (leak stop additive) for sealing leaks, in the refrigerant circuit offered on the market are not approved by copying for private or commercial purposes, in part or in whole, is not by Volkswagen/Audi. There are no permanent - , validity: Or the correctness of information in this document. Copyright by AUDI AG. material compatibility tests. Therefore damage or malfunctions in the A/C system or the A/C service station cannot be excluded.
- The stop leak additives offered on the open market have different physical and chemical properties, which can impair the function of the A/C system and the A/C service station and can even shut down the system completely. Volkswagen/Audi does not approve the use of chemicals to seal leaks in the refrigerant circuit (leak stop additives).
- Chemical materials to seal leaks in the refrigerant circuit react with air or the moisture in the air and form deposits in the refrigerant circuit (and the A/C service station) that lead to malfunctions in the valves and other components that come into



contact with such chemicals. These deposits cannot be removed completely from the components, even by flushing.

- It is not possible to recognize chemical substances to seal leaks in the refrigerant circuit (leak stop additive) and the label that is supposed to come with them is usually not there. Therefore be careful when working with a vehicle if its service history is unknown.
- Accessories offer containers used to separate out these chemicals (used to seal leaks in the refrigerant circuit). Since Volkswagen/Audi does not know composition and the physical and chemical properties of these materials, it is not possible to make a statement about their effectiveness and the deposition rate of these filters.

If the refrigerant circuit gets filed with a chemical material (stop leak additive) to seal any leaks (or if there is a suspicion of this) and if it then necessary to perform a repair to the refrigerant circuit, then it is necessary to inform the customer of the following:

◆ It is not possible to evacuate the refrigerant from the A/C system due to the stop leak additive that has been added to the system because it will damage the A/C service station. When extracting the refrigerant it can be filled as contaminated refrigerant as described in recycling bottles. Refer to ≥ "3.13 Contaminated Refrigerant, Filling in Recycling Container for Analysis, Processing, or Disposal", page 162. If it is not possible an outside company for example must evacuate the contaminated refrigerant with a suitable device and extract it from the refrigerant circuit after completing the preparation (or the disposal) (for example, a local waste management company that specializes in disposing of refrigerant).

- It will be necessary to replace any refrigerant circuit components that have come in contact with the stop leak additive in order to repair the A/C system properly. Certain refrigerant circuit components may already be damaged by the stop leak additive (for example, the A/C Compressor Regulator Valve N280-) or will get damaged if they are used over again and will fail after a short amount of time. In addition to this, if there is any sediment from the stop leak additive still in the circuit, it could come loose at a later point and cause the A/C system to fail again (currently it is not possible to clean these components with any workshop tools).
- Contaminated refrigerant can make the entire filling of the A/ C service station unusable.
- ◆ Before extracting with a suitable tester check the composition of the refrigerant in the refrigerant circuit. Refer to <u>⇒ "3.3 Refrigerant Gas Analysis, Performing", page 138</u>.
- ◆ Extract contaminated refrigerant in a recycling bottle and return it to the gas supplier to be analyzed, processed or disposed of. Refer to ⇒ "6.2.17 Return of Contaminated Refrigerant R1234yf for Analysis, Preparation or Disposal", page 26.

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- Damaged refrigerant can change the A/C system function and/ or damage the refrigerant circuit components.
- Mixing different refrigerant (for example refrigerant R1234yf with a certain percentage of refrigerant R134a) my not be filled in a vehicle which was type-tested with refrigerant R1234yf.

Important Information when Working with A/C Service Station

Pay attention to the following to start the A/C service station (currently available A/C service station. Refer to Special Tools and Equipment Catalog.)

- The filters and dryers installed must be replaced, at the latest, when the service life specified in the relevant operating instructions has been reached.
- If an A/C service station is also used for cleaning (flushing) the refrigerant circuit, dryer and filter must be replaced in shorter intervals. Refer to ⇒ "2.6.10 Refrigerant Circuit, Flushing with Compressed Air or Nitrogen", page 130.
- In the reservoir exclusive use is to be made of refrigerant oils which have been approved for the vehicle-specific refrigerant circuit (if necessary, fill refrigerant oil directly into refrigerant circuit). Refer to Parts Catalog.
- Depending on the version of the A/C service station and the procedures to be performed a specific minimum amount of refrigerant, refrigerant oil and UV-leak detection are in the corresponding reservoir of the A/C service station. Refer to the A/ C service station Owner's Manual.

Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not Extracted refrigerant is not to be reused if there is any doubt about accept any liability the composition of the refrigerant extracted, even after cleaning to by AUDI AG. in the A/C service station. Refer to \Rightarrow "3.3 Refrigerant Gas Analysis, Performing", page 138.

- If the wrong refrigerant is accidentally filled in the A/C service station it must be discharged. The system must be cleaned and the filter and dryer as well at the filled refrigerant oil is to be replaced. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141 and ⇒ "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136.
- ◆ For example, within Germany, contaminated refrigerant can be returned to the supplier in recycling containers for analysis, recycling or for environmentally safe disposal. Other or additional regulations may apply in other countries. Refer to ⇒ <u>"6.2.17 Return of Contaminated Refrigerant R1234yf for Analysis, Preparation or Disposal", page 26</u>.

3.2 A/C Service Station on Refrigerant Circuit, Connecting

Connecting

 Work procedure may vary depending on the type of tools selected (the tool-specific operating instructions should therefore be followed).



Perform the procedure as described in the A/C service station Owner's Manual. Refer to A/C service station Owner's Manual.

The charging hoses are to be connected as follows to prevent the ingress of air or moisture into the refrigerant circuit:

- On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.
- Switch off the ignition.
- Connect the A/C service station to the power supply.
- Switch on the A/C service station and the related Owner's Manual according to specification. Refer to A/C service station Owner's Manual.

- Remove the closure caps from the service connections. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the vehicle-specific refrigerant circuit.
- Evacuate the charging hoses if necessary.
- Check the refrigerant circuit service connections of debris and corrosion and if necessary clean.



Dirt or a rough surface on the service connections due to corrosion can cause seal damage, which can then cause premature failure of the quick-release couplings.

Connect the quick-release couplings to the refrigerant circuit service connections.



Risk of damaging the A/C compressor or the A/C service station.

A short circuit between the high and low pressure side is possible when opening the valves with the A/C system is on.

- Never open the valves in the high or low pressure side when the A/C system is on.
- Install the hand wheel for the low pressure side quick-release coupling connection just far enough into the until the valve is securely opened inside the service connection (pay attention to the pressure gauge, do not put too much pressure on the valve).
- Perform a gas analysis using the A/C service station (only necessary when the refrigerant is to be extracted or the pressure in the refrigerant circuit is to be checked). Refer to <u>⇒</u>
 <u>"3.3 Refrigerant Gas Analysis, Performing", page 138</u>.



Connect the gas analyzer or the A/C service station according to the Owner's Manual and turn on. Refer to \Rightarrow "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136, the Gas Analyzer Owner's Manual and/or the A/C service station Owner's Manual.

A specific refrigerant circuit pressure is necessary (for example 2.5 bar (36.25 psi) at an ambient temperature of 20 °C (68 °F)) for performing the gas analysis. If there is only so little refrigerant in the circuit, so that not enough pressure is built (for example less than 30 g (1.05 oz) refrigerant which only builds a pressure of approximately 1 bar (14.5 psi)) depending on the version of the A/C Service Station it may be the case that a gas analysis can no longer be performed. Without a gas analysis no refrigerant may be removed from the A/C Service Station . If this is the case pay attention to the instructions in the Owner's Manual from the A/C Service Station . It is described what the quantity that is removed from the refrigerant circuit.

If it is determined by the gas analysis that the refrigerant in the circuit meets the specifications.

 Install the hand wheel for the high pressure side quick-release coupling connection just far enough into the until the valve is securely opened inside the service connection (pay attention)



to the pressure gauge, do not put too much pressure on the valve).

Perform the specified procedures on the refrigerant circuit using the A/C service station.

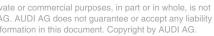


- If it is determined by the gas analysis that the refrigerant R1234yf is contaminated, extract the refrigerant from the refrigerant circuit and return it to the gas supplier to be processed or disposed of. Refer to <u>⇒ "3.13 Contaminated Refrigerant</u>, Filling in Recycling Container for Analysis, Processing, or Disposal", page 162, \Rightarrow "6.2.17 Return of Contaminated Re-frigerant R1234yf for Analysis, Preparation or Disposal", page 26 and \Rightarrow "6.1 A/C Technology Basic Principles", page 17.
- If there is not the possibility to move the contaminated refrigerant immediately from the vehicle refrigerant circuit in a recycling bottle. Remove (close) the hand wheel from the low pressure side quick-release coupling connection switch off the A/C service station (and if necessary disconnect the power supply). Then disconnect the low pressure side quick-release coupling adapter from the vehicle. Then disconnect the low pressure side quick-release coupling connection for example for a workshop extraction system suction hose from the filler hose to the A/C service station and let the contaminated refrigerant flow out of the filler hose in the workshop extraction system suction hose. To make the A/C service station ready vate or commercial purposes, in part or in whole, is not to use again, re-connect the low pressure side of the pressure side of the context of the service of the context of the context of the service of the context of coupling adapter on the filler hose to the A/C service station and evacuate using the A/C service station according to the corresponding Owner's Manual. Refer to the A/C service station Owner's Manual.
- Perform the specified procedures using the A/C service station.
- Refer to \Rightarrow "3.3 Refrigerant Gas Analysis, Performing", page 138
- Refer to \Rightarrow "3.4 Refrigerant Circuit, Discharging", page 141.
- Refer to \Rightarrow "3.5 Refrigerant Circuit, Evacuating", page 144.
- Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
- Refer to ⇒ "3.8 A/C Service Station, Switching off and Disconnecting from Refrigerant Circuit", page 154
- Refer to \Rightarrow "3.9 Refrigerant, Filling in Reservoir", page 156.
- Refer to \Rightarrow "3.10 A/C Service Station, Discharging", page 156
- Refer to \Rightarrow "3.14 Pressures, Checking", page 170

3.3 Refrigerant Gas Analysis, Performing

Note

- It is necessary for the operation of the A/C system that the refrigerant used has a certain purity.
- Contamination with other refrigerants or gases can case damage and lead to failure of the A/C system.





- Contaminated refrigerant must be returned to the gas supplier for processing (or disposal) as a gas of an unknown composition according to the legal requirements.
- So that fluids components (for example drops of refrigerant oil) in the extracted refrigerant gas does not lead to a faulty result of the gas analysis, a separator (filter) is installed in the gas analyzer which separates the fluid drops. Replace the separator according to the specification of the gas analyzer for example the Owner's Manual belonging to the A/C service station. Refer to the Gas Analyzer Owner's Manual or Owner's Manual A/C service station.

All Vehicles

- Connect the gas analyzer or the A/C service station according to the Owner's Manual and turn on. Refer to ⇒ "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136, the Gas Analyzer Owner's Manual and/or the A/C service station Owner's Manual.
- Perform the gas analysis according to the Owner's Manual. Refer to the A/C service station Owner's Manual.

i Note

- Faulty gas analysis is possible due to air in the refrigerant hose or not following the procedure of the gas analysis according to the Owner's Manual.
- ♦ A specific refrigerant circuit pressure is necessary (for example 2.5 bar (36.25 psi) at an ambient temperature of 20 °C (68 °F)) for performing the gas analysis. If there is only so little refrigerant in the circuit, so that not enough pressure is built (for example less than 30 g (1.05 oz) refrigerant which only builds a pressure of approximately 1 bar (14.5 psi)) depending on the version of the A/C Service Station it may be the case that a gas analysis can no longer be performed. Without a gas analysis no refrigerant may be removed from the A/C Service Station . If this is the case pay attention to the instructions in the Owner's Manual from the A/C Service Station . It is described what the quantity that is removed from the refrigerant circuit.
- Pay exact attention to the gas analyzer/A/C service station Owner's Manual.
- Evacuate the refrigerant hose from the A/C service station be private or commercial purposes, in part or in whole, is not fore connecting the service couplings to the refrigerant circuit/ by AUDI AG. AUDI AG does not guarantee or accept any liability on the gas bottle with refrigerant R1234yf. Refer to the gas analyzer/A/C service station Owner's Manual.

The following results are possible for the gas analysis:

- If the analyzed refrigerant R1234yf meets the requirements, the planed procedures can be performed using the A/C service station.
- If a malfunction occurs during the gas analysis, determine the malfunction and correct it and the perform the gas analysis again. Refer to the A/C service station Owner's Manual.
- If the analyzed refrigerant R1234yf does not meet the requirements, the analyzed refrigerant must be extracted as a gas of an unknown composition and for example returned to the gas supplier to be analyzed, processed or disposed of. Refer to <u>⇒</u> <u>"6.2.17 Return of Contaminated Refrigerant R1234yf for Analysis, Preparation or Disposal", page 26</u>.





- If during the analysis of the refrigerant which was extracted from a vehicle refrigerant circuit contamination is determined. A gas analysis can be performed on for example refrigerant from a delivered bottle by the gas supplier if assurance is wanted of the gas analysis.
- Due to the required purity of the refrigerant R1234yf small amounts of surrounding air in the A/C service station filler hoses can cause a faulty result. For this reason in most the A/ C service station a process is included, in which the gas analysis is repeated up to two times before and NOK result is displayed. Refer to the A/C service station Owner's Manual.
- A simple function test of the gas analyzer can be performed for example with the surrounding air. (Service coupling from the refrigerant hose with which the gas analysis is performed is removed and the gas analysis is performed with the refrigerant hose open). For this test it must then be displayed the the analyzed gas is NOK.
- The procedures of the gas analysis are developed for motor vehicle workshops and does not state the complete composition of the refrigerant. This gas analysis can only give the result of how high the portion of refrigerant R1234yf in the analyzed refrigerant is. If the portion or R1234yf is under 95% the refrigerant no longer meets the requirements and can cause damage to the refrigerant circuit components. A gas analysis which can give the exact composition of the analyzed refrigerant is currently not possible for the workshop area. Gas analysis which can determine the exact composition of gases require expensive devices and procedures and can usually only be preformed in test equipment for this.

If Contaminated Refrigerant Is Determined during the Gas Analysis before Continuing Work Speak with the Customer and Inform Them of the Following:

In the refrigerant circuit of their vehicle there is contaminated refrigerant or refrigerant of an unknown composition which does not meet the requirements of the vehicle manufacturer. This refrigerant:

- ♦ Must be extracted as a gas of an unknown composition and for example returned to the gas supplier to be analyzed, processed (or disposed of). Refer to ⇒ "6.2.17 Return of Contaminated Refrigerant R1234yf for Analysis, Preparation or Disposal", page 26.
- Can be the cause of a malfunction or have damaged the refrigerant circuit to such an extent that in the near future malfunctions can occur.
- Depending on their composition the use of contaminated refrigerant can void the type approval of the vehicle.
- If internal damage to the refrigerant circuit occurs due to contaminated refrigerant (for example when a decomposition product of the contaminated refrigerant attacks the refrigerant circuit components, the refrigerant circuit can only be 100% serviced when all components which have touched the contaminated refrigerant have been replaced. The internal state of the refrigerant circuit can be evaluated by a visual inspection of specific refrigerant circuit components (for example the state of the inner surface of removed refrigerant lines and refrigerant hose, the inner surface of the receiver/dryer and the state of the removed dryer cartridge). Refer to ⇒ "2.5 Components, Replacing", page 71.

- If internal damage of the refrigerant circuit occurs due to contaminated refrigerant (for example A/C compressor failure due to damaged components or due to overheating, the refrigerant oil is discolored more than normal and the refrigerant carrying components however were not damaged the refrigerant circuit can be refilled after it is flushed (replaced A/C compressor, dryer and expansion valve). Because no statement/results about the long-term effect of contaminated refrigerant on the refrigerant oil and the refrigerant circuit components can be made, in this case no guarantee of the future function of the refrigerant circuit components is possible. Refer to ⇒ <u>"2.5 Components, Replacing", page 71</u>.
- ◆ If internal damage of the refrigerant circuit occurs due to contaminated refrigerant (for example the refrigerant oil is discolored more than normal and the refrigerant circuit components were not damaged) the refrigerant circuit can be refilled after the dryer is replaced and the refrigerant circuit is evacuated for a long time (minimum one hour). Because no statement/ results about the long-term effect of contaminated refrigerant on the refrigerant oil and the refrigerant circuit components can be made, in this case no guarantee of the future function of the refrigerant circuit components is possible. Refer to <u>⇒</u> "2.5 Components, Replacing", page 71.

i Note

- If there is a concern which was caused by contaminated refrigerant (for example leaking seals or hoses, a damaged A/C compressor, contaminated refrigerant) flush the refrigerant poses in part or in whole, is not circuit and replace all components which the contaminated guarantee or accept any liability refrigerant has damaged (seals) hoses, the receiver/dryer orn. Copyright by AUDLAG. the dryer cartridge, the expansion valve and the A/C compressor). If it is determined that contaminated refrigerant has also damaged other components (for example the inner surfaces of the refrigerant pipes and refrigerant hoses, damaged seals) the refrigerant circuit must be completely replaced. Connect the refrigerant circuit and refill with new refrigerant. Then check the A/C system function. Make the customer aware for their protection that the refrigerant circuit was filled with contaminated refrigerant.
- If there is a complaint which was caused by contaminated refrigerant (for example no or too little cooling output) and no other concerns on the refrigerant circuit can be determined or the refrigerant must be extracted because work in the refrigerant circuit surrounding area requires this, after extracting proceed as follows. Remove the dryer and check it for contamination, because refrigerant oil is located also on and in the dryer is must be checked. If the refrigerant oil is contaminated, dark or viscous or dirt deposits have built on the dryer, flush the refrigerant circuit and replace the components as described above (they may already be damages which can cause the refrigerant circuit to fail in the near future). If the refrigerant oil is OK and the dryer does not have more contamination than from normal operation, replace the dryer. Evacuate the refrigerant circuit longer than normally required (minimum one hour) and then fill with clean refrigerant. Check the A/C system function. Make the customer aware for their protection that the refrigerant circuit was filled with contaminated refrigerant.

3.4 Refrigerant Circuit, Discharging

 Work procedure may vary depending on the type of tools selected (the tool-specific operating instructions should therefore be followed). Refer to the A/C service station Owner's Manual.

- The refrigerant circuit is to be discharged if parts of the refrigerant circuit are to be removed, if there is any doubt about the quantity of refrigerant in the circuit, when contaminated refrigerant is determined by the gas analysis or if safety precautions so require.
- All of the necessary operating instructions for working with the A/C service station for refrigerant can be found in the A/C service station Owner's Manual. Refer to the A/C service station Owner's Manual.

Draining:

- On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.
- Switch off the ignition.
- Connect the A/C service station to the power supply.

Additionally on vehicles with electric operated valves in the refrigerant circuit, which cannot be opened without power:



On vehicles with high-voltage system and additional functions of the A/C system ("heat pump operation" or "cooling the high-voltage battery") valves may be installed in the refrigerant circuit which cannot be opened without power. These valves are opened and closed for example via a step motor and after switching off the ignition are no longer activated. To completely discharge, correctly evacuate and charge the refrigerant circuit, no sections may be closed. Therefore these valves must be opened before performing this work. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

 Open the electrically activated valves, which to now open without power using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

All Vehicles

- Start the A/C service station according to the corresponding operating instructions.
- Remove the closure caps from the refrigerant circuit service connections. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the vehicle-specific refrigerant circuit.
- Connect the A/C service station to the refrigerant circuit. Refer to ⇒ "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136.
- Perform a gas analysis with the A/C service station. Refer to ⇒ "3.3 Refrigerant Gas Analysis, Performing", page 138.



If it is determined by the gas analysis that the refrigerant R1234yft or in whole, is not is contaminated, extract the refrigerant from the refrigerant circuit accept any liability (fill in a recycling container) and return it to the gas supplier to be the yAUDI AG. analyzed, processed (or disposed of). Refer to \Rightarrow "6.2.17 Return of Contaminated Refrigerant R1234yf for Analysis, Preparation or Disposal", page 26.

 Discharge the refrigerant circuit using the A/C service station according to the operating instructions.

Risk of damaging the A/C compressor by the refrigerant circuit vacuum.

Never start the engine with vacuum in the refrigerant circuit.



- ◆ There is a possibility of refrigerant oil being extracted from the refrigerant circuit together with the refrigerant. To ensure compression lubrication, the refrigerant oil in the critical by copying for private or commercial purposes, in part or in whole, is not pressor lubrication, the refrigerant oil in the critical frager by copying for private or commercial purposes, in part or in whole, is not pressor lubrication, the refrigerant oil. Refer to ⇒riti3.6. Refrigerant hess of information in this document. Copyright by AUDI AG. Circuit, Charging", page 149.
- Depending on the version of the A/C service station pressure can be created in the refrigerant circuit when extracting refrigerant (residual pressure less than approximately 300 mbar (4.35 psi)).
- On vehicles fitted with a compressor with no A/C clutch (with A/C Compressor Regulator Valve - N280-) the engine should not be run for longer than absolutely necessary with the refrigerant circuit empty (A/C compressor always in operation as well).
- On vehicles with a compressor with no A/C clutch, the engine is only to be started following complete assembly of the refrigerant circuit (avoid high engine speeds).
- Depending on the A/C compressor version, there may be a valve installed on the high pressure side of the A/C compressor, which prevents the liquid refrigerant from flowing back into the compressor once the A/C is turned off. If an A/C compressor with this valve is installed in a vehicle with a refrigerant circuit having an expansion valve, then it may take some time until the pressure in the high pressure side decreases (the expansion is cold and the pressure in the low pressure side quickly increases after it is turned off, the expansion valve closes and the refrigerant flows slowly into the low pressure side). If the A/C compressor is switched on (or the refrigerant circuit is evacuated on the low pressure side) the pressure on the low pressure side goes down, the expansion valve open and the refrigerant can flow of the low pressure side.

Should work be performed on the vehicle after discharging which does not require using the A/C service station.

- Disconnect and the A/C service station from the refrigerant circuit and turn it off. Refer to ⇒ <u>"3.8 A/C Service Station, Switching off and Disconnecting from Refrigerant Circuit", page 154</u>.
- Open the refrigerant circuit at a connection location.

Danger or frostbite due to refrigerant coming out under pressure.

Frostbite on the skin and other parts of the body is possible.

- Wear safety gloves.
- Wear protective eyewear.
- Extract refrigerant and open the refrigerant circuit immediately.



- If more than 10 minutes elapse after extracting the refrigerant and the refrigerant circuit was not opened, extract the refrigerant again. Pressure can develop in the refrigerant circuit due to evaporation.
- Perform the specified procedures on the refrigerant circuit.

Should the refrigerant circuit after the discharge be evacuated and refilled. Refer to \Rightarrow "3.5 Refrigerant Circuit, Evacuating", page 144.

Note

- After opening the connection locations in the refrigerant circuit seal the open lines and component connections (so that no moisture and dirt can enter these components).
- ٠ There is a possibility of refrigerant oil being extracted from the refrigerant circuit together with the refrigerant. To ensure compressor lubrication, the refrigerant oil in the circuit must be topped up with fresh oil.
- On vehicles fitted with a compressor with (with A/C Compressor Regulator Valve - N280-) the engine should not be run for longer than absolutely necessary with the refrigerant circuit empty (A/C compressor always in operation as well).
- On vehicles with an A/C compressor with A/C Compressor Regulator Valve N280- the engine may only be started when the refrigerant circuit is completely assembled, at the same time avoid high engine speeds.

3.5 Refrigerant Circuit, Evacuating

- Perform the procedure as described in the A/C service station Owner's Manual. Refer to A/C service station Owner's Manual.
- The quantity of refrigerant oil in the A/C service station is checked and if necessary corrected. Refer to the A/C service station Owner's Manual.
- The refrigerant quantity in the A/C service station is checked and if necessary corrected. Refer to the A/C service station Owner's Manual.

The refrigerant circuit must be evacuated before it is filled with refrigerant (vacuum). Moisture is also extracted by this from the circuit.

Leaks may be found when evacuating the refrigerant circuit. Refer to \Rightarrow "2.4 Leaks, Finding", page 63.

CAUTION Æ

Risk of damaging the A/C compressor by the refrigerant circuit dept any liability AUDI AG. vacuum

whole, is not

Never start the engine with vacuum in the refrigerant circuit.

Evacuating:

- The refrigerant circuit is completely assembled.
- On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.
- Switch off the ignition.
- Connect the A/C service station to the power supply.

Additionally on vehicles with electric operated valves in the refrigerant circuit, which cannot be opened without power:



- On vehicles with high-voltage system and additional functions of the A/C system ("heat pump operation" or "cooling the high-voltage battery") valves may be installed in the refrigerant circuit which cannot be opened without power. These valves are opened and closed for example via a step motor and after switching off the ignition are no longer activated. To completely discharge, correctly evacuate and charge the refrigerant circuit, no sections may be closed. Therefore these valves must be opened before performing this work. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- The check valves in the refrigerant circuit in the flow direction have a specified residual pressure (approximately 0.1 bar or 100 mbar (1.45 psi)). So that the refrigerant circuit can be completely evacuates (residual pressure less than 5 mbar (72.5 psi)) all electrically activated valves must be opened.
- Open the electrically activated valves, which to now open without power using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

All Vehicles

- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability Switch on the A/C service station and the related Owner's
- Manual according to specification. Refer to A/C service station Owner's Manual.
- Remove the closure caps from the refrigerant circuit service connections. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the vehicle-specific refrigerant circuit.
- Check the refrigerant circuit service connections of debris and corrosion and if necessary clean.



Dirt or a rough surface on the service connections due to corrosion can cause seal damage, which can then cause premature failure of the quick-release couplings.

- Connect the A/C service station to the refrigerant circuit. Refer to \Rightarrow "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136
- Switch on the A/C service station, evacuate the refrigerant and perform a pressure test (vacuum pump on for approximately 10 minutes to remove air, remaining refrigerant and moisture and 20 minute pressure/pressure increase test).



The pressure at the end of the evacuation process must be smaller than 5 bar (72.5 psi) absolute pressure (the vacuum pump of the A/C service station runs). If during the evacuation process the refrigerant circuit pressure is not smaller than 5 mbar (.07 psi), this may have various causes: For example leaks in the refrigerant circuit or in the connection to the A/C



service station causes the evacuation time to be too short the vacuum pump from the A/C service station does not generate the required vacuum or the vacuum sensor from the A/C service station is not correctly calibrated. Refer to the A/C service station Owner's Manual.

- An absolute pressure of 5 mbar (0.07 psi) corresponds to for example a absolute pressure of 980 mbar (14.21 psi) a vacuum of 975 mbar (14.14 psi).
- At the end of the vacuum/pressure increase test the refrigerant circuit pressure must not be higher than 20 mbar (0.29 psi) absolute pressure. If the refrigerant circuit pressure during the vacuum/pressure increase test is greater than 20 mbar (0.29 psi), the vacuum pump is switched on and the procedure begins again. Refer to the A/C service station Owner's Manual. If after repeating the procedure twice the refrigerant circuit pressure does not stay smaller than 20 mbar (0.29 psi), this may have various causes. If there are leaks in the refrigerant circuit, leaks in the connection from the refrigerant circuit to the A/C service station or in the A/C service station itself, the time for the evacuation time is too short or the time for the vacuum/pressure increase is too long.
- If it is suspected that a leak in the refrigerant circuit is present if necessary switch off the A/C service station and let it sit as long as possible (for example one hour to check for leaks in the refrigerant circuit). Refer to the A/C service station Owner's Manual.
- Depending on the version of the A/C service station the refrigerant circuit pressure is displayed directly, it can also be the case that only when the vacuum pump is running the current pressure is shown. Refer to the A/C service station Owner's Manual. If the A/C service station only displays the ambient pressure then the display of the refrigerant circuit pressure is dependent on the ambient pressure when turning on (the ambient pressure at 980 mbar (14:21 ps)) corresponds commercial purposes, in part or in whole, is not to a vacuum of 975 mbar (14:14 ps)) a residual pressure of 5 does not guarantee or accept any liability of the corresponds of 5 does not guarantee or accept any liability are solved and pressure of 5 does not guarantee or accept any liability of the corresponds of 6 does not guarantee or accept any liability of the corresponds of 5 does not guarantee or accept any liability of 5 does not guarantee mbar (0.07 psi) absolute pressure).
- If the refrigerant circuit was opened, a small amount of moisture may have entered the refrigerant circuit. If this is the case, evacuate the refrigerant circuit for at least 30 minutes (refrigerant circuit pressure less than 20 mbar before filling).
- If refrigerant was extracted (to check the capacity) and the refrigerant circuit is only evacuated to fill it again (the refrigerant circuit was not opened and has no leaks) it is enough to evacuate the refrigerant circuit for five minutes and no time or only a short amount of time (for example one minute) is needed adjust the vacuum/pressure increase test (no air and no moisture has entered the refrigerant circuit).
- Depending on the quantity of refrigerant oil in the refrigerant circuit, the age and the mileage of the vehicle, the design of the refrigerant circuit etc. it can also be the case, that the specified absolute pressure in the refrigerant oil raises above the specified 20 mbar (0.29 psi) during the vacuum test. Due to refrigerant (and also due to moisture) which has evaporated from the refrigerant oil on a refrigerant circuit without leaks. If this is the case repeat again and/or adaptation the pre-set times accordingly.

If the vacuum reading does not change (and the pressure remains smaller than 20 mbar (0.29 psi)) the system does not have leaks and can be filled.





- Depending on the version of the A/C service station the current refrigerant circuit pressure is constant or is displayed after switching of for evacuate the "Evacuate" function. Refer to the A/C service station Owner's Manual.
- ◆ Because of the high temperature of the evacuation it can be the case that the refrigerant evaporating from the refrigerant oil can cause the refrigerant circuit pressure to increase during the vacuum test to 20 to 40 mbar (0.29 to 0.58 psi) (absolute pressure). This does not indicate a leak in the refrigerant circuit be depending on the version of the A/C service station can lead to a displayed malfunction. If necessary evacuate the refrigerant circuit again and monitor the vacuum indicator over a longer time, once the vacuum is maintained and it is ensured that there are no leaks in the refrigerant circuit, the system may be filled.
- Charge the refrigerant circuit using the A/C service station.
 Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.

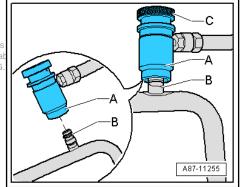
If the vacuum is not maintained or cannot generate a sufficient vacuum, perform the following:

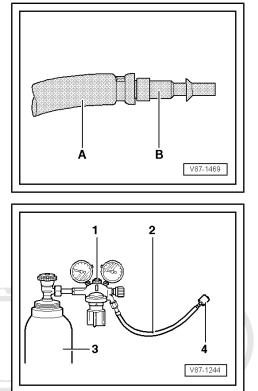
- If the refrigerant circuit pressure raises only slowly after evacuating for example due to refrigerant (or moisture) that evaporated from the refrigerant oil. Evacuate the refrigerant circuit again and observe the vacuum indicator over a longer period of time.
- If it is possible that the refrigerant circuit may have leaks, evacuate and check the vacuum display again over several hours Only when the vacuum is maintained can the refrigerant circuit be charged.
- It can only be filled once it is ensured that refrigerant circuit does not have leaks. Refer to <u>⇒ "3.6 Refrigerant Circuit,</u> <u>Charging", page 149</u>.

Additional Procedure, If a Leak Is Detected When Evacuating.

- If there is a leak that allowed enough air to enter during evacuation that the A/C service station cannot generate a sufficient vacuum or that the vacuum is lost immediately after switching the A/C service station off:
- Determine leaks on the refrigerant circuit as follows:

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Note

- A large leak can be identified if a maximum of pressure of 15 bar (217.56 psi) can be generated in the refrigerant circuit using clean, dry compressed air or nitrogen. Refer to 2.6.10 Refrigerant Circuit, Flushing with Compressed Nitrogen", page 130 . If the leak is large enough, the sound of escaping air or gas can be heard at the location of the leak.
- Add the compressed air or nitrogen to the closed empty refrigerant circuit through the service connection -B- after fitting it with a quick-release connector adapter -A-.
- Install the hand wheel -C- in the guick-release coupling connection -A- until the valve in the service connection -B- is securely opened, do not put too much pressure on the valve.
- The quick-release coupling adapter for service connections can be connected to the air compressor using a modified filler hose -A- (for example, M12 x 1.5-6G thread according to SAE J63 depending on the threads on the quick-release coupling adapter) and a suitable adapter -B-. Refer to \Rightarrow "4.3 Improvised nless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability page 247. This keeps humidity, oil and dirt coming espect to the correctness of information in this document. Copyright by AUDI AG. lool out of the workshop compressed air system from getting into the A/C refrigerant circuit. Also use a combination fine-gauge filter for compressed air systems with oil, dirt and water separator such as those that are standard in paint shops. Install it between the compressed air system and the filler hose -A-. Refer to the Parts Catalog.
- A compressed gas cylinder filled with nitrogen -3- can be connected to the closed empty refrigerant circuit using a pressure gauge battery with a pressure reducer for nitrogen (maximum reduction pressure: 15 bar (217.56 psi)) -1- and a filler hose -2- (for example, with M12 x 1.5 -6G threads according to SAE J639) connected to the service connection. A quick-release coupling adapter must also be connected to the service connection. Refer to = "4.2 Commercially Available Tools and Materials", page 246 .
- Rain the refrigerant circuit pressure slowly to a maximum of 15 bar (217.56 psi).

WARNING

Risk of injury due to nitrogen flowing under high pressure. Use a pressure reducer for the nitrogen container.

- Find the location of the leak by listening for the sound of venting gas.
- Eliminate the leak.

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- Evacuate and check the vacuum display again over several hours. Only when the vacuum is maintained can the refrigerant circuit be charged.
- ♦ If there is a leak that is small enough that no air or very little air vents through it when evacuating the refrigerant circuit and the A/C service station can generate a sufficient vacuum. The vacuum indicator does not increase after switching off the A/ C service station or only increases slowly, indicating that air is only entering through a small leak.
- − Add 100 grams (3.5 oz) of refrigerant to the circuit, find the location of the leak using an electronic leak detector and repair it or add UV contrast dye to the refrigerant and find the location of the leak with the leak detection system. Refer to \ge "2.4.2 Refrigerant Circuit, Finding Leaks using Electronic Leak Detector", page 64 and \Rightarrow "2.4.3 Leaks, Finding with UV Leak Detection System", page 65.
- Empty the refrigerant circuit, if necessary. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141
- Service the refrigerant circuit. Refer to A Heating Ventilation or in whole, is not and Air Conditioning, Repti Gred 87 VR Prigerant Gircuit (vehi or accept any liability cle-specific repair manual).
- Evacuate the refrigerant circuit and observe the vacuum reading again over a longer period of time. Only when the vacuum is maintained can the refrigerant circuit be charged. Refer to ⇒ "3.5 Refrigerant Circuit, Evacuating", page 144.

Should work be performed on the vehicle after evacuating which does not require using the A/C service station.

Disconnect and the A/C service station from the refrigerant circuit and turn it off. Refer to ⇒ "3.8 A/C Service Station, Switching off and Disconnecting from Refrigerant Circuit", page 154.

Risk of damaging the A/C compressor by the refrigerant circuit vacuum.

- Never start the engine with vacuum in the refrigerant circuit.
- Make sure that when charging the refrigerant circuit the engine cannot be started.

If after discharging and evacuating the refrigerant circuit cannot be refilled. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.

3.6 Refrigerant Circuit, Charging

Note

- The entire refrigerant capacity can be filled either in the high or low pressure side, the following describes the charging the refrigerant circuit on the high pressure side.
- Capacity for refrigerant and refrigerant oil. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- Perform the procedure as described in the A/C service station Owner's Manual. Refer to A/C service station Owner's Manual.

- Before charging the refrigerant correct the quantity of refrigerant oil. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- Make sure the A/C service station is on the same level as the vehicle whose refrigerant circuit is to be charged (maximum difference 50 cm) when charging the refrigerant circuit. If a difference in height is too large, a difference between the amount of refrigerant displayed on the service station and the actual amount filled in the circuit may result (depending on the version of the A/C service station). The filling precision of the A/C service station may change.
- Completely reassemble the refrigerant circuit again. Refer to
 ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87;
 Refrigerant Circuit (vehicle-specific repair manual).
- On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.
- Switch off the ignition.
- Connect the A/C service station to the power supply.
- Check and if necessary correct the refrigerant quantity, the quantity of refrigerant oil and the quantity for the UV additive for leak detection in the A/C service station. Refer to A/C service station Owner's Manual.

Additionally on Vehicles with Electric Operated Valves in the Refrigerant Circuit, Which Cannot Be Opened without Power:



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On vehicles with high-voltage system and additional functions of the A/C system ("heat pump operation" or "cooling the high-voltage battery") valves may be installed in the refrigerant circuit which cannot be opened without power. These valves are opened and closed for example via a step motor and after switching off the ignition are no longer activated. To completely discharge, correctly evacuate and charge the refrigerant circuit, no sections may be closed. Therefore these valves must be opened before performing this work. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

 Open the electrically activated valves, which to now open without power using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

All Vehicles

- Switch on the A/C service station and the related Owner's Manual according to specification. Refer to A/C service station Owner's Manual.
- Remove the closure caps from the refrigerant circuit service connections. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the vehicle-specific refrigerant circuit.
- Connect the quick-release couplings to the refrigerant circuit service connections. Refer to ⇒ "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136
- Evacuate the refrigerant circuit using the A/C service station. Refer to <u>⇒ "3.5 Refrigerant Circuit, Evacuating", page 144</u>.

- Adjust the specified refrigerant oil quantity and if necessary the specified quantity of refrigerant oil and the quantity of the UV additive for leak detection on the A/C service station. Refer to A/C service station Owner's Manual and ⇒ heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- Adjust on the A/C service station that the refrigerant will be filled on the high pressure side. Refer to the A/C service station Owner's Manual.

When charging the refrigerant circuit via the low pressure side, liquid refrigerant can get into the compression chamber of the A/ C compressor.

If it is necessary to fill the refrigerant circuit via the Tow up as a circuit via the the tirst activity of the tirst activity as a circuit via the tow of the tirst activity of t



- The refrigerant and the refrigerant oil are filled via the high pressure side in the refrigerant circuit.
- If on a vehicle no service connection is present on the high pressure side of the refrigerant circuit, the refrigerant may be filled via a service connection om the low pressure side. To do this pay attention to the adjustment and the A/C service station Owner's Manual.
- If on the A/C service station the filling direction cannot be set if necessary remove (close) the hand wheel on the quick-release coupling connection on the low pressure side.
- Fill the refrigerant circuit with the specified refrigerant quantity if necessary fill the specified quantity refrigerant oil and the quantity of the UV additive.
- Switch on the A/C system after filling. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit; Switching On A/C system after Charging the Refrigerant Circuit (vehicle-specific repair manual) and <u>⇒ "3.7 A/C</u> System, Operating after Charging", page 152.

Operating an A/C System with an Electrically Driven A/C Compressor

Activate the A/C compressor via the "Basic Setting, Compressor Cut-In" function from Guided Fault Finding using the Vehicle Diagnostic Tester.

Additionally on vehicles with electric operated valves in the refrigerant circuit, which cannot be opened without power:

 Via the Vehicle Diagnostic Tester the electrically activated valves which do not open without power for the operation of the A/C system enable the activation of these valves via the respective control module (to open or close) using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.



On vehicles with high-voltage system and additional functions of the A/C system ("heat pump operation" or "cooling the high-voltage battery") valves may be installed in the refrigerant circuit which cannot be opened without power. These valves are opened and closed for example via a step motor and after switching off the ignition are no longer activated. To completely drain, correctly discharge and charge the refrigerant circuit no areas may be closed, for this reason the valves must be opened before these procedures. After finishing work on the activation of these valves are enabled via the respective control module. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

All Vehicles

Should a function test be performed after charging the refrigerant circuit?

Check the pressures in refrigerant circuit. Refer to <u>⇒</u>
 <u>"3.14 Pressures, Checking", page 170</u>.

Should a function test not be performed after charging the refrigerant circuit?

 Disconnect and the A/C service station from the refrigerant circuit and turn it off. Refer to ⇒ <u>"3.8 A/C Service Station,</u> <u>Switching off and Disconnecting from Refrigerant Circuit",</u> <u>page 154</u>.

3.7 A/C System, Operating after Charging

Note

- If the mechanically driven A/C compressor has been removed, rotate it about 10 times by hand prior to initial start-up (when or after installing, for example prior to installing the ribbed belt) to prevent damage caused by liquid impact when first switched on (any refrigerant oil in compressor cylinder is forced out on rotation). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor; A/C Compressor, Removing and Installing (vehicle-specific repair manual).
- If the electronically driven A/C compressor was removed, activate it after filling the A/C compressor before the A/C system on via the "basic setting, compressor cut-in" function for the Guided Fault Finding. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for A/C System and battery regulation. This prevents the A/C compressor from becoming damaged for example by liquid impact when it is first switched on (any refrigerant oil in the A/C compression chamber is forced out).
- ◆ The vehicle engine drives the mechanically driven A/C compression via a belt or shaft. The electrically driven A/C compression of the vehicle engine driven via an electric motor directly on the A/C AUDI AG does not guarantee or accept any liability compressor. Refer to ⇒ Heating; Ventilation and Air Condim in this document. Copyright by AUDI AG. tioning; Rep. Gr. 87; A/C Compressor; A/C Compressor, Removing and Installing (vehicle-specific repair manual).

Operating an A/C System with a Mechanically Driven A/C Compressor

- Switch the ignition on.
- Adjust the A/C system ti the lowest possible output (for example select "A/C off" mode).
- Switch off the A/C compressor activation (for example select "A/C off" mode).
- Start the engine with the A/C compressor switched off (for example select "A/C off" mode).
- Wait until idle speed has stabilized.

- Switch on the A/C compressor and operate the system for at least two minutes at idle speed.
- If necessary, check pressures in the refrigerant circuit using the A/C service station. Refer to <u>⇒ "3 Working with A/C Service</u> <u>Station", page 134</u>.
- Turn the engine off.
- Disconnect and the A/C service station from the refrigerant circuit and turn it off. Refer to ⇒ "3.8 A/C Service Station, Switching off and Disconnecting from Refrigerant Circuit", page 154.

Operating an A/C System with an Electrically Driven A/C Compressor

- Switch the ignition on.
- Operate the A/C compressor using "basic setting, compressor cut-in" in Guided Fault Finding. Refer to Vehicle Diagnostic Tester, "Guided Fault Finding" function in A/C system and battery regulation.

Additionally on vehicles with electric operated valves in the re-

 Via the Vehicle Diagnostic Tester the electrically activated valves which do not open without power for the operation of the A/C system enable the activation of these valves via the respective control module (to open or close) using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

i Note

On vehicles with high-voltage system and additional functions of the A/C system ("heat pump operation" or "cooling the high-voltage battery") valves may be installed in the refrigerant circuit which cannot be opened without power. These valves are opened and closed for example via a step motor and after switching off the ignition are no longer activated. To completely drain, correctly discharge and charge the refrigerant circuit no areas may be closed, for this reason the valves must be opened before these procedures. After finishing work on the activation of these valves are enabled via the respective control module. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

All A/C systems with electrically-driven A/C compressor

- After the basic setting and if necessary, check pressures in refrigerant circuit using A/C service station.
- On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.
- Switch off the ignition.
- Disconnect and the A/C service station from the refrigerant circuit and turn it off. Refer to <u>⇒ "3.8 A/C Service Station, Switching off and Disconnecting from Refrigerant Circuit", page 154</u>.

Vehicles with an Electrically-Driven A/C Compressor

- The engine may only be started if the refrigerant circuit is completely assembled.
- Hybrid drive on vehicles with battery cooling is only possible with a fully charged A/C system in which there are no stored

errors. Refer to Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the a/c system and the battery regulation.

- After the installation of the electrically-driven A/C compressor and the subsequent filling of the refrigerant circuit, start the A/ C compressor for the first time using the "compressor intake" function for the basic setting. The A/C compressor may otherwise become damaged if refrigerant oil was improperly stored in the A/C compressor compression chamber before installation. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for A/C System and Battery Regulator.
- Only activate the electrically-driven A/C compressor when the refrigerant circuit is filled. The A/C compressor may become damaged if the A/C compressor is run while the refrigerant circuit is empty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for A/C system and battery regulation.
- Charge the vehicle battery, for example, using the Battery Charger - VAS5904- in the battery support mode to minimize the number of automatic starts during the test- and measuring procedures while the ready mode is active. Refer to ⇒ Electrical Equipment General Information; Rep. Gr. 27 ; Battery, Charging and ⇒ High Voltage Vehicle General Information; Rep. Gr. 93; High-Voltage System General Warnings..in part or in whole, is not
- For testing and measurement procedures that require the right by AUDI AG. AUDI AG does not guarantee or accept any liability ready mode to be active or the ignition to be switched on, the selector lever must be in the "P" position and the parking brake must be activated. The required tools must be placed so that they do not come into contact with any rotating components in the engine and they must also not go into the vicinity of the rotating components when the engine is running.

3.8 A/C Service Station, Switching off and Disconnecting from Refrigerant Circuit

- End the specified procedures using the A/C service station.
- Switch off the ignition.
- Remove (seal) the hand wheel from both service couplings.

Danger or frostbite due to refrigerant coming out under pressure.

Frostbite on the skin and other parts of the body is possible.

- Wear safety gloves.
- Wear protective eyewear.
- When loosing the service coupling longer than 1 s refrigerant leaks out of the refrigerant line, install the hand wheel and replace the faulty valve.
- Extract refrigerant and open the refrigerant circuit immediately.
- If more than 10 minutes elapse after extracting the refrigerant and the refrigerant circuit was not opened, extract the refrigerant again. Pressure can develop in the refrigerant circuit due to evaporation.

Different Versions of the Service Couplings

 On one version the service couplings is ventilated outward in the space between the version in the refrigerant circuit service connection and the valve in the service coupling when removing the hand wheel. For these service couplings when removing the service connection hand wheel first connect the valve in the vehicle service connection and the valve in the service coupling to the filler hose to the A/C service station. When further removing drain the pressure which is still in the space between both valves via an additional valve (approximately 2 cm³ refrigerant). If both of these valves (the valve on the vehicle service connection or the valve in the filler hose service connection) do not close correctly the entire refrigerant can flow out of the vehicle refrigerant circuit or the filler hose.

On another version the service couplings is ventilated outward in the space between the version in the refrigerant circuit service connection and the valve in the service coupling when removing the hand wheel. On this version a valve is present, which on a connected service coupling is open, so that a pressure equalization between the area in the valve in the refrigerant circuit service connection and the filler hose connected on the service connection is possible. On this version no refrigerant escapes when turning back the hand wheel, for this reason the refrigerant from the filler hose must be extracted back before disconnecting the service couplings in the A/C service station. If here for example after a pressure test or the charging the refrigerant circuit a larger quantity or refrigerant is recovered (more than approximately 50 g) this indicates that a valve in one of the refrigerant circuit service connections has a leak and the refrigerant is coming out of the vehicle refrigerant circuit (extract the refrigerant and replace the faulty valve).

Before extracting back the refrigerant from the filling hoses in the A/C service station, remove the hand wheels from both service couplings all the way.

i Note

- In the A/C service station a function is present which when switching off a causes defined operating condition. Via this function the entire refrigerant is extracted back out of the filling hose in the A/C service station.
- If when activating this function the hand wheel of both service coupling cannot be removed, refrigerant can be extracted from the vehicle refrigerant circuit.
- Extract the refrigerant using the A/C service station according to the corresponding Owner's Manual from both filler hoses. Refer to the A/C service station Owner's Manual.

Note

- If on an A/C service station with a service coupling, by which the pressure is not removed outward, this procedure takes longer than two minutes or a large quantity or refrigerant is extracted, this indicates a malfunction in one of the valves in the service connection.
- If on an A/C service station with a service coupling, by which the pressure is not removed outward, this procedure takes opying for private or commercial purposes, in part or in whole, is not longer than two minutes, this indicates a malfunction in one of y AUDI AG. AUDI AG does not guarantee or accept any liability the valves in the service coupling.
- First remove (close) the hand wheels from the quick-release coupling connection.
- The extract refrigerant from both filler hoses using the A/C service station.

- Switch off the A/C service station (and if necessary disconnect from the power supply). Refer to A/C service station Owner's Manual.
- Disconnect the quick-release couplings to the refrigerant circuit service connections.
- Install the closure caps on the service connections. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and the vehicle-specific refrigerant circuit.

3.9 Refrigerant, Filling in Reservoir

- Connect the bottle with fresh refrigerant R1234yf to the service coupling on the low pressure side on the A/C service station. Refer to the A/C service station Owner's Manual.
- Perform a gas analysis for the refrigerant to be filled (from the bottle) using the A/C service station. Refer to = "3.3 Refrigerant Gas Analysis, Performing", page 138
- Perform the procedure as described in the A/C service station Owner's Manual. Refer to A/C service station Owner's Manual.

WARNING

Risk of explosion due to overfilling the refrigerant vessels. Refrigerant can expand and the refrigerant vessel can explode due to overfilling.

- Use a refrigerant vessel with safety valve.
- Never exceed the permitted capacity of the refrigerant vessel.



Note

Depending on the version of the A/C service station and the procedures to be performed a specific minimum amount of refrigerant, refrigerant oil and UV-leak detection are in the corresponding reservoir of the A/C service station. Refer to the A/C service station Owner's Manual.

3.10 A/C Service Station, Discharging

Note

- If it is necessary to drain the A/C service station (for example due to extraction of contaminated refrigerant), all filters and dryers must always be replaced (do not remove filter and dryer from the air-tight shipping packaging until before installation to minimize moisture absorption).
- It is necessary to empty the A/C service station (for example because specific procedures must be performed on the A/C service station that correspond to the refrigerant which was or will be extracted from the A/C service station) it can be filled in recycling container and then reused. The requirement for this the it is not contaminated. Refer to the A/C service station Owner's Manual.
- Refrigerant containers filled with contaminated or used refrigerant are referred to as "Recycling containers" or "R containers".

- Thoroughly evacuate the recycling containers prior to initial filling with refrigerant (if there is air in a refrigerant container it is not to be filled with refrigerant).
- ◆ Different types of refrigerant may not be mixed together (refrigerant mixtures cannot be recycled and are to be disposed of). If the contains of the container are not clear, share this with the gas preparator / gas disposer. Refer to ⇒ "3.13 Contaminated Refrigerant, Filling in Recycling Container for Analysis, Processing, or Disposal", page 162 and ⇒ "6.2.17 Return of Contaminated Refrigerant R1234yf for Analysis, Preparation or Disposal", page 26.

Risk of explosion due to overfilling the refrigerant vessels. Refrigerant can expand and the refrigerant vessel can explode due to overfilling.

- Use a refrigerant vessel with safety valve.
- Never exceed the permitted capacity of the refrigerant vessel.

There are different possibilities for discharging the A/C service station. Pay attention to the A/C service station Owner's Manual. Refer to the A/C service station Owner's Manual.

 Fill the refrigerant from the A/C service station to be emptied in another A/C service station at the same time pay attention to the A/C service station Owner's Manual. Refer to the A/C service station Owner's Manual and <u>⇒ "3.13 Contaminated Refrigerant, Filling in Recycling Container for Analysis, Processing, or Disposal", page 162.
</u>

3.11 Electrically Driven A/C Compressor, Cleaning

Vehicles with a High-Voltage System

Observe all of the additional warnings for all work performed on vehicles with the high-voltage system. Refer to \Rightarrow Electrical Equipment; Rep. Gr. 93; General Warnings when Working on High-Voltage System .

If it is necessary to perform work in the vicinity of high-voltage system components, "visually inspect" the high-voltage compopying for private or commercial purposes, in part or in whole, is not nents and cables for damage and follow the "general warnings d by AUDI AG. AUDI AG does not guarantee or accept any liability when working on the high-voltage system". Refer to motific the commercial purposes of information in this document. Copyright by AUDI AG. Equipment; Rep. Gr. 93; General Warnings for Working on High-Voltage System .

If it is necessary to perform work on the high-voltage system components, de-energize the high-voltage system and observe the "High-Voltage System General Warnings". Refer to \Rightarrow Electrical Equipment; Rep. Gr. 93; High-Voltage System, De-Energizing and \Rightarrow Electrical Equipment; Rep. Gr. 93; High-Voltage System General Warnings).

Rinse the A/C Compressor



 The refrigerant oil cannot be poured out for electrically driven A/C compressors (there is no oil drain plug) nor can it be poured out during the removal of the compressor.



- The refrigerant oil is removed by flushing in the flow direction for electrically driven A/C compressors (because of the installed valve it is not possible to flush against the flow direction).
- To flush, arrange the A/C compressor so that the connection for the refrigerant line on the high pressure side is as low as possible.
- On a new A/C compressor that is filled with more than 100 cm³, pour out as much refrigerant oil as possible before flushing -item 5- <u>⇒ Item 5 (page 158)</u>.

1 - A/C Service Station

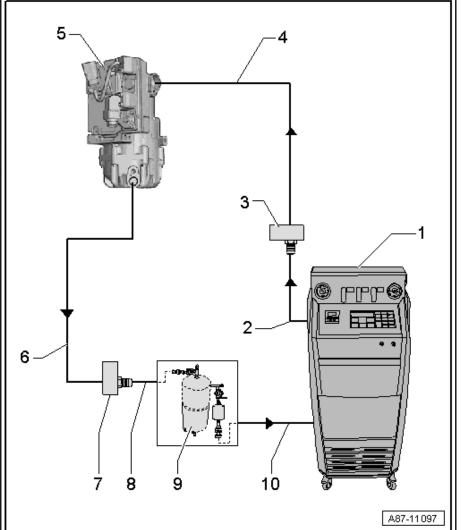
- Use electronics and a program to flush the A/C service station with flushing device. Refer to the Parts Catalog.
- If an A/C service station without a flushing program is used, the procedure must be performed manually (evacuate, flush four times with at least 2 kg refrigerant for each and extract the refrigerant again, evacuate).

2 - Refrigerant Hose for A/C Service Station

From the high pressure side of the A/C service station (mostly red colored) to the low pressure side connection of the A/C compressor on refrigerant circuit (larger diameter).

3 - Adapter to the Connection for the Low Pressure Side on the A/C Compressor

- There are different versions depending on vehicle. Refer to <u>⇒</u>
 <u>*2.6.8 Adapter for Assembling Flushing Circuit</u>", page 99.
- Use the Refrigerant Circuits Adapter Set -Adapter 48 -VAS6338/48- between t



VAS6338/48- between the refrigerant hose -2- and the adapter -3-.

□ From the VW/Audi - passenger vehicle adapter set (for example the Adapter - VAS6338/41-)

4 - Refrigerant Line

□ To the A/C compressor connection on the adapter -item 3- \Rightarrow Item 3 (page 158)

5 - Electrically-Driven A/C Compressor

- The A/C compressor is flushed in the flow direction (from the low pressure side input to the high pressure side output)
- □ So that as much refrigerant oil as possible is flushed out from the A/C compressor, the A/C compressor must be positioned so that the high pressure side output is as low as possible

Note

- Depending on the A/C compressor a larger refrigerant oil quantity can be filled in a new A/C compressor. Refer to \Rightarrow <u>"5.2 Re-</u> frigerant Oil Capacity", page 1 and the manufacturer on the A/C compressor.
- On a new A/C compressor that is filled with more than 100 cm^3 , pour out as much refrigerant oil as possible before flushing.
- Reason: depending on the A/C service station version, the oil amount that is deposited/separated in one step may be limited.



Note

If clean refrigerant oil is emptied from a new A/C compressor in a clean container and this is closed air tight, this can be reused to adjust the refrigerant oil quantity in the circuit.

6 - Refrigerant Line

- □ To the A/C compressor connection on the adapter -item 7- \Rightarrow Item 7 (page 159)
- To remove the flushing circuit use for example a refrigerant line with the part number 7L6 820 721 BF. Refer to the Parts Catalog.

7 - Adapter to the Connection for the High Pressure Side on the Refrigerant Circuit

- There are different versions depending on vehicle. Refer to \Rightarrow "2.6.8 Adapter for Assembling Flushing Circuit", page 99.
- □ From the VW/Audi passenger vehicle adapter set (for example the Adapter VAS6338/40-)

8 - Filler Hose for Refrigerant Circuit Flushing Device

□ From the connection to the high pressure side of the A/C compressor on the refrigerant circuit (smaller diameter) to the input of the refrigerant circuit flushing device.

9 - Refrigerant Circuit Flushing Device

- There are different versions of the refrigerant circuit flushing device. Refer to the Parts Catalog (Tools; Special Tools and Equipment: A/C and Heating).
- With filter, viewing glass, safety valve, heater, refrigerant reservoir, etc. (depending on version).
- Depending on the design of the A/C service station and the flushing device for the refrigerant circuits, a connection for a service coupling for the refrigerant circuits can be installed on the output and may also be installed on the input of the flushing device. If on the output of the flushing device a service connection with valve is installed this valve must be completely opened when the service coupling is connected. A valve that is not completely opened creates a constriction.
- □ If on the input of the flushing device a connection for a service coupling is present, modify the input so that the refrigerant hose which comes from the vehicle can be directly connected.



A service coupling and a valve in the flushing device input makes a constriction which impairs the refrigerommercial purposes, in part or in whole, is not ant flow from the vehicle information in this document. Copyright by AUDI AG. flushing device.

10 - Refrigerant Hose for A/C Service Station

□ From the low pressure side of the A/C service station (mostly blue colored) to the output of the refrigerant circuit flushing device.

3.12 Refrigerant Circuit, Cleaning

- Perform the preliminary work for cleaning (flushing with refrigerant R1234yf). Refer to ⇒ "2.6.2 Cleaning the Refrigerant Circuit, Preliminary Work (flushing with Refrigerant R1234yf)", page 88.
- Check the refrigerant quantity in the A/C Service Station ; there must be at least 6 kg refrigerant R1234yf present. Refer to A/ C service station Owner's Manual.
- Empty the A/C service station container for used oil. Refer to the A/C service station Owner's Manual.
- Connect the supply hose (high pressure side) of A/C service station to the low pressure line leading to the A/C compressor (line with larger diameter) using an adapter. Refer to ⇒
 <u>"2.6.8 Adapter for Assembling Flushing Circuit", page 99</u>.
- Connect the return hose (low pressure- or intake side) of the A/C service station to the output of refrigerant circuit flushing device.
- Connect the input on the refrigerant circuit flushing device to the high pressure line leading to the A/C compressor (line with smaller diameter) using an adapter. Refer to <u>⇒ "2.6.8 Adapter</u> for Assembling Flushing Circuit", page 99.
- Flushing Circuit Block Diagrams. Refer to ⇒ <u>"2.6 Refrigerant</u> <u>Circuit, Cleaning", page 86</u>.
- Adapter for Assembling Flushing Circuit. Refer to <u>⇒</u> <u>"2.6.8 Adapter for Assembling Flushing Circuit", page 99</u>.

Note

- Components are almost always flushed in the opposite direction of refrigerant flow when the A/C system is in operation. (Exception: the electrically-driven A/C compressor). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- While flushing, contaminants from the refrigerant circuit enter the refrigerant circuit flushing device and the A/C service station and are absorbed by the filters and dryers installed there. Depending on the contaminant, these components are to be replaced in shorter intervals according to the operating instructions for the A/C service station or refrigerant circuit flushing device. Refer to A/C service station Owner's Manual.
- The filter in the refrigerant circuit flushing device depends on the type and degree of contamination in the flushed refrigerant circuit, it should be changed after five to ten flushing cycles (flushed vehicles) at the latest. If a heavily contaminated refrigerant circuit is flushed (the refrigerant oil from the circuit is black and viscous or there are many shavings in the refrigerant circuit), the filter should be replaced after flushing. With a refrigerant circuit heavily contaminated in this way, it is wise to flush the circuit again after changing the filter.
- Depending on the type of contamination, dirt (old refrigerant vigit. Copying for private or commercial purposes, in part or in whole, is not oil and abraded material from A/C compressor) is deposited authorised by AUDI AG. AUDI AG does not guarantee or accept any liability on the viewing glass. If necessary clean the level indicator after correctness of information in this document. Copyright by AUDI AG. ter flushing and flush the refrigerant circuit with a flushing procedure to check (one cycle is sufficient).



- ◆ Liquid refrigerant cannot be led through the expansion valve, restrictor and desiccant bag of certain receiver/dryers at the necessary speed, therefore these components must be removed and replaced by adapters if necessary. Refer to <u>⇒</u> <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Adapters for connecting the A/C service station and for bridging certain refrigerant circuit components. Refer to <u>⇒</u> <u>"2.6.8 Adapter for Assembling Flushing Circuit", page 99</u>.

Perform the flushing procedure (The progress takes place automatically according to the A/C service station program. Refer to A/C service station Owner's Manual.)

- Switch on the A/C service station. Refer to the A/C service station Owner's Manual.
- Select the program for flushing on the A/C service station. Refer to the A/C service station Owner's Manual.
- Flush the refrigerant circuit (duration 1 to 1.5 hours for a flushing cycle with four flushing procedures). Refer to the A/C service station Owner's Manual.



- Flushing procedure sequence. Refer to <u>⇒ "2.6.3 Refrigerant</u> <u>Circuit, Cleaning Process", page 90</u>.
- The flushing procedure is to be performed according to the A/ C service station Owner's Manual. Refer to the A/C service station Owner's Manual.
- Depending on version of A/Cpservice station. Old oil container after holds only approximately 125 cm ³ refrigerant oil in the event this document. Copyright by AUDI AG. a system with a larger quantity of refrigerant oil must be flushed, it may be necessary to drain the old oil container after the first flushing process of one flushing cycle.
- Observe the refrigerant which flows back into the A/C service station from the refrigerant circuit, only when the refrigerant streams clear and completely colorless through the viewing glass of refrigerant circuit flushing device into the A/C service station is the refrigerant circuit cleaned.
- While flushing, all the refrigerant oil is washed out of the refrigerant circuit (up to a very small amount for example in the evaporator, however this can be disregarded).
- If heavily contaminated, it may be necessary to perform the flushing procedure twice (two flushing cycles with four flushing operations each).
- After the flushing procedure check the flushing device viewing glass(es) for the refrigerant circuit, if they are dirty clean them according to the flushing device Owner's Manual for the refrigerant circuit or the A/C service station and perform the flushing procedure once more as a test (one cycle is sufficient, duration approximately 30 minutes). Refer to the A/C service station Owner's Manual.
- Check the refrigerant circuit pressure there must not be any pressure in the refrigerant circuit (evacuate the refrigerant circuit briefly once more if necessary).
- Remove the connections to the A/C service station from the vehicle refrigerant circuit (there must be no positive pressure in the refrigerant circuit).

- Replace these vehicle-specific components (restrictor and reservoir, expansion valve and receiver/dryer or dryer cartridge in the receiver/dryer). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Parts Catalog.
- Depending on the concern replace the A/C compressor (vehicle-specific repair manual) or let the remaining refrigerant oil flow out of the removed A/C compressor and re-fill the prescribed quantity of fresh refrigerant oil. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit, <u>⇒ "2.5 Components, Replacing", page 71</u>, ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data frigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual) and the Parts Catalog.



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- ◆ There is a defined and prescribed amount of refrigerant oil in the replacement compressor. On vehicles with two evaporators if necessary install an additional certain amount of refrigerant oil in the circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).
- If the A/C compressor is not be replaced, replace the refrigerant oil quantity in the A/C compressor to the specified capacity (pour out or flush out the refrigerant oil and refill the prescribed quantity into the A/C compressor or refrigerant circuit). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oils and Refrigerant Oil Capacities (vehicle-specific repair manual).
- Completely reassemble the refrigerant circuit again. Refer to

 → Heating, Ventilation and Air Conditioning; Rep. Gr. 87;
 Refrigerant Circuit (vehicle-specific repair manual).
- Evacuate and fill the refrigerant circuit according to the specification. Refer to ⇒ "3.5 Refrigerant Circuit, Evacuating", page 144, ⇒ "3.6 Refrigerant Circuit, Charging", page 149 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oil and Capacities for Refrigerant Oil (vehicle-specific repair manual).
- Start up the A/C system according to specification. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and <u>⇒ "3.7 A/</u> <u>C System, Operating after Charging", page 152</u>.
- 3.13 Contaminated Refrigerant, Filling in Recycling Container for Analysis, Processing, or Disposal

 \Rightarrow "3.13.1 Contaminated Refrigerant, Filling in a Recycling Bottle, using Technical Devices", page 162

 \Rightarrow "3.13.2 Contaminated Refrigerant, Filling in the Recycling Bottle by Cooling", page 165

3.13.1 Contaminated Refrigerant, Filling in a Recycling Bottle, using Technical Devices

- Note
- Devices may be offered as accessories (vacuum and disposal units) that are approved to extract gases with an unknown composition, based on the manufacturer instructions. These devices have not been approved and specified for this reason no statements can be made about their suitability and function.
- ◆ So that contaminated refrigerant can drain without a corresponding device in a suction recycling bottle it must be strongly cooled, these procedures have been checked and their use is described. Refer to ⇒ "3.13.2 Contaminated Refrigerant, Filling in the Recycling Bottle by Cooling", page 165.

Risk of explosion by using unsuitable devices.

Refrigerant of an unknown composition can expand due to a chemical reaction or overheating and the device used can expand due to a provide the providet the

- Only use devices and accessories which meet the corresponding laws and regulations for operation from the manufacturer which are certified and approved for working with gases of an unknown composition.
- Read the corresponding Owner's Manual before using these devices.
- When using these devices pay attention to the instructions and their corresponding Owner's Manual.

A WARNING

Risk of explosion due to overfilling the refrigerant vessels. Refrigerant can expand and the refrigerant vessel can explode due to overfilling.

- Use a refrigerant vessel with safety valve.
- Never exceed the permitted capacity of the refrigerant vessel.

Chemical reaction due to contaminated refrigerant. When mixing gases of unknown composition different chemical reactions can occur.

Injury is possible.

- Never mix refrigerant of different origins.

Fill refrigerant of an unknown composition from the refrigerant circuit in a recycling bottle.

- Connect the device and a recycling bottle to fill according to the Owner's Manual belonging to it on the vehicle refrigerant circuit.
- Start the filling device according to the corresponding instructions.
- Pay attrition to the emptying of the refrigerant circuit via a suitable pressure gauge.



- When discharging the refrigerant circuit you can for example use a pressure gauge or the A/C Service Station pressure display.
- Completely emptying contaminated refrigerant from the refrigerant circuit takes a certain period of time, only switch off the device with which you are filling once the entire refrigerant is extracted from the refrigerant. Pay attention to the respective pressure indicator and the corresponding Owner's Manual.

After the contaminated refrigerant is completely emptied:

- Switch off the device.
- Close the recycling bottle hand shut-off valves.
- Wait a certain period of time (for example 20 minutes) and then check if pressure builds again in the vehicle refrigerant circuit.



If the refrigerant circuit pressure builds by refrigerant evaporation, fill the refrigerant whose pressure builds in an additional step in the recycling bottle.

- Remove the filler hose and connection piece from the recycling bottle and close the recycling bottle connection with the closure cap.
- Completely fill out the required paper (instructions for disposal, acceptance certificate etc.) for analysis, processing (or disposal) of contaminated refrigerant.

Note

- All of the information and documents about the analysis, processing (or disposal) can be received from the gas preparator / gas disposer.
- The recycling bottle has a form fill this out accordingly and affix it to the recycling bottle.
- If it is not possible weigh the recycling bottle before and after filling with contaminated refrigerant, for the applicable vehicle mark the specified capacity for the refrigerant as the refrigerant quantity, which can be filled in the recycling bottle. Only the refrigerant quantity from one vehicle may be filled in the recycling bottle.



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- Place the recycling bottle at a suitable location until picked up to the correctness of information in this document. Copyright by AUDI AG. by the gas preparator / gas disposer.
- Fill out the supplement data sheet for the recycling bottle (R bottle) with contaminated refrigerant and secure on the recycling bottle.



Note

- In the field "Miscellaneous notes" it can be for example indicated who receives the gas analysis and in which form this should be done.
- Example of a recycling bottle (R bottle) supplement sheet. Refer to <u>⇒ page 170</u> .



 Evacuate the refrigerant circuit with the A/C Service Station for at least one hour. Refer to <u>⇒ "3.5 Refrigerant Circuit, Evacuating", page 144</u>.

Note

- Then by evacuating the rest of the contaminated refrigerant, which could be attached to the refrigerant oil can be removed at an absolute pressure of less than 10 mbar.
- If after switching off the device for filling a refrigerant circuit, pressure builds which is larger than the permitted pressure for starting the "Evacuating" function on the A/C Service Station, then discharge this pressure (this refrigerant) for example in the workshop ventilation systems.
- ◆ The following procedures depend on the concern on the refrigerant circuit. Refer to ⇒ "3.3 Refrigerant Gas Analysis, Performing", page 138.

3.13.2 Contaminated Refrigerant, Filling in the Recycling Bottle by Cooling

Special tools and workshop equipment required

- Minimum dimension 10 kg dry ice (as pellets or granulate) commercially available.
- Evacuated recycling bottle for contaminated R1234yf, which is suitable for low temperatures (for example with a permitted capacity higher than 3.0 kg). Commercially available from gas supplier
- Protected by copyright. Copyring for private or commercial aurooses, in part or in whole, is not per Extractor (for refrigerant R1234yf)= Dry Ice Box ac Refer to the Rarts Catalogre or commercially available Copyright by AUDI AG.
- Container connector with seal (to connect the filler hose on the recycling bottle, W 21.8 x 1/14 LH left and M 12 x 1.5-6G according to SAE J639 internal thread). Refer to the Parts Catalog - or commercially available.
- Filler hose for refrigerant R1234yf with seals (2 m filler hose with M12 x 1.5-6G outer thread according to SAE J639). Refer to the Parts Catalog - or commercially available.
- Low pressure side service coupling according to SAE J639. Refer to the Parts Catalog - or commercially available.



- So that contaminated refrigerant can be filled by itself without corresponding devices in an evacuated recycling container, it must be strongly cooled.
- To cool the evacuated recycling container use a insulated container and dry ice. Refer to the Parts Catalog.
- Dry ice is solid carbon dioxide (CO₂), that at 78 °C (-108.4 ° F) goes directly from a solid into a gas.
- ◆ The majority of gas, which can be used as a refrigerant, have a very low temperature and only have a low vapor pressure (at -50 °C (-58 °F) smaller than 0.6 bar (87.02 psi) absolute pressure). If in a deeply cooled recycling container which is connected to a refrigerant circuit, the refrigerant becomes a liquid in a cold recycling container and the refrigerant circuit pressure goes under the ambient pressure. Refer to <u>⇒</u> <u>"6.1.3 Refrigerant Vapor Pressure Table", page 18</u>.

The commercially available recycling containers are mostly made of universal steel, that are not designed for low temperatures (here up to -78 °C (-108.4 °F)) for this reason the only use these suitable recycling containers for this use and carefully warm the bottle to the ambient temperature (for example by placing the insulated containers with the recycling container in a secured well ventilated area on which the dry ice can safely vaporize).

i Note

Dry ice evaporates at ambient temperature from the insulated container (depending on the ambient conditions approximately 20 to 30 % a day). For this reason only order dry ice when all other necessary tools are present and the procedure can be performed just after receiving the dry ice (For example do not order dry ice on a Friday afternoon if not working on Saturday and Sunday).

WARNING

Risk of frostbite or suffocation due to dry ice.

Frostbite of the skin and other body and suffocation as a gas is possible.

- Wear safety gloves.
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
 Wear protective eyewear
 Wear protective eyewear
 Immitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
- Only work with the dry ice in well-ventilated areas.
- Never perform procedures in and near basement staircases or other below ground areas.

WARNING

Risk of explosion due to improperly stored dry ice.

When dry ice evaporates the pressure in the container increases. Unsuitable containers can explode.

 Transport and store dry ice only in the containers designed for it.

Fill the Refrigerant in a Supercooled Recycling Bottle.

- Have all necessary tools, devices, and the dry ice in sufficient quantity
- Remove the recycling bottle seal and remove the closure cap from the connection.

Note

- Recycling bottles usually come from the gas supplier sealed and evacuated.
- If the recycling bottle is not evacuated, then evacuate it if necessary using a vacuum pump or an A/C Service Station.
- Recycling bottles are clearly identified as such, these are in contrast to refrigerant supply bottles do not have a check valve and can therefore be filled.
- Recycling bottles are designed for international use, and this means that "O" on the hand wheel means "open" (for bottle vale open) and not "0" (zero for closed).

- If the recycling bottle has an absolute pressure larger than 100 mbar (1.45 psi) but smaller than 900 mbar (13.05 psi) which can be measured, evacuate the recycling bottle with a vacuum pump (or a A/C Service Station) (residual pressure less than 50 mbar (0.725 psi)). Refer to <u>⇒ "3.5 Refrigerant Circuit, Evacuating", page 144</u>.
- If in the recycling bottle an absolute pressure greater than 900 mbar can be measured there are different possibilities. The hand shut-off valve was opened and not correctly closed or the recycling bottle was already used temporarily store refrigerant and then not correctly evacuated. Refer to ⇒ "3.10 A/C Service Station, Discharging", page 156. (evacuating the recycling bottle). The recycling bottle has leaks (return the recycling bottle to the supplier).
- Connect the vacuum meter (or the A/C Service Station) to the recycling bottle.
- Carefully open the recycling bottle hand shut-off valve to check the vacuum and check the vacuum in the bottle permittee authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
- If necessary evacuate the recycling bottle using the A/Cr Service Station.

Note

- If air is in the recycling bottle, it can be evacuated with an R1234yf - A/C Service Station . To do so remove the low pressure service coupling from the A/C Service Station filler hose and connect the filler hose directly with the adapter belonging to the Extractor (for Refrigerant R1234yf)- Dry Ice Box to the adapter on the recycling bottle.
- ♦ If there is air in the recycling bottle and the R1234yf- A/C Service Station is not available the recycling bottle can also be evacuated with a R134a- A/C Service Station via the corresponding rinsing tank when using an Refrigerant Circuits Adapter 38 -VAS6338/38- and the filler hose from the Extractor (for Refrigerant R1234yf)- Dry Ice Box.
- Residual pressure in the recycling bottle less than 10 mbar (0.15 psi) absolute pressure.

i Note

- Recycling bottles are pre-evacuated from the supplier, but it cannot always be ensured during storage that the vacuum can always remain.
- In order to get a clear statement when analyzing the contaminated refrigerant about the type and content of the contamination of the refrigerant filled, the recycling bottle must be evacuated to a residual pressure less than 50 mbar (0.725 psi) before filling.
- Switch off the ignition.
- For good ventilation of the work space switch on the workshop ventilation equipment if equipped.
- Connect the filler hose with a suitable adapter to the evacuated recycling bottle.

WARNING

Risk of explosion due to overfilling the refrigerant vessels.

Refrigerant can expand and the refrigerant vessel can explode due to overfilling.

- Use a refrigerant vessel with safety valve.
- Never exceed the permitted capacity of the refrigerant vessel.

Note

- Because in the following procedure the contaminated refrigerant only the refrigerant from one vehicle is filled in the recycling bottle it can be excluded that a recycling bottle can be overfilled with a capacity greater than 3.0 kg (6.6 lbs).
- If contaminated refrigerant for example from the A/C Service Station is filled in a recycling bottle, it must be ensured due to the usually large quantity that the recycling bottle is not overfilled. Use a recycling bottle with a sufficiently large permitted capacity and when filling check by weighing that the maximum by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability permitted capacity is not exceeded.

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WARNING

Chemical reaction due to contaminated refrigerant. When mixing gases of unknown composition different chemical reactions can occur.

Injury is possible.

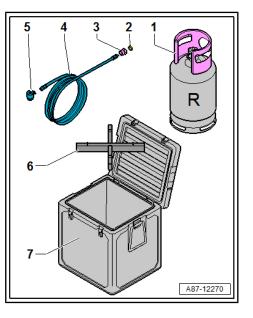
- Never mix refrigerant of different origins.
- Connect the service coupling for refrigerant R1234yf -5- to the filler hose -4-.
- Connect the filler hose -4- with the connection piece -3- (and seal -2-) on the recycling bottle -1-.
- Position the spacer -6- in the insulated container -7-.
- Cover the bottom of the insulated container -7- with dry ice.
- Position the recycling bottle -1- in the insulated container -7-Extractor (for Refrigerant R1234yf)- Dry Ice Box .
- Fill the remaining dry ice in the insulated container -7-.
- Cool the recycling bottle -1- with dry ice (approximately 15 minutes).
- Connect the recycling bottle -1- via the service coupling -5- on the A/C Service Station connection (or in the vehicle refrigerant circuit).
- Open the recycling bottle hand shut-off valve -1-.

Note

Recycling bottles are designed for international use, and this means that "O" on the hand wheel means "open" (for bottle vale open) and not "0" (zero for closed).

Connect the pressure gauge to the refrigerant circuit (or the use the A/C Service Station pressure gauge) and check the refrigerant circuit pressure.





- Carefully open the service coupling -5- on the filler hose to the recycling bottle and let the refrigerant flow slowly in the recycling bottle -1-.
- Wait until the refrigerant in the recycling bottle -1- is liquid (pay attention to the pressure indicator on the connected pressure gauge).



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- When discharging the refrigerant circuit you can for example industry use a pressure gauge or the A/C Service Station pressure display.
- If the displayed pressure after approximately 60 minutes is smaller than 0.3 bar (4.35 psi) absolute pressure it can be assumed that the refrigerant in the recycling bottle is liquid.
- The complete evaporation of the contaminated refrigerant from the refrigerant circuit takes a certain period of time, after 60 min it can be assumed that the entire refrigerant is evaporated.
- Close the service coupling -5- and the recycling bottle hand shut-off valve -1-.
- Remove the filler hose -4- and connection piece -3- from the recycling bottle -1- and close the recycling bottle connection with the closure cap.
- Completely fill out the required paper (instructions for disposal, acceptance certificate etc.) for analysis, processing (or disposal) of contaminated refrigerant.



- All of the information and documents about the analysis, processing (or disposal) can be received from the gas preparator/ gas disposer.
- The recycling bottle has a form fill this out accordingly and affix it to the recycling bottle.
- If it is not possible weigh the recycling bottle before and after filling with contaminated refrigerant, for the applicable vehicle mark the specified capacity for the refrigerant as the refrigerant quantity, which can be filled in the recycling bottle. Only the refrigerant quantity from one vehicle may be filled in the recycling bottle.
- Place the insulated container -7- with the recycling bottle -1and the dry ice in a secured, well ventilated area outside of the building.
- Open the cover of the insulated container -7- or remove and let the dry ice evaporate.



Remove the recycling bottle -1- first from the insulated container -7-, when the dry ice is evaporated and the recycling bottle has taken the ambient temperature.

 Remove the recycling bottle -1- from the insulated container -7-.

- Place the recycling bottle -1- at a suitable location until picked up by the gas preparator/gas disposer.
- Evacuate the refrigerant circuit with the A/C Service Station for at least one hour. Refer to <u>⇒ "3.5 Refrigerant Circuit, Evacuating", page 144</u>.



- Then by evacuating the rest of the contaminated refrigerant, which could be attached to the refrigerant oil can be removed at an absolute pressure of less than 10 mbar.
- The following procedures depend on the concern on the refrigerant circuit. Refer to <u>⇒ "3.3 Refrigerant Gas Analysis,</u> <u>Performing", page 138</u>.
- Fill out the supplement data sheet for the recycling bottle (R bottle) with contaminated refrigerant and secure on the recycling bottle -1-.

Note

In the field "Miscellaneous notes" it can be for example indication. Copying for private or commercial purposes, in part or in whole, is not who receives the gas analysis and in which form this should be does not guarantee or accept any liability does not guarantee or accept and lia

Example of a recycling bottle (R bottle) supplement sheet

Supplement Sheet for R Bottles with Contaminated Refrigerant	
Service Contact Person	
Dealer contact person:	
E-mail address:	
Costumer information:	
Name, first name:	
Street:	
City:	
Vehicle type	
License plate:	
VIN:	
Odometer reading:	
Gas analysis performed on:	
Information for R bottles:	
Bottle number:	
Bottle weight with con- tents: gross weight	
Capacity (net weight)	
Miscellaneous notes	

3.14 Pressures, Checking

<u>⇒ "3.14.1 General Information for Checking the Refrigerant Cir-</u> <u>cuit Pressure", page 171</u>

 \Rightarrow "3.14.2 Refrigerant Circuit Pressures and Temperatures", page 173

⇒ "3.14.3 Refrigerant Circuit with Ignition Switched on, Checking Pressure", page 175

 \Rightarrow "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182 .

 \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201

3.14.1 General Information for Checking the Refrigerant Circuit Pressure



Working on the refrigerant circuit with the A/C service station can normally be performed without needing to de-energize the highvoltage system.

Vehicles with Electric Operated Valves in the Refrigerant Circuit, Which Cannot Be Opened without Power:



On vehicles with high-voltage system and additional functions of the A/C system ("heat pump operation" or "cooling the high-voltage battery") valves may be installed in the refrigerant circuit which cannot be opened without power. These valves are opened and closed for example via a step motor and after switching off the ignition are no longer activated. To check the pressures in the refrigerant circuit with the A/C system switched off, no areas may be closed, therefore the valves must be opened before this procedure. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

 Open the electrically activated valves, which to now open without power using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

All Vehicles

Risk of damaging the A/C compressor or the A/C service station.

A short circuit between the high and low pressure side is possible when opening the valves with the A/C system is on.

- Never open the valves in the high or low pressure side when the A/C system is on.

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◆ The specific test requirements are vehicle-specific and described in the repair manual for the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair

Instructions; Checking Cooling Output (vehicle-specific repair manual).

- Checking the cooling output. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- Connections with valve and service connections for measurement and testing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- Depending on the A/C compressor version, there may be a valve installed on the high pressure side of the A/C compressor, which prevents the liquid refrigerant from flowing back into the compressor once the A/C is turned off. If an A/C compressor with this valve is installed in a vehicle with a refrigerant circuit having an expansion valve, then it may take some time until the pressure in the high pressure side decreases (the expansion is cold and the pressure in the low pressure side quickly increases after it is turned off, the expansion valve closes and the refrigerant flows slowly into the low pressure side). If the A/C compressor is switched on, the pressure on the low pressure side reduces, the expansion valve opens and the refrigerant can flow to the low pressure side.

Under certain operating conditions, residual moisture in refrigerant circuit can lead to an ice build-up at compressor regulator valve. This ice build-up interferes with A/C compressor regulation. The evaporator is cooled too intensely and freezes. The freezeup of the evaporator can be the cause for the following customer complaints:

- After a long drive, A/C system repeatedly or sporadically fails (no cooling or heating performance), after switching off vehicle and after a short time, A/C function is OK again.
- After a long drive, the vehicle windows fog up from the inside, vehicle windows are also not cleared by then pressing the Defrost button, after switching off the vehicle (or switching off the A/C system) and after a short time, A/C system function is OK again.

Corrective Measure:

- On vehicles with an A/C compressor with A/C Compressor Regulator Valve - N280-, check measured value of evaporator outflow temperature Evaporator Vent Temperature Sensor -G263- (via function "Read measuring value block"). If the sensor measured value is too low under the operating conditions, in part or in whole, is not described by the customer (at an ambient temperature above nee or accept any liability 0 °C (32 °F), longer when it is lower than 0 °C (32 °F) although Copyright by AUDI AG. the A/C Compressor Regulator Valve - N280- is not currently activated) or too high (above 10 °C (50 °F) even though the A/ C system is working correctly). Can freeze-up due to incorrect activation of the A/C Compressor Regulator Valve - N280- of the incorrect measured value of the Evaporator Vent Temperature Sensor - G263- . Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the AVC system. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- If the vehicle does not have an Evaporator Vent Temperature Sensor - G263-, check the vent temperature via, for example, the Footwell Vent Temperature Sensor - G192- at the "Lo temperature" or "cold" for the driver and passenger side, lowest setting (4 or 5 bar (58 to 72.5 psi)) for fresh air blower speed, air outlet in footwell and fresh air operation under operating conditions specified by customer. If the measured value of the sensor is too low (at an ambient temperature over 0 °C (32

F), over a longer time colder than 0 $^{\circ}$ C (32 $^{\circ}$ F)) the evaporator can freeze-up due to the incorrect measured value. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

- On vehicles with a shut-off valve in the refrigerant circuit, check the function and activation of these valves. Use the Vehicle Diagnostic Tester in the A/C system "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- With the engine running, check the refrigerant line from the evaporator (or from the inner heat exchanger) to the A/C compressor (thick pipe, low pressure side). If this line is thickly iced-up when complaint occurs (a thin layer of ice is permitted), this also indicates that the temperature in the evaporator is too low. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Discharge the refrigerant circuit, replace the receiver/dryer with dryer, replace and seal the reservoir with dryer or the dryer cartridge, and evacuate the refrigerant circuit for at least three hours. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and <u>⇒ "3 Working with A/C Service Station", page 134</u>.
- Refer to ⇒ "3.14.3 Refrigerant Circuit with Ignition Switched on, Checking Pressure", page 175
- Refer to ⇒ "3.14.4 Mechanically Driven A/C Compressor, <u>Checking Pressure with A/C System Switched On", page</u> <u>182</u>.
- Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201

3.14.2 Refrigerant Circuit Pressures and Temperatures

General information for pressure and temperature in the refrigerant circuit. Refer to \Rightarrow page 173 .

Pressures and temperatures in the refrigerant circuit with expansion valve. Refer to ⇒ page 174 . Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not

General information for pressure and temperature in the refriger and in this document. Copyright by AUDI AG.

- The pressures and temperatures in the refrigerant circuit depend on the current operating conditions (such as engine speed, radiator fan level 1, 2 or 3, engine temperature, A/C compressor activation 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 A/C Compressor Regulator Valve - N280-.
- 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 approximately 20 minutes.
- ◆ The pressure gauge set connections intended for the pressure measurement can be found in the vehicle-specific refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

 At 20 °C (68 °F) with the engine not running, the pressure in the refrigerant circuit is 4.7 bar (68.17 psi). Refer to ⇒ <u>"6.1.3 Refrigerant Vapor Pressure Table", page 18</u> (vapor pressure table).



- Pressure is measured in different units: 1 MPa (mega Pascal) corresponds to 10 bar (145 psi) positive pressure. 1 bar (1.45 psi) absolute pressure corresponds to 0 bar (0 psi) positive pressure and thus to the ambient pressure (atmospheric pressure).
- The pressure and temperature is approximately the same on refrigerant circuits restrictor and reservoir as in refrigerant circuits with expansion valve. Because currently for Volkswagen/ Audi only refrigerant circuits with expansion valves are installed, only this refrigerant circuit is described here.

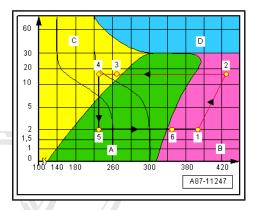
Pressures and Temperatures in the Refrigerant Circuit with Expansion Valve



- In the following Log (p), h diagram (logarithmic pressure, energy diagram) the procedure is shown, how it flows in the refrigerant circuit for a specific operating condition. Depending on the ambient conditions (engine speed, ambient temperature, specified cooling output etc.) these values change.
- The Log (p), h diagram shows the pressure (0 to 60 in bar (0 to 870 psi) absolute pressure) and the energy content (100 to 420 specific enthalpy in kilojoule per kg of the refrigerant R1234yf) in the refrigerant circuit cycle.
- The arrows show the refrigerant flow direction in the refrigerant circuit.
- A Area with Vaporous Refrigerant
- B Area with Gas Refrigerant
- C Area with Liquid Refrigerant

D - Super critical pressure and temperature area, the aggregate state of refrigerant is unspecified (there is no more separation between the fluid and gas refrigerant), itted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

- Low pressure side: output inner heat exchanger, A/C compressor input, the refrigerant is completely evaporated and gas the temperature of the refrigerant is at approximately -4
 °C (24.8 °F)
- 2 High pressure side: A/C compressor output, A/C compressor input, the refrigerant was sealed and gas, the temperature of the refrigerant is at approximately 80 °C (176 °F)
- High pressure side: condenser output (receiver/dryer), inner heat exchanger input, the refrigerant is cooled and fluid the temperature of the refrigerant is at approximately 55 °C (131 °F)
- 4 High pressure side: inner heat exchanger output, expansion valve input, the liquid refrigerant was cooled and the refrigerant temperature is at approximately 50 °C (122 °F)
- 5 Low pressure side: evaporator expansion valve, evaporator input, the liquid refrigerant has released the tension and be-



gins to evaporate, the temperature of the refrigerant is at approximately -7 $^\circ C$ (19.4 $^\circ F)$

6 - Low pressure side: evaporator output, expansion valve, inner heat exchanger input, the refrigerant is essentially evaporated, a small part is still vapor, the temperature of the refrigerant is at approximately -6 °C (21.2 °F)



- The specified temperature correspond to the refrigerant in the refrigerant circuit. Through heat absorption and the heat emission and changes the temperature on the surface of the refrigerant from the components.
- ◆ The pressure (and the temperature) in refrigerant circuits is maintained at approximately 3 bar (43.5 psi) absolute pressure (corresponds to approximately 2 bar (29 psi) positive pressure), regulated by A/C compressor, even though heat transfer changes and engine speeds vary. However, this applies only within the performance range of the A/C compressor; if the performance limits of the A/C compressor are exceeded, the pressure (and the temperature) increases. Refer to ⇒ "3.14 Pressures, Checking", page 170.
- ♦ On A/C compressors which do not regulate their output themselves, the pressure on the low pressure side and with this the evaporator temperature are regulated by the corresponding control module via the A/C Compressor Regulator Valve N280-. If depending on the version and the adjustment a temperature in the air downstream from evaporator is smaller than 2 °C (35.6 °F) is measured, the output of the A/C compressor is reduced, under 0 °C (32 °F) the activation of the A/C Compressor Regulator Valve N280- is switched off. This prevents the evaporator from cooling to sharply or icing.
- Temperature and pressure in the refrigerant circuit also on thewhole, is not second evaporator, in vehicles with two evaporators and twopt any liability expansion valves correspond to those in vehicles with only AUDLAG. one evaporator and one expansion valve (parallel switching).
- ◆ Depending on the version of the refrigerant circuit a component with the inner heater core is installed. Inside the inner heat exchanger, the flowing fluid warm refrigerant on the high pressure side is delivered into the low pressure side as flowing, vapor, cold refrigerant to increase the efficiency of the A/C system. Refer to ⇒ "2.2.13 Refrigerant Line with Inner Heat Exchanger", page 48.
- Depending on the version of the control module (for example the Front A/C Display Control Head - E87- or the Climatronic Control Module - J255-), the measured ambient conditions (exterior temperature, moisture in the vehicle interior etc.) and from the adjustment on the control module (vehicle interior temperature, mode etc.) the pressure and with this the temperature on the evaporator output are regulated to a higher value. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.

3.14.3 Refrigerant Circuit with Ignition Switched on, Checking Pressure

Test Prerequisites. Refer to \Rightarrow page 175.

checking the pressure with the ignition switched on. Refer to \Rightarrow page 178.

Test Requirements

i Note

- Working on the refrigerant circuit with the A/C service station (check the pressure here) usually requires, although not necessary, the high-voltage system to be disabled.
- Only de-energize the high-voltage system is procedures are necessary on the high-voltage system. Refer to <u>⇒ "1.4 Safety</u> <u>Precautions when Working on Vehicles with High-Voltage</u> <u>System", page 2</u>.

All Vehicles



- The specific test requirements are vehicle-specific and described in the repair manual for the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- Depending on the A/C compressor version, there may be a valve installed on the high pressure side of the A/C compressor, which prevents the liquid refrigerant from flowing back into the compressor once the A/C is turned off. If an A/C compressor with this valve is installed in a vehicle with a refrigerant circuit having an expansion valve, then it may take some time until the pressure in the high pressure side decreases (the expansion is cold and the pressure in the low pressure side quickly increases after it is turned off, the expansion valve closes and the refrigerant flows slowly into the low pressure side). If the A/C compressor is switched on, the pressure on the low pressure side reduces, the expansion valve opens and the refrigerant can flow to the low pressure side.
- ♦ Checking the cooling output. Refer to ⇒ Heating, Ventilation and Air Conditioning, Rep. Gr. 00, Repair Instructions, whole is not Checking Cooling Output (vehicle-specific repair manual) or AG.
- Connections with valve and service connections for measurement and testing. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ♦ Connect the A/C service station. Refer to ⇒ "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136.

Under certain operating conditions, residual moisture in refrigerant circuit can lead to an ice build-up at compressor regulator valve. This ice build-up interferes with A/C compressor regulation. The evaporator is cooled too intensely and freezes. The freezeup of the evaporator can be the cause for the following customer complaints:

- After a long drive, A/C system repeatedly or sporadically fails (no cooling or heating performance), after switching off vehicle and after a short time, A/C function is OK again.
- ◆ After a long drive, the vehicle windows fog up from the inside, vehicle windows are also not cleared by then pressing the <u>Defrost</u> button, after switching off the vehicle (or switching off the A/C system) and after a short time, A/C system function is OK again.

Corrective Measure:

 On vehicles with an A/C compressor with A/C Compressor Regulator Valve - N280-, check measured value of evaporator outflow temperature Evaporator Vent Temperature Sensor -G263- (via function "Read measuring value block"). If the sensor measured value is too low under the operating conditions described by the customer (at an ambient temperature above 0 °C (32 °F), longer when it is lower than 0 °C (32 °F) although the A/C Compressor Regulator Valve - N280- is not currently activated) or too high (above 10 °C (50 °F) even though the A/ C system is working correctly). Can freeze-up due to incorrect activation of the A/C Compressor Regulator Valve - N280- of the incorrect measured value of the Evaporator Vent Temperature Sensor - G263- . Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).

- If the vehicle does not have an Evaporator Vent Temperature Sensor - G263-, check the vent temperature via, for example, the Footwell Vent Temperature Sensor - G192- at the "Lo temperature" or "cold" for the driver and passenger side, lowest setting (4 or 5 bar (58 to 72.5 psi)) for fresh air blower speed, air outlet in footwell and fresh air operation under operating conditions specified by customer. If the measured value of the sensor is too low (at an ambient temperature over 0 °C (32 ° F), over a longer time colder than 0 °C (32 °F)) the evaporator can freeze-up due to the incorrect measured value. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- On vehicles with shut-off valves in the refrigerant circuit check the function and activation of these valves. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function checking the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehiclespecific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- With the engine running, check the refrigerant line from the evaporator (or from the inner heat exchanger) to the A/C compressor (thick pipe, low pressure side). If this line is thickly iced-up when complaint occurs (a thin layer of ice is permitted), this also indicates that the temperature in the evaporator is too low. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Discharge the refrigerant circuit, replace each reservoir/receiver/dryer with dryer or the dryer cartridge, replace and evacuate the refrigerant circuit for at least three hours? Refer in part or in whole, is not to ⇒ Heating, Ventilation and Air Conditioning, Rep. Got got accept any liability Refrigerant Circuit (vehicle-specific repair manual) and ⇒ "3 Working with A/C Service Station", page 134.

Test Requirements

◆ Pay attention to the general information for checking the refrigerant circuit pressure. Refer to <u>⇒ "3.14.1 General Information for Checking the Refrigerant Circuit Pressure", page</u> <u>171</u>.



All of the test requirements marked with a "*" are vehicle-specific and described in the repair manual for the vehicle. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).

General test requirements (these only have an influence on the pressure gauge display for this measurement with the A/C system switched on)

- Radiator and condenser are clean (clean if necessary) *.
- The thermal insulation at expansion valve is OK and properly installed.'
- Ribbed belt is OK and properly tensioned. Ribbed belt for A/C compressor and generator are OK and correctly tensioned.3
- The drive unit for the A/C compressor is OK and installed correctly. *
- All air ducts, covers and seals are OK and properly installed
- The A/C system diagnostic does not detect any malfunctions (when the engine is running and the A/C system is switched on), and no compressor shut-off condition is displayed in the measured values (only for vehicles with "A/C system" diagnostic). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system.
- Air flow through dust and pollen filter not obstructed by dirt *.
- All instrument panel vents are open *.

Note

- The A/C compressor is driven by different components depending on the engine (belt or input shaft) pyro protect these relations in part or in whole, is not components and the engine an overload protection in installed does not guarantee or accept any liability is the belt will be a the ACC and the protection in installed document. Copyright by AUDI AG. in the belt pulley or the A/C compressor drive unit which disengages by a difficult to move A/C compressor. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
- On specific versions the fan is switched on after the refrigerant circuit pressure specified value is exceeded. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.

Additional test requirements (these have an influence on the display of the pressure gauge on this measurement)

- Vehicle is not exposed to direct sunlight. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- The ambient temperature is greater than 15 °C (59 °F).
- The ignition is switched off.
- The A/C service station in connected to the refrigerant circuit. Refer to ⇒ "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136.
- Refer to \Rightarrow "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page <u>182</u> .
- Refer to \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page

Checking the Pressure with the Ignition Switched On

Note

- The switching pressures for the activation of the A/C Compressor Regulator Valve N280-, the A/C Clutch N25- (if equipped) and the radiator fan (for example the Radiator Fan V7- / Radiator Fan 2 V177-) are vehicle specific. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- ◆ Pressures must be measured at the service connections; the component location for these connections are vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ After completing the specified procedures disconnect the A/C service station from the refrigerant circuit and switch it off. Refer to ⇒ "3.8 A/C Service Station, Switching off and Disconnecting from Refrigerant Circuit", page 154.
- The engine is warm (at an ambient temperature below 25 °C (77 °F)).

i Note

- If the engine is not warm perform a road test.
- For the cooling output test the engine must be warm but at an ambient temperature smaller than 25 °C (77 °F) a specific A/ C system cooling output it is necessary that the engine and lower ambient temperatures are warm.
- ◆ Observe the test requirements. Refer to <u>⇒ page 175</u>.
- On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.
- Switch off the ignition.
- Connect the A/C service station. Refer to <u>⇒ "3.2 A/C Service</u> <u>Station on Refrigerant Circuit, Connecting", page 136</u>.
- Check the pressure in the refrigerant circuit which the engine not running.
- Take the A/C service station pressure gauge readings (two possible results):
- Pressure in refrigerant circuit lower than indicated in following table. Refer to <u>> page 181</u>.
- ◆ The refrigerant circuit pressure is in line with following table or is higher. Refer to <u>⇒ page 182</u>.



- Refrigerant R1234yf vapor pressure table. Refer to <u>⇒</u> <u>"6.1.3 Refrigerant Vapor Pressure Table", page 18</u>.
- On vehicles with high-voltage system and additional functions of the A/C system ("heat pump operation" or "cooling the highvoltage battery") valves may be installed in the refrigerant circuit which cannot be opened without power. These valves are opened and closed for example via a step motor and after switching off the ignition are no longer activated. Depending on the last operating condition of the A/C system the specific area of the refrigerant circuit are shut off via these valves. De-

pending on the layout of the service connections in the refrigerant circuit they can be in the area which was shut off (for example the area with the high pressure side service connection on the Audi Q7 e-tron). If necessary these valves must be opened before checking the pressure. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

The pressure specified in the following table is slightly lower than the specified vapor pressure table for the refrigerant R1234yf. The vapor pressure of the refrigerant in the refrigerant circuit adjusts itself to the coldest component and can for this reason be slightly lower than the vapor pressure table for the refrigerant R1234yf also with the refrigerant circuit correctly filled.

Ambient Temperature in °C (°F)	Pressure in Refrigerant Circuit in bar (psi) Positive Pressure	
15 °C (59 °F)	3.5 (50.76 psi)	
20 °C (68 °F)	4.4 (63.82 psi)	
25 °C (77 °F)	5.3 (76.87 psi)	
30 °C (86 °F)	for private or compercial purpose, in part or in whole,	. is no
35 content of the source to th	AUDI AG. AV7044 (107 339psi) tee or accept any	liabilit
40 °C (104 °F)	8.6 (124.73 psi)	ч о .
45 °C (113 °F)	10.0 (145.04 psi)	



Note

- Temperature of refrigerant circuit components should be equal to ambient temperature. Pressure will deviate from values in table if individual components of refrigerant circuit are warmer or colder.
- At absolute pressure, 0 bar (0 psi) corresponds to absolute vacuum. Normal ambient pressure (positive pressure) corresponds to 1 bar (14.5 psi) absolute pressure. 0 bar (0 psi) pressure corresponds to an absolute pressure of one bar on most pressure gauges (indicated for example by -1 bar (-14.5 psi) below 0).
- ♦ On vehicles with a pressure sensor (High Pressure Sensor -G65-, Refrigerant Circuit Pressure Sensor - G805-, A/C Pressure/Temperature Sensor - G395- etc.), by which the pressure in the measured values of the diagnostic is displayed, if the measured value is aligned to the values in the table (or slightly higher). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- Pressure is measured in different units: 1 MPa (mega Pascal) corresponds to 10 bar (145 psi) positive pressure. 1 bar (14.5 psi) absolute pressure corresponds to 0 bar (0 psi) positive pressure and thus to the ambient pressure (atmospheric pressure).

If the measured values are okay and there is no concern:

- Remove (close) the hand wheel on the quick-release coupling connection. Refer to the A/C service station Owner's Manual.
- Extract the refrigerant using the A/C service station according to the corresponding Owner's Manual from both filler hoses. Refer to the A/C service station Owner's Manual.

 Switch off the A/C service station (and if necessary disconnect from the power supply). Refer to ⇒ <u>"3.8 A/C Service Station,</u> <u>Switching off and Disconnecting from Refrigerant Circuit",</u> page 154.

If the measured values are okay and there is a concern:

- Check the A/C system cooling output and at the same time pay attention to the pressure in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- Refer to ⇒ "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182.
- Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, <u>Checking Pressure with A/C System Switched On", page</u> <u>201</u>

If the measured values are not OK:

- Determine and correct the cause for the difference.



- If the pressure is too low it can be due to little refrigerant in the circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual) and <u>⇒ "3.4 Refrigerant Circuit, Discharging", page 141</u>.
- If the pressure is to high it is possible that there is too much refrigerant or refrigerant oil in the circuit. Empty the refrigerant circuit with the A/C service station if the extracted refrigerant quantity is greater than the specified capacity for the refrigerant R1234ỹf. Refer to <u>⇒ "3.4 Refrigerant Circuit, Discharging'</u> <u>page 141</u> and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). Evacuate the refrigerant circuit and fill again with the correct quantity or refrigerant R1234yf. Then repeat the test. If the extracted refrigerant quantity corresponds to approximately the specified capacity for the refrigerant R1234yf or is lower, clean the refrigerant circuit with refrigerant. Refer to \Rightarrow "2.6 Reference of the content of t frigerant Circuit, Cleaning", page 86. Then fill the specified quantity of refrigerant oil, evacuate the refrigerant circuit, fill again with the correct quantity of refrigerant R1234yf and repeat the test again.
- If the pressure is too low or high and contaminated refrigerant is determined by a gas analysis it is possible that this is the cause of the difference (contaminated refrigerant have different vapor pressures) empty the refrigerant circuit and then clean with refrigerant R1234yf. Refer to ⇒ "3.3 Refrigerant Gas Analysis, Performing", page 138, ⇒ "3.4 Refrigerant Circuit, Discharging", page 141 and ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.

The Refrigerant Circuit Pressure Is Lower Than indicated in Table Description of the permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability Not enough refrigerant in refrigerant circuit the correctness of information in this document. Copyright by AUDI AG.

- − Determine refrigerant circuit leaks. Refer to \Rightarrow "2.4 Leaks, Finding", page 63.
- Check the pressure relief valve. Refer to \Rightarrow "2.2.17 Pressure Relief Valve", page 50.

If pressure relief valve has responded. Refer to \Rightarrow "2.2.17 Pressure Relief Valve", page 50.

- Check the activation of the radiator fan or the radiator fans. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- On vehicles with shut-off valves for the refrigerant circuit, check the activation and function of this shut-off valve. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system (and the battery regulation). Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Check the refrigerant pipes and hoses for cross-section constrictions due to outer damage and inadequate bending radii. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- If no error is determined, clean the refrigerant circuit. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.

The Refrigerant Circuit Pressure Is in Line with Table or Is Higher

- Refer to ⇒ "3.14.4 Mechanically Driven A/C Compressor, <u>Checking Pressure with A/C System Switched On", page</u> <u>182</u>.
- Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201

3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On

Pressures, Checking. Refer to ⇒ page 182 Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

Specified values for the refrigerant circuit pressures pRefer to the transformation in this document. Copyright by AUDI AG.

Pressures, Checking

Refrigerant circuit with expansion valve, receiver/dryer with or without A/C Clutch - N25- and A/C Compressor Regulator Valve - N280- (with an A/C compressor regulated from the outside)

Note

- ♦ Connect the A/C service station. Refer to ⇒ "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136.
- If a malfunction occurs at only one evaporator in vehicles with two evaporators, check pressures in the refrigerant circuit; if they are OK, check line connection between malfunctioning evaporator and line connection end at distribution point of refrigerant lines (for constrictions or blockage). If no malfunction can be determined, empty the refrigerant circuit and refill with the specified refrigerant quantity. Then check the pressures and the A/C system cooling output again; if the complaint still exists, replace the expansion valve that is prematurely switched by the questioned evaporator. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Refer to ⇒ "3.14.3 Refrigerant Circuit with Ignition Switched on, Checking Pressure", page 175

Test Requirements



- The A/C service station in connected to the refrigerant circuit. Refer to ⇒ "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136.
- Pay attention to the test requirements for checking the pressures in the refrigerant circuit with the ignition switched off. Refer to <u>⇒ page 175</u>.
- The pressures in the refrigerant circuit with the ignition turned off meet the specifications. Refer to ⇒ <u>"3.14.3 Refrigerant Circuit with Ignition Switched on, Checking Pressure", page</u> <u>175</u>.
- Pay attention to the test requirements for checking the cooling by a to rive a commercial purposes, in part or in whole, is not output. Refer to ⇒ Heating, Ventilation and Airi©onditioning d by AUDI AG. AUDI AG does not guarantee or accept any liability Rep. Gr. 00; Repair Instructions; Checking Cooling Output rectness of information in this document. Copyright by AUDI AG. (vehicle-specific repair manual).

i Note

- The switching pressures for the activation of the A/C Compressor Regulator Valve N280-, the A/C Clutch N25- (if equipped) and the Radiator Fan V7- are vehicle specific. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- Pressures must be measured at the service connections; the component location for these connections are vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- The engine is warm (at an ambient temperature below 25 °C (77 °F)).



- If the engine is not warm perform a road test.
- For the cooling output test the engine must be warm but at an ambient temperature smaller than 25 °C (77 °F) a specific A/ C system cooling output it is necessary that the engine and lower ambient temperatures are warm.
- Start the engine.
- Adjust the A/C system to maximum cooling output. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- The A/C compressor is actually being driven with the engine running (visual inspection). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- The A/C Compressor Regulator Valve N280- is activated. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system.



◆ The A/C compressor is driven by different components depending on the engine (belt or input shaft). The belt pulley or the drive unit has an overload protection to protect these components and the engine, if the A/C compressor is runs with resistance. Refer to ⇒ Heating, Ventilation and Air Condition-

ing; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).

 On vehicles with A/C Compressor Regulator Valve - N280- the control current can be read out in the measured values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system.

If A/C compressor is not driven with the engine running or regulating valve is not actuated:

- Determine and eliminate cause for example by checking air conditioner DTC memory. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- If equipped, check the power supply for the A/C Clutch N25if this is OK, service the A/C clutch. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Check the activation of the A/C Compressor Regulator Valve
 N280-. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.

] Note

- On A/C compressors with a A/C Clutch N25- the A/C compressor only works (delivers refrigerant) when near the A/C Compressor Regulator Valve N280- the A/C Clutch N25- is also activated. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- ◆ The A/C Compressor Regulator Valve N280- (and the A/C Clutch - N25-) is activated by the A/C Control Module - J301-, from the Front A/C Display Control Head - E87- or the Climatronic Control Module - J255- or a downstream control module. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ All of the test requirements marked with a * are vehicle-specific and described in the repair manual belonging to the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehiclespecific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- Radiator and condenser are clean (if necessary clean)*. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- The heat shield insulation on the expansion valve is OK and installed correctly*. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Ribbed belt is OK and properly tensioned. Ribbed belt for A/C compressor and generator are OK and correctly tensioned.*
 Refer to ⇒ Heating, Ventilation and Air Conditioning; Repr Gr. private or commercial purposes, in part or in whole, is not 87; Refrigerant Circuit (vehicle-specific repair manual) and UDI AG. AUDI AG does not guarantee or accept any liability Heating, Ventilation and Air Conditioning; Repr. Gr. 87°; Re frigerant Circuit (vehicle-specific repair manual).
- The drive unit and the A/C compressor is OK and installed correctly.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning;



Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

- All air guides, covers and seals are OK and correctly installed*. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehiclespecific repair manual).
- The A/C system diagnostic does not detect any malfunctions (when the engine is running and the A/C system is switched on), and no compressor shut-off condition is displayed in the measured values of the corresponding control module (only for vehicles with "A/C system" diagnostic).* Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system.
- Air flow through dust and pollen filter not obstructed by dirt* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehiclespecific repair manual).
- The heater and A/C unit does not draw in any secondary air at the highest fresh air blower speed. The evaporator and the heater not drawing in secondary air at maximum fresh-air blower speed.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual).
- The air doors in the heater and A/C unit, in the heater and in the evaporator reach their end position.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehiclespecific repair manual).
- The fresh air intake ducts under the hood and in the vehicle interior and the corresponding water drain valves are OK.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehiclespecific repair manual) and ⇒ Heating, Ventilation and Airpyright. Copying for private or commercial purposes, in part or in whole, is not Conditioning; Rep. Gr. 87 ; Component Location Overview authorised by AUDI AG. AUDI AG does not guarantee or accept any liability A/C System (vehicle-specific repair manual).
- The engine is warm.
- Vehicle is not exposed to direct sunlight. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- The ambient temperature is greater than 15 °C (59 °F).
- All instrument panel vents are open.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Air Duct (vehicle-specific repair manual).

Adjustment for example on the Front A/C Display Control Head -E87- or the Climatronic Control Module - J255- or the A/C Control Module - J301- (and the Rear A/C Display Control Head - E265on vehicles with two heater and A/C units)*. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual).

Adjustment on the Front A/C Display Control Head - E87- / Climatronic Control Module - J255- *. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual).



- Preselect "Auto" mode (A/C compressor on).
- Set temperature pre-selector switch to "cold" or "LO" for driver's side and front passenger's side (and left and right rear seats in vehicles with two heater and A/C units).

Adjustment on the A/C Control Module - J301- *:

- Press A/C button and Rec- or recirculated air button.
- Turn rotary temperature control towards "cold" stop.
- Position the fresh arc blower dial in the position "4" (maximum, in part or in whole, is not fresh air blower specified unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

The following system test conditions should be met:

 The Radiator Fan - V7- is operated or the Radiator Fan - V7and Radiator Fan 2 - V177- runs (minimum in 1 step).* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual).

i Note

On specific versions the fan is switched on after the refrigerant circuit pressure specified value is exceeded. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.

- Fresh Air Blower V2- (and Rear Fresh Air Blower V80- in vehicles with two heater and A/C units) running at maximum speed.*
- The coolant shut-off valve is closed.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehiclespecific repair manual).
- The pump/valve unit valves are closed and there is no coolant circulation pump delivery.* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehicle-specific repair manual).
- Fresh Air Blower V2- (and Rear Fresh Air Blower V80- in vehicles with two heater and A/C units) running at maximum speed.*
- Recirculated/fresh-air door set to "Recirculated air mode" (within one minute, after starting vehicle, air-flow door is closed and recirculated-air door is opened)*
- The coolant shut-off valve is closed.*
- The valves of pump/valve unit are closed and there is no coolant circulation pump delivery.*

Specified Values for the Refrigerant Circuit Pressures

 Pay attention to the test requirements and check the pressure. Refer to <u>⇒ page 182</u>.

Checking:

- Bring the engine speed up to 2000 RPM.

Pay attention to the pressure indicator (for example the pressure gauge) of the A/C service station. Refer to the A/C service station Owner's Manual.



- The switching pressures for the activation of the A/C Compressor Regulator Valve N280- and the radiator fan are vehicle-specific. use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system.
- Pressures must be measured at the service connections; the component location for these connections are vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

High-Pressure Side:

Increasing from initial pressure (when connecting the pressure gauges) to a maximum of 20 bar (290 psi).

Low-Pressure Side:

Decreasing from initial pressure (when connecting the pressure gauges) to a value between 1.5 and 2.3 bar (21.76 to 33.36 psi) absolute pressure (depending on the required cooling output).



- If high cooling output is needed (for example, the outside temperature is very high, the blower speed it set on high but the engine speeds are low), then the A/C compressor will not bring the pressure on the low pressure side to the specified value (for example, for a certain time after turning on the A/C). The A/C compressor is actuated with maximum specified control current, however delivery volume is no longer sufficient at this engine speed to reduce pressure on low-pressure side to the specified value. To check the A/C compressor control unders, in part or in whole, is not these conditions, for example, the fresh air blower is activated tee or accept any liability only with approximately 40% of the maximum output (voltage), opyright by AUDI AG. check the pressures at a lower fresh air blower speed. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- If there is a low cooling output (for example an exterior temperature of 20 °C (68 °F) and a low fresh air blower speed) the pressure on the high pressure side increases only to a value of 6 to 7 bar (87 to 101.5 psi) (the absence of energy is low, the refrigerant is quickly cooled in the condenser). To check the A/C compressor control and the pressure in the refrigerant circuit under these conditions for example the activating the fresh air blower with maximum voltage, adjusting the A/C system to maximum heat output and recirculating air mode. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- Under unfavorable conditions (very high ambient temperatures, high humidity), pressure on high-pressure side may increase to max. 29 bar (421 psi).
- The specified operating current for the A/C Compressor Regulator Valve - N280- is displayed as the measured value of the Front A/C Display Control Head - E87-, the A/C Control Module - J301- of the Climatronic Control Module - J255-. Use the

Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.

- The measured high pressure from the High Pressure Sensor - G65-, from the Refrigerant Circuit Pressure Sensor - G805or the A/C Pressure/Temperature Sensor - G395- is displayed as the measured value of the Front A/C Display Control Head - E87-, the A/C Control Module - J301- or the Climatronic Control Module - J255-. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- Low pressure settles depending on control current for A/C Compressor Regulator Valve - N280- and control characteristic of expansion valve within compressor output range in tolerance range. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- Under unfavorable conditions (very high ambient temperatures, or high humidity) the output of the A/C compressor may not always be sufficient to attain the specified pressure values within the specified time (depending on the engine speed it can take longer until the specified low pressure can be reached).
- If the A/C compressor load is greater than 90%, the pressure on the low pressure side can be greater than the specified tolerance range. The A/C compressor load is no longer sufficient to reduce the pressure on the low pressure side to the value of approximately 2 bar (29 psi) under predominant ambient conditions (ambient temperature, humidity, A/C compressor settings, engine speed etc.).
- The specified operating current for the A/C Compressor Regulator Valve - N280- must be greater than 0.3 A in order to ensure reliable A/C Compressor Regulator Valve - N280- actuation. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- In "maximum cooling output" setting, control current for A/C Compressor Regulator Valve - N280- is regulated to approximately 0.65 A (up to 0.85 A). The measured value is vehiclespecific and is displayed in the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- At absolute pressure, 0 bar (0 psi) corresponds to absolute vacuum. Normal ambient pressure corresponds to 1 bar (14.5 psi) absolute pressure. 0 bar (0 psi) pressure corresponds to an absolute pressure of 1 bar (14.5 psi) on most pressure gauges (indicated for example by -1 bar (-14.5 psi) below 0). Depending on the version of the corresponding control module the pressure is displayed as a measured value on the basis of the absolute pressure and relative pressure (difference between the display 1 bar (14.5 psi)). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- The temperature of the air downstream from evaporator, the current A/C compressor speed and the pressure of the refrigerant on the high pressure side as well as the specified operating current for the A/C compressor Regulator Valve N280 or accept any liability is displayed for example as the measured value of the displaying by AUDLAG. control head of the Climatronic Control Module J255 . Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.

Pc	ossible Deviation from Specified Value, e Cause and Its Elimination		
•	The requested cooling output is not at- tained.	Refer to <u>⇒ page</u> <u>190</u>	
•	the high pressure remains constant or increases only slightly (above pressure with engine stopped),		
•	The low pressure quickly drops to target value or lower.		
•	The requested cooling output is not at- tained.	Refer to <u>⇒ page</u> <u>191</u>	
	The high pressure pipe corresponds to the specified value		
•	The low pressure corresponds to the specified value or is too low		
•	Required cooling output is not attained	Refer to <u>⇒ page</u>	
•	The high pressure does not increase or only increases slightly above pressure with engine stopped		
•		rised by AUDI AG. AUDI AG	ercial purposes, in part or in whole, is does not guarantee or accept any lial
•	Required cooling output is not attained	errectness of information in the Refer to <u>⇒ page</u>	is document. Copyright by AUDI AG.
	The high pressure increases above specification	<u>193</u>	
	The low pressure quickly drops to target value or lower		2
•	The required cooling is reached next af- ter some or a long running time the cool- ing output is no longer sufficient.	Refer to <u>⇒ page</u> <u>194</u>	
•	The high pressure and low pressure are normal.		
•	After some time the high pressure raises above the specified value, the low pres- sure corresponds to the specified value or it falls under the specified value.		
•	The specified cooling output is reached, then after a shorter or longer period of time the specified cooling output is no longer reached.	Refer to <u>⇒ page</u> <u>196</u>	
•	The high pressure and the low pressure are normal at first, after some time high pressure increases above the specified value and the low pressure falls to the specified value or lower.		
•	The high pressure and the low pressure are normal, then after a period of driving time the low pressure falls to the speci- fied value or lower, the evaporator ices over.		
•	The required cooling performance is obtained.	Refer to <u>⇒ page</u> <u>197</u>	

	essible Deviation from Specified Value, Cause and Its Elimination	
•	The high pressure pipe corresponds to the specified value	
•	The low pressure is too low (lower than the target value)	
•	The A/C compressor noise (particularly after switch-on)	Refer to <u>⇒ page</u> <u>198</u>
•	The required cooling performance is obtained.	
•	High pressure normal or too high	
•	The low pressure is normal or too high (the specified value is not always reached,	
•	The requested cooling output is not at- tained.	Refer to <u>⇒ page</u> 200
•	The high pressure and the low pressure corresponds to the specified value	

- The requested cooling output is not attained.
- ٠ the high pressure remains constant or increases only slightly (above pressure with engine stopped),
- The low pressure does not drop or drops only slightly.

Possible causes for the deviation from specified value and their solutions

- The activation of the A/C Compressor Regulator Valve N280- is faulty.
- Check the activation of the A/C Compressor Regulator Valve N280- and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. A/C Compressor Regulator Valve - N280- or A/C compressor faulty
- ٠
- Check the function of the A/C Compressor Regulator Valve N280- and if necessary remove the A/C Compressor Regulator Valve - N280- and if necessary check for contamination. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to \Rightarrow "2.5 Components, Replacing", page 71.
- Replace the A/C Compressor Regulator Valve N280- or the A/C compressor. Refer to \Rightarrow "2.5 Components, Replacing", page 71.
- If there is dirt in the refrigerant circuit clean the refrigerant circuit (flush with refrigerant R1234yf) and expansion valve and desiccant bag/dryer cartridge (or replace the reservoir/receiver/dryer). Refer to 2.5 Components, Replacing", page 71, \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86

Final Procedures

- Repeat the test. Refer to ⇒ "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182

Note

Pay attention that the A/C compressor (the shaft of the A/C compressor) under these concern is actually driven by the belt pulley/the drive unit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; A/C Compressor (vehicle-specific

repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- In no malfunction is determined for this concern, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>⇒</u> <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>.
- Check the measured values of the Evaporator Vent Temperature Sensor - G263- and the activation of the A/C Compressor Regulator Valve - N280- . If the measured value of the Evaporator Vent Temperature Sensor - G263- malfunctions the evaporator can ice over or the cooling output is not reached. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- If the A/C system function is not OK after repeating the test, for example after replacing expansion valve, clean the refrigerant circuit by flushing using the refrigerant R1234yf. Refer to ⇒ <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>. Replace the A/C compressor and dryer cartridge (or reservoir/receiver/dryer). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.
- If the expansion valve is faulty (constantly closed or does not open far enough), the A/C Compressor Regulator Valve -N280- is actuated to maximum output and the low pressure drops to value in graph or below (the A/C compressor draws off refrigerant from low-pressure side). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. As however refrigerant cannot flow via the expansion valve, the cooling output is not attained and high pressure may also not increase or only increase slightly due to the absence of energy conversion.



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Pos	sible Deviation from Specified Value During the Pressure Test
♦ T	he requested cooling output is not attained.
♦ T	he high pressure pipe corresponds to the specified value
♦ Т	he low pressure corresponds to the specified value or is too low
Pos	sible causes for the deviation from specified value and their solutions
♦ T	here is too little refrigerant in the refrigerant circuit.
♦ T	he expansion valve is faulty.
– E	Extract refrigerant from the refrigerant circuit. Refer to \Rightarrow "3.4 Refrigerant Circuit, Discharging", page 141.
le	f the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz) ess). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific epair manual), and look for leaks and correct. Refer to \Rightarrow "2.4 Leaks, Finding", page 63.
v	The extracted refrigerant quantity corresponds approximately to the specified capacity, replace expansion valve for the evaporator in the heater and A/C unit. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
Fina	I Procedures
– C	Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
	Repeat the test. Refer to \Rightarrow "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182.

Note

- Check the measured values of the Evaporator Vent Temperature Sensor - G263- and the activation of the A/C Compressor Regulator Valve - N280- . If the measured value of the Evaporator Vent Temperature Sensor - G263- malfunctions the evaporator can ice over or the cooling output is not reached. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- If the A/C system function is not OK after repeating the test, for example after replacing expansion valve, clean the refrigerant circuit by flushing using the refrigerant R1234yf. Refer to <u>⇒ "2.6 Refrigerant Čircuit, Cleaning", page 86</u>. Then re-place the A/C compressor and reservoir/receiver/dryer (or dryer cartridge). Refer to ⇒ Heating, Ventilation and Air Con-ditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Possible Deviation from Specified Value during the Pressure Test

- Required cooling output is not attained
- The high pressure does not increase or only increases slightly above pressure with engine stopped ٠
- The low pressure does not drop or drops only slightly

Possible causes for the deviation from specified value and their solutions

- The A/C compressor is not driver or not driven with the specified speed. ٠
- Check the A/C compressor drive (via the belt or drive unit). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual). The activation of the A/C Compressor Regulator Valve N280 (the A/C Clutch - N25-) is faulty.
- ٠
- Check the activation of the A/C Compressor Regulator Valve 7N280 (and the A/C Clutch N25-) and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C compressor.
- A/C Compressor Regulator Valve N280- or A/C compressor faulty ٠
- Check the function of the A/C Compressor Regulator Valve N280- and if necessary remove the A/C Compressor Regulator Valve - N280- and if necessary check for contamination. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to \Rightarrow "2.5 Components, Replacing", page 71
- Replace the A/C Compressor Regulator Valve N280- or the A/C compressor. Refer to \Rightarrow "2.5 Components, Replacing", page 71
- If there is dirt in the refrigerant circuit clean the refrigerant circuit (flush with refrigerant R1234yf), expansion valve and desiccant bag/dryer cartridge (or replace the reservoir/receiver/dryer). Refer to a <u>nents</u>, <u>Replacing</u>", <u>page 71</u>, \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and \Rightarrow "2.6 <u>Refrigerant Circuit</u>, <u>Cleaning</u>", <u>page 86</u>.
- ٠ Constriction or obstruction in refrigerant circuit (for example, inside the refrigerant line between the service connection "low pressure side" and the A/C compressor).
- Run hand over refrigerant circuit to check for differences in temperature. Refer to *⇒* Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). If on a component differences in temperature is determined, because the hose or pipe are kinked or constricted, replace this component. If there is a blockage or no malfunction can be determined, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86.
- Replace the expansion valve and desiccant bag/dryer cartridge (or reservoir/receiver/dryer). Refer to ≥ 2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.

Repeat the test. Refer to \Rightarrow "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182.

i Note

- ◆ Make sure that the A/C compressor (the A/C compressor shaft) is actually being driven by the belt pulley/drive unit for this complaint (pay attention to the overload protection). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
- ◆ For some engines, A/C compressor are being introduced that, in addition to the A/C Compressor Regulator Valve - N280-, an A/C Clutch - N25- is being attached to the belt pulley. Make sure that the A/C Clutch - N25- is actually being actuated and the A/C compressor (A/C compressor shaft) is being driven by the belt pulley. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and to the Parts Catalog.
- ◆ In no malfunction is determined for this concern, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>⇒</u> <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>.
- Check the measured values of the Evaporator Vent Temperature Sensor - G263- and the activation of the A/C Compressor Regulator Valve - N280- . If the measured value of the Evaporator Vent Temperature Sensor - G263- malfunctions the evaporator can ice over or the cooling output is not reached. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- If the A/C system function is not OK after repeating the test, for example after replacing expansion valve, clean the refrigerant circuit by flushing using the refrigerant R1234yf. Refer to ⇒ <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>. Then replace the A/C compressor and reservoir/receiver/dryer (or dryer cartridge). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If the expansion valve is faulty (constantly closed or does not open far enough), the A/C Compressor Regulator Valve -N280- is actuated to maximum output and the low pressure drops to value in graph or below (the A/C compressor draws off refrigerant from low-pressure side). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. As however refrigerant cannot flow via the expansion valve, the cooling output is not attained and high pressure may also not increase or only increase slightly due to the absence of energy conversion.

Possible Deviation from Specified Value during the Pressure Test

- Required cooling output is not attained permitted unless authorized by AUDI AG. AUDI AG does not guarantee or accept any liability
- The high pressure increases above specification
- The low pressure quickly drops to target value or lower

Possible causes for the deviation from specified value and their solutions

The activation of the A/C Compressor Regulator Valve - N280- is faulty.

- Check the activation of the A/C Compressor Regulator Valve N280- and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- Constriction or obstruction in refrigerant circuit
- Expansion valve malfunctioning
- ◆ If a shut-off valve installed in the refrigerant circuit does not open or opens incorrectly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If equipped check the function of the installed shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Run hand over refrigerant circuit to check for differences in temperature. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). If on a component differences in temperature is determined, because the hose or pipe are kinked or constricted, replace this component. If there is a blockage or no malfunction can be determined, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- Replace the expansion valve and desiccant bag/dryer cartridge (or reservoir/receiver/dryer). Refer to <u>⇒</u> <u>"2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.
- Repeat the test. Refer to ⇒ "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182.



- With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.
- If the expansion valve is faulty (constantly closed or does not open far enough), the A/C Compressor Regulator Valve -N280- is actuated to maximum output and low pressure drops to value in graph or below (the A/C compressor draws off refrigerant from low-pressure side). As the refrigerant cannot flow via the expansion valve, if the cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/ C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If there is too much refrigerant oil in the circuit, the A/C compressor must be emptied and the desiccant bag (the dryer cartridge) or the receiver/receiver/dryer must be replaced. After cleaning (flushing with refrigerant R1234yf) fill the refrigerant circuit with the correct quantity of refrigerant oil. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86, ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oil and Capacities for Refrigerant Oil (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).



If the specified value when repeating the check is stillenoted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability reached and on the refrigerant circuit no malfunction can beect to the correctness of information in this document. Copyright by AUDI AG. determined, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.

- The required cooling is reached next after some or a long running time the cooling output is no longer sufficient.
- The high pressure and low pressure are normal.
- After some time the high pressure raises above the specified value, the low pressure corresponds to the specified value or it falls under the specified value.

Possible causes for the deviation from specified value and their solutions

- Radiator for coolant, condenser is contaminated or the activation of the radiator fan is not OK.
- Check the activation of the radiator fan and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- Check the condenser and radiator for the condenser for contamination and if necessary clean. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Engine Mechanical; Rep. Gr. 19; Radiator/Radiator Fan .
- The activation of the A/C Compressor Regulator Valve N280- is faulty.
- Check the activation of the A/C Compressor Regulator Valve N280- and the measured value of the Evaporator Vent Temperature Sensor - G263- and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- Too much refrigerant in the refrigerant circuit
- Extract refrigerant from the refrigerant circuit. Refer to \Rightarrow "3.4 Refrigerant Circuit, Discharging", page 141
- If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity. There is too much refrigerant in the refrigerant circuit. Refill the refrigerant circuit with the correct quantity of R1234yf and repeat the test. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). A/C Compressor Regulator Valve - N280- or A/C compressor faulty
- Check the function of the A/C Compressor Regulator Valve N280- and if necessary remove the A/C Compressor Regulator Valve N280- and if necessary check for contamination. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to \Rightarrow "2.5 Components, Replacing",
- Replace the A/C Compressor Regulator Valve N280- or the A/C compressor Refer to ⇒ "2.5 Components. Replacing", page 71. with respect to the correctness of information in this document. Copyright by AUDI AG
- If there is dirt in the refrigerant circuit clean the refrigerant circuit (flush with refrigerant R1234yf), expansion valve and desiccant bag/dryer cartridge (or replace the reservoir/receiver/dryer). Refer to = "2.5 Compo-<u>nents, Replacing", page 71</u>, \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86.
- Too much refrigerant oil in the refrigerant circuit
- Moisture in refrigerant circuit
- Extract refrigerant from the refrigerant circuit. Refer to \Rightarrow "3.4 Refrigerant Circuit, Discharging", page 141
- If the extracted refrigerant quantity meets the specified capacity is only slightly smaller (maximum 100 g (3.5 oz)). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehiclespecific repair manual) too much refrigerant oil is in the refrigerant circuit.
- Clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86.
- Replace the expansion valve and desiccant bag/dryer cartridge (or reservoir/receiver/dryer). Refer to ≥ 2.5 Components, Replacing", page 71 and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182



If there is too much refrigerant oil in the circuit, the A/C compressor must be emptied and the desiccant bag (the dryer

cartridge) or the receiver/receiver/dryer must be replaced. After cleaning (flushing with refrigerant R1234yf) fill the refrigerant circuit with the correct quantity of refrigerant oil. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86, ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oil and Capacities for Refrigerant Oil (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.
- ◆ Problem with Evaporator Vent Temperature Sensor G263-in part or in whole, is not can also cause firing-up of refrigerant circuit. For this concerne or accept any liability also pay attention to the measured value of the Evaporator Vent Temperature Sensor G263-. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System (vehicle-specific repair manual).

Possible Deviation from Specified Value during the Pressure Test

- The specified cooling output is reached, then after a shorter or longer period of time the specified cooling output is no longer reached.
- The high pressure and the low pressure are normal at first, after some time high pressure increases above the specified value and the low pressure falls to the specified value or lower.
- The high pressure and the low pressure are normal, then after a period of driving time the low pressure falls to the specified value or lower, the evaporator ices over.

Possible causes for the deviation from specified value and their solutions

- Radiator for coolant, condenser is contaminated or the activation of the radiator fan is not OK.
- Check the activation of the radiator fan and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- Check the condenser and radiator for the condenser for contamination and if necessary clean. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Engine Mechanical; Rep. Gr. 19; Radiator/Radiator Fan.
- The measured value of the Evaporator Vent Temperature Sensor G263- is faulty.
- Check the measured value and installation of the Evaporator Vent Temperature Sensor G263-. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System.
- ◆ The activation of the A/C Compressor Regulator Valve N280- is faulty.
- Check the activation of the A/C Compressor Regulator Valve N280- and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- A/C Compressor Regulator Valve N280- or A/C compressor faulty
- Check the function of the A/C Compressor Regulator Valve N280- and if necessary remove the A/C Compressor Regulator Valve N280- and if necessary check for contamination. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to <u>⇒ "2.5 Components, Replacing", page 71</u>.
- Replace the A/C Compressor Regulator Valve N280- or the A/C compressor. Refer to ⇒ "2.5 Components, Replacing", page 71
- If there is dirt in the refrigerant circuit clean the refrigerant circuit (flush with refrigerant R1234yf) and the expansion valve and desiccant bag/dryer cartridge (or replace the reservoir/receiver/dryer). Refer to <u>⇒</u>
 <u>*2.6 Refrigerant Circuit, Cleaning</u>, page 86, <u>⇒</u> <u>*2.5 Components, Replacing</u>, page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Moisture in refrigerant circuit
- Extract refrigerant from the refrigerant circuit. Refer to <u>⇒ "3.4 Refrigerant Circuit, Discharging", page 141</u>.

- Clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning" page 86.
- Replace the expansion valve and desiccant bag/dryer cartridge (or reservoir/receiver/dryer). Refer to ≥ $\overline{5}$ Components, Replacing", page 71 and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182

Note

- With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.
- A malfunction on the Evaporator Vent Temperature Sensor -G263- can also cause icing-up of refrigerant circuit. For this concern also pay attention to the Evaporator Vent Temperature Sensor - G263- measured value.
- If there is moisture in the circuit, discharge the A/C compressor and replace the desiccant bag/dryer cartridge (or receiver/receiver/dryer). After cleaning (flushing with refrigerant R1234yf) fill the refrigerant circuit with the correct quantity of refrigerant oil. Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>, ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual) and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Possible Deviation from Specified Value during the Pressure Test

- The required cooling performance is obtained.
- The high pressure pipe corresponds to the specified value
- The low pressure is too low (lower than the target value)

Possible causes for the deviation from specified value and their solutions

- The measured value of the Evaporator Vent Temperature Sensor G263- is faulty.
- Check the measured value and installation of the Evaporator Vent Temperature Sensor G263- . Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehiclespecific repair manual). The activation of the A/C Compressor Regulator Valve - N280- is faulty.
- If a shut-off valve installed in the refrigerant circuit does not open or opens incorrectly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System (vehiclespecific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Check the activation of the A/C Compressor Regulator Valve N280- and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- If equipped check the function of the installed shut-off valves. Refer to ----- Heating, Ventilation and Air Conditioning; ReparGrad 87ess Component Location Overviewar A/C System and >> Heating, Ventilation and Air Conditioning; ReparGrad 87es Refrigerant Circuit this document. Copyright by AUDI AG.
- A/C Compressor Regulator Valve N280- or A/C compressor faulty
- Check the function of the A/C Compressor Regulator Valve N280- and if necessary remove the A/C Compressor Regulator Valve - N280- and if necessary check for contamination. Use the Vehicle Diagnostic

- Tester in the "Guided Fault Finding" function of the A/C system. Refer to <u>⇒ "2.5 Components, Replacing",</u> page 71.
- Replace the A/C Compressor Regulator Valve N280- or the A/C compressor. Refer to ⇒ "2.5 Components, Replacing", page 71.
- If there is dirt in the refrigerant circuit clean the refrigerant circuit (flush with refrigerant R1234yf) and the expansion valve and desiccant bag/dryer cartridge (or replace the reservoir/receiver/dryer). Refer to <u>⇒</u>
 <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>, <u>⇒</u> "2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.
- Repeat the test. Refer to ⇒ "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182.

🚺 Note

- For the malfunction "high pressure normal, low pressure too low" With this malfunction, evaporator may ice up, although quantity of refrigerant in circuit is OK.
- If there is a malfunction on a present shut-off valve (the shut-off valve does not open) it is not necessary to clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to = "2.6 Refrigerant Circuit Cleaning, page 60 provides of the shut-off valve, or accept any liability tion it is sufficient to check the activation of the shut-off valve, ight by AUDI AG. if this is OK replace the shut-off valve.
- If the problem is with the A/C Compressor Regulator Valve -N280- (regulating valve is not actuated but compressor operates nevertheless), refrigerant circuit needs to be cleaned (flush with refrigerant R1234yf). In this case, it is sufficient to replace the A/C compressor (observe quantity of refrigerant oil in A/C compressor). Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>.
- If the expansion valve is faulty (constantly closed or does not open far enough), the A/C Compressor Regulator Valve N280- is actuated to maximum output and low pressure drops to value in graph or below (the A/C compressor draws off refrigerant from low-pressure side). As however refrigerant cannot flow via the expansion valve, the cooling output is not always attained and high pressure may also not increase or only increase slightly due to the absence of energy conversion. For these malfunctions it is not necessary to clean the refrigerant circuit (flush with refrigerant R1234yf) it is sufficient to replace the expansion valve. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86
- Check measured values of the Evaporator Vent Temperature Sensor - G263- and the actuation of the A/C Compressor Regulator Valve - N280- . If the measured value of the Evaporator Vent Temperature Sensor - G263- malfunctions the evaporator can ice over or the cooling output is not reached. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.

Possible Deviation from Specified Value During the Pressure Test

The A/C compressor noise (particularly after switch-on)

- The required cooling performance is obtained.
- High pressure normal or too high
- The low pressure is normal or too high (the specified value is not always reached,

Possible causes for the deviation from specified value and their solutions

- The activation of the A/C Compressor Regulator Valve N280- is faulty.
- Check the activation of the A/C Compressor Regulator Valve N280- and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
 Check the function of the A/C Compressor Regulator Valve N280- and if necessary replace the A/C
- Check the function of the A/C Compressor Regulator Valve N280- and if necessary replace the A/C Compressor Regulator Valve N280- and check for damage. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Replace the A/C Compressor Regulator Valve N280- or the A/C compressor. Refer to <u>⇒ "2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
- ♦ If there is dirt in the refrigerant circuit clean the refrigerant circuit (flush with refrigerant R1234yf) and the expansion valve and desiccant bag/dryer cartridge (or replace the reservoir/receiver/dryer). Refer to <u>></u> <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>, <u>></u> <u>"2.5 Components, Replacing", page 71</u> and > Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Too much refrigerant or refrigerant oil in the refrigerant circuit
- Extract refrigerant from the refrigerant circuit. Refer to <u>⇒ "3.4 Refrigerant Circuit, Discharging", page 141</u>.
- If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity. There is too much refrigerant in the refrigerant circuit. Fill the refrigerant circuit and repeat the test. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity. There is too much refrigerant in the refrigerant circuit. Fill the refrigerant circuit and repeat the test. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual). Clean the refrigerant circuit (flush with refrigerant R1234yf) and fill with the correct quantity of refrigerant and refrigerant oil and repeat the test. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- Expansion valve malfunctioning
- If a shut-off valve installed in the refrigerant circuit does not open or opens incorrectly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If equipped check the function of the installed shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
 Replace the expansion valve and desiccant bag/dryer cartridge (or reservoir/receiver/dryer). Refer to ≥
- Replace the expansion valve and desiccant bag/dryer cartridge (or reservoir/receiver/dryer). Refer to <u>⇒</u> <u>"2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- A/C compressor faulty.
- If no malfunction can be determined on a component and the extracted refrigerant quantity corresponds to the specifications, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant <u>Circuit, Cleaning", page 86</u>. If when cleaning the refrigerant circuit no excessive amount of refrigerant oil is determined, replace the A/C compressor. Refer to <u>⇒ "2.5 Components, Replacing", page 71</u>, ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehiclespecific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).

Final Procedures

Note

- Charge the refrigerant circuit. Refer to ⇒ "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182.

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- ◆ This fault may also be caused by too much refrigerant oil in the refrigerant circuit. Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil. If there is too much refrigerant oil in the refrigerant circuit, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>
- If the expansion valve (or a present shut-off valve) is faulty (constantly closed or does not open far enough), the A/C Compressor Regulator Valve - N280- is actuated to maximum output and low pressure drops to value in graph or below (the A/C compressor draws off refrigerant from low-pressure side). As the refrigerant cannot flow via the expansion valve, if the cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

- The requested cooling output is not attained.
- The high pressure and the low pressure corresponds to the specified value

Possible causes for the deviation from specified value and their solutions

- There is too little refrigerant in the refrigerant circuit.
- Extract refrigerant from the refrigerant circuit. Refer to ⇒ <u>"3.4 Refrigerant Circuit, Discharging", page 141</u>.
 If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz) less). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), and look for leaks and correct. Refer to ⇒ <u>"2.4 Leaks, Finding", page 63</u>.
 If the extracted refrigerant quantity corresponds approximately to the specified capacity, the measured
- If the extracted refrigerant quantity corresponds approximately to the specified capacity, the measured value of the Evaporator Vent Temperature Sensor G263-, the activation of the A/C Compressor Regulator Valve N280- and the function of the expansion valve is faulty or there is a malfunction on another component (see below).
- ponent (see below).
 The measured value of the Evaporator Vent Temperature Sensor G263- is faulty.
- Check the measured value and installation of the Evaporator Vent Temperature Sensor G263-. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
- The activation of the A/C Compressor Regulator Valve N280- is faulty.
- Check the activation of the A/C Compressor Regulator Valve N280- and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- Expansion valve malfunctioning
- If a shut-off valve installed in the refrigerant circuit does not open or opens incorrectly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
- Run hand over refrigerant circuit to check for differences in temperature. Refer to ⇒ Heating, Ventilation and Air Conditioning, Rep. Gr. 87, Refrigerant Circuit (vehicle-specific repair manual). If on a component differences in temperature is determined, because the hose or pipe are kinked or constricted, replace this component. If there is a blockage or no malfunction can be determined, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
 If equipped check the function of the installed shut-off valve. Refer to ⇒ Heating, Ventilation and Air Con-
- If equipped check the function of the installed shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Replace the expansion valve and desiccant bag/dryer cartridge (or reservoir/receiver/dryer). Refer to <u>⇒</u> <u>"2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Too much refrigerant oil in the refrigerant circuit
- If the extracted refrigerant quantity meets the specified capacity is only slightly smaller than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to ⇒ Heating,

- Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual). Clean the refrigerant circuit (flush with refrigerant R1234yf) and fill with the correct quantity of refrigerant and refrigerant oil and repeat the test. Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86
- Expansion valve malfunctioning
- If a shut-off valve installed in the refrigerant circuit does not open or opens incorrectly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If equipped check the function of the installed shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Replace the expansion valve and desiccant bag/dryer cartridge (or reservoir/receiver/dryer). Refer to <u>⇒</u> <u>"2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.
- Repeat the test. Refer to <u>⇒ "3.14.4 Mechanically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 182</u>.



- ♦ Check the measured values of the Evaporator Vent Temperature Sensor - G263- and the activation of the A/C Compressor Regulator Valve - N280- . If measured value of Evaporator Vent Temperature Sensor - G263- is incorrect, evaporator may ice up or cooling output is not attained use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system, Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87r¢Component LocationpOverviewerA/Cirposes, in part or in whole, is not System (vehicle-specific repair manual). AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
- Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.
- If expansion valve is malfunctioning (permanently open), evaporator temperature is no longer regulated such that only refrigerant in gaseous state exits from the evaporator. Under certain usage conditions, liquid droplets may then be drawn in by the compressor and cause noise (liquid cannot be compressed).
- If too much refrigerant oil is located in the circuit, the A/C compressor must be discharges and if equipped replace the receiver/receiver/dryer (or dryer cartridge). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). After cleaning the refrigerant circuit (flushing with refrigerant R1234yf) and fill it with the correct quantity of refrigerant oil in the circuit. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).

3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On

Pressures, Checking. Refer to \Rightarrow page 202.

Refrigerant Circuit Pressures Specified Values, Vehicles without Heat Pump. Refer to \Rightarrow page 207.

Refrigerant Circuit Pressures Specified Values, Vehicles with Heat Pump. Refer to \Rightarrow page 226.

Pressures, Checking



Working on the refrigerant circuit with the A/C service station (check the pressure here) usually requires, although not necessary, the high-voltage system to be disabled.

- Charge the vehicle battery, for example, using the Battery Charger - VAS5904- in the battery support mode to minimize the number of automatic starts during the test- and measuring procedures while the ready mode is active. Refer to ⇒ Electrical Equipment General Information; Rep. Gr. 27 ; Battery, Charging and ⇒ High Voltage Vehicle General Information; Rep. Gr. 93 ; High-Voltage System General Warnings .
- For testing and measurement procedures that require the ready mode to be active or the ignition to be switched on, the selector lever must be in the "P" position and the parking brake must be activated. The required tools must be placed so that they do not come into contact with any rotating components in the engine and they must also not go into the vicinity of the rotating components when the engine is running.

Note

- Also move the selector lever into position "P" and activate the parking brake for testing and measuring procedures which require the ignition to be on, but do not require the ready mode to be active.
- The ready mode is displayed in the Instrument Cluster Control Module - J285- above the "power meter". Refer to Owner's Manual.
- For activating and deactivating the ready mode (while doing so, note the display in the Instrument Cluster Control Module - J285-). Refer to the Owner's Manual.
- On vehicles with a high-voltage system, switch off (deactivate) the "auxiliary climate control" function. Refer to the Owner's Manual and Infotainment/MMI Operating Manual.
- Switch off the ignition otected by copyright. Copying for private or commercial purposes, in part or in whole, is not
 permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
- Connect the A/C service station the Referites sof "3:2nA/C Service net. Copyright by AUDI AG. Station on Refrigerant Circuit, Connecting", page 136.



Is a concern occurs on only on evaporator, on vehicles with two evaporators (a evaporator in the heater and A/C unit and an evaporator on the high-voltage battery heat exchanger) check the pressure in the refrigerant circuit, is this okay? Check the line connection between the evaporator in question and the exit of line connection at distribution point of refrigerant lines (for constriction). If no malfunction can be detected, discharge the refrigerant circuit and charge it with the specified refrigerant quantity. Then check the pressure and the A/C system cooling output again, if the concern is present again check/replace the following components: If the concern only occurs on the evaporator in the heater and A/C unit, check the shut-off valve in from of the evaporator in the heater and A/C unit (it is not open in the activated state and lets the refrigerant flow through). Replace the expansion valve on the evaporator in the heater and A/C unit id no malfunction can be determined on the shut-off valve. If there is a concern only on the evaporator on the high-voltage battery heat exchanger, check the activation of the shut-off valve on the expansion valve on the evaporator and high-voltage battery heat exchanger (it is not closed in the activated state and does not let refrigerant flow through). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Test Requirements

- The A/C service station in connected to the refrigerant circuit. Refer to ⇒ "3.2 A/C Service Station on Refrigerant Circuit, Connecting", page 136.
- Pay attention to the test requirements for checking the pressures in the refrigerant circuit with the ignition switched off. Refer to <u>⇒ page 175</u>.
- The pressures in the refrigerant circuit with the ignition turned off meet the specifications. Refer to ⇒ <u>"3.14.3 Refrigerant Circuit with Ignition Switched on, Checking Pressure", page</u> <u>175</u>.
- Pay attention to the test requirements for checking the cooling output. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00, Repair Instructions, Checking Cooling Output accept any liability (vehicle-specific repair manual), of information in this document. Copyright by AUDI AG.



- The switching pressures for the activation of the Electrical A/ C Compressor - V470- and the Radiator Fan - V7- are vehiclespecific. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation.
- ◆ Pressures must be measured at the service connections; the component location for these connections are vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- The engine is warm (at an ambient temperature below 25 °C (77 °F)).



- If the engine is not warm perform a road test.
- For the cooling output test the engine must be warm but at an ambient temperature smaller than 25 °C (77 °F) a specific A/ C system cooling output it is necessary that the engine and lower ambient temperatures are warm.
- Charge the vehicle battery, for example, using the Battery Charger - VAS5904- in the battery support mode to minimize the number of automatic starts during the test- and measuring procedures while the ready mode is active. Refer to ⇒ Electrical Equipment General Information; Rep. Gr. 27 ; Battery, Charging and ⇒ High Voltage Vehicle General Information; Rep. Gr. 93 ; High-Voltage System General Warnings .
- Activate the ready mode (the engine must run). Refer to the Owner's Manual.

- Adjust the A/C system to maximum cooling output. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- The Electrical A/C Compressor V470- is activated and runs. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Note

- The activation of the electrically driven A/C compressor occurs from the vehicle electrical system. The engine speed does not have any effect on the A/C cooling output.
- The A/C compressor is currently not actuated at the maximum specified speed (of approximately 8500/min) on a stationary or slow moving vehicle (up to a speed of approximately 45 km/ h (28 mph)) (the A/C compressor speed is limited to approximately 5000/min).
- The activation of the electrically driven A/C compressor can be monitored by the Guided Fault Finding using the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for A/ C System and the Battery Regulation.
- ◆ All of the test requirements marked with a * are vehicle-specific and described in the repair manual for the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).

If the A/C compressor is not activated while ready mode is active:

- Determine and eliminate cause for example by checking air conditioner DTC memory. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation.
- The radiator and condenser are clean (if necessary clean)*. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Engine Mechanical; Rep. Gr. 19; Radiator/Radiator Fan.
- The heat shield insulation on the expansion valve is OK and installed correctly*. Refere to Carry Heating, Ventilation and Airpart or in whole, is not Conditioning, Rep. Gres 87 or Refrigerant Circuit (Venicle spectra accept any liability cific repair manual).
- All air guides, covers and seals are OK and correctly installed*. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehiclespecific repair manual).
- The diagnostic of the A/C system does not determine a malfunction (with the ready mode active and the A/C system switched on) in the measured value block no compressor shutoff condition is shown. Using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation.
- The various pressure/temperature sensors installed on or in the refrigerant circuit provide valid measured values when the A/C system is being used. To check, use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to
 ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System . If no errors can be detected, evacuate the refrigerant.

- The airflow through the dust and pollen filter is not impaired by debris*. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual).
- The heater and A/C unit does not draw in any secondary air at the highest fresh air blower speed. Evaporator and heater not drawing in secondary air at maximum fresh-air blower speed. *Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- The air doors in the heater and A/C unit, in the heater and in the evaporator reach their end position*. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- Fresh-air intake ducts beneath hood and in passenger compartment as well as corresponding water drain valves OK*. Refer to ⇒ Heating, Ventilation, Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual).
- Vehicle is not exposed to direct sunlight. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- The ambient temperature is greater than 15 °C (59 °F).
- All instrument panel vents are open *.

Adjustment for example on the Front A/C Display Control Head -E87- (and the Rear A/C Display Control Head - E265- on vehicles with two heater and A/C units) *. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System .

Adjustment for example on the Front A/C Display Control Head - E87- *:

- Preselect "Auto" mode (A/C compressor on).
- Set temperature pre-selector switch to "cold" or "LO" for driver's side and front passenger's side (and left and right rear seats in vehicles with two heater and A/C units)*.

Adjustment on the A/C Control Module - J301- *:

- Press A/C button and Rec- or recirculated air button*.
- Turn rotary temperature control towards "cold" stop*.
- Position the fresh-air blower dial in the position "4" (maximum fresh air blower speed)*.

The following system test conditions should be met:

 The Radiator Fan - V7- is operated or the Radiator Fan - V7and Radiator Fan 2 - V177- runs (minimum in 1 step).* Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and ⇒ Engine Mechanical; Rep. Gr. 19; Radiator/Radiator Fan.



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On specific versions the fan is switched on after the refrigerant circuit pressure specified value is exceeded. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation.

- Fresh Air Blower V2- (and Rear Fresh Air Blower V80- in vehicles with two heater and A/C units) running at maximum speed.'
- Recirculated/fresh-air door set to "Recirculated air mode" (within one minute, after starting vehicle, air-flow door is closed and recirculated-air door is opened)*
- The coolant shut-off valve is closed.* Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and > Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/CrSystem (vehicle by AUDI AG. AUDI AG does not guarantee or accept any liability specific repair manual). respect to the correctness of information in this document. Copyright by AUDI AG.
- The pump/valve unit valves are closed and there is no coolant circulation pump delivery.* Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual).

Note

- The activation of the electrically-driven A/C compressor takes place from the vehicle electrical system, the engine speed does not have an influence on the A/C system cooling output. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation.
- The A/C compressor is currently not actuated at the maximum specified speed (of approximately 8500/min) on a stationary or slow moving vehicle (up to a speed of approximately 45 km/ h (28 mph)) (the A/C compressor speed is limited to approximately 5000/min).
- The activation of the electrically driven A/C compressor can be monitored by the Guided Fault Finding using the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for A/ C System and the Battery Regulation.
- Pressures must be measured at the service connections; the component location for these connections are vehicle-specific. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Specified Values for the Refrigerant Circuit Pressures

- Refrigerant Circuit Pressures Specified Values, Vehicles without Heat Pump. Refer to \Rightarrow page 207.
- Refrigerant Circuit Pressures Specified Values, Vehicles with Heat Pump. Refer to \Rightarrow page 226.



- The specified and current speed for the activation of the Electrical A/C Compressor - V470- and the Radiator Fan - V7- are vehicle-specific. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation.
- Pressures must be measured at the service connections; the component location for these connections are vehicle-specific.



Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Refrigerant Circuit Pressures Specified Values, Vehicles without Heat Pump

- ◆ Observe the test requirements. Refer to <u>⇒ page 202</u>.
- Pay attention to the pressure indicator (for example the pressure gauge) of the A/C service station.



- The switching pressures for the activation of the Electrical A/ C Compressor - V470- and the Radiator Fan - V7- / Radiator Fan 2 - V177- are vehicle-specific. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation.
- Pressures must be measured at the service connections; the component location for these connections are vehicle-specific. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

High-Pressure Side:

From the output pressure (when connecting the pressure gauge) raises up to maximum 20 bar (290 psi) pressure (depending on the ambient temperature and the operating conditions of the A/C system).

Low-Pressure Side:

Decreasing from initial pressure (when connecting the pressure gauges) to a value between 1.5 and 2.3 bar (21.76 to 33.36 psi) absolute pressure (depending on the required cooling output).

A/C Compressor Speed:

Depending on the required cooling output between 800 and 8500/ min (currently a maximum of 5000/min for parked vehicles).

i	Note
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- The temperature of the air downstream from evaporator, the current A/C compressor speed and the pressure of the refrigerant on the high pressure side depending on the vehicle are displayed by the different control modules (for example by the Front A/C Display Control Head or E87 end the Climatronic Control Module J255 or the Thermal Management Control Module J1024- or the A/C Control Module J301-). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation.
- If a high cooling output is required (for example, a high outside temperature and the blower speed set on high), then the A/C compressor will not bring the pressure on the low pressure side to the required value (for example, for a certain time after turning on the A/C). The A/C compressor is not actuated at the maximum specified speed (of approximately 8500/min) on a stationary or slow moving vehicle (up to a speed of approximately 45 km/h (28 mph)) (the A/C compressor speed is limited to approximately 5000/min). After a vehicle reaches a speed of more than approximately 45 km/h (28 mph), the limit for the maximum permissible A/C compressor speed is lifted. At a A/C compressor speed of 5000/min, a high outside temperature and a high fresh air blower speed (inefficient environmental controls), the A/C compressor output (the delivery

volume) is no longer sufficient to reduce the pressure on the low pressure side to the target value. To check the A/C compressor control under these conditions, for example, the fresh air blower is activated only with approximately 40% of the maximum voltage, check the pressures at a lower fresh air blower speed. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for A/C system and the battery regulation. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).

- If there is a low cooling output (for example an exterior temperature of 20 °C (68 °F) and a low fresh air blower speed) the pressure on the high pressure side increases only to a value of 6 to 7 bar (87 to 101.5 psi) (the absence of energy is low, the refrigerant is quickly cooled in the condenser). To check the A/C compressor control and the pressure in the refrigerant circuit under these conditions for example the activating the fresh air blower with maximum voltage, adjusting the A/C system to maximum heat output and recirculating air mode. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- Under unfavorable conditions (very high ambient temperatures, high humidity), pressure on high-pressure side may increase to max. 29 bar (421 psi).
- The specified speed of the A/C compressor depending on the vehicle is displayed from different control modules (for example by the Front A/C Display Control Head E87-, Climatronic Control Module J255- or the A/C Control Module J301-). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- The measured high pressure from different sensors (for example from the High Pressure Sensor G65-, from the Refrigerant Circuit Pressure Sensor G805- or the A/C Pressure/ Temperature Sensor - G395-) is displayed by the vehicle (for example from the Front A/C Display Control Head - E87-, the A/C Control Module - J301-, the Thermal Management Control Module - J1024- or the Climatronic Control Module - J255-). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- Depending on the A/C compressor speed and the control characteristic of the expansion valve, the low pressure settles within the A/C compressor output range in the tolerance range (1.5 to 2.3 bar (1.5 to 33.36 psi) positive pressure).
- The specified speed of the A/C compressor must for this test be greater than 1500 RPM. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C compressor.
- In setting "maximum cooling output" the target speed of the A/ C compressor is regulated to approximately 4000 up to 5000/ min. This value is vehicle-specific and is displayed as the measured value from the corresponding control module (for example from the display control head, the Front A/C Display Control Head - E87-, Climatronic Control Module - J255- or the Thermal Management Control Module - J1024-). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation.
- At absolute pressure, 0 bar (0 psi) corresponds to absolute vacuum. Normal ambient pressure corresponds to 4 bar (14.5 oses, in part or in whole, is not psi) absolute pressure. On the scales of most pressure loss not guarantee or accept any liability gauges, 0 bar (0 psi) corresponds to an absolute pressure of ent. Copyright by AUDI AG. 1 bar (14.5 psi) (can be seen from -1 bar (-14.5 psi) mark below

0). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C System.

- If, for a vehicle with two evaporators (one in the heater and A/ C unit and one for battery cooling), the measured temperature on one of the evaporators corresponds to the specified value or the specified value falls short, but does not reach the required specified value on the other evaporator, the following adjustment is performed: the corresponding control module (for example battery regulation control module or the thermal management control module) activates the electric A/C compressor with increased speed (thereby increasing the A/C system cooling output and decreasing the pressure on the low pressure side as well as the evaporator temperature) via additional control modules (for example the electric drive power and control electronics and the A/C compressor control module). If on the evaporator the specified value for the temperature falls short, the corresponding control module (for example the battery regulation control module) activates the shut-off valve (for example the refrigerant shut-off valve 1 or the refrigerant shut-off valve 2) so that no more refrigerant flows through the evaporator which is too cold. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instruc-tions; Checking Cooling Output (vehicle-specific repair manual) and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87'; Component Location Overview - A/C System (vehiclespecific repair manual).
- ◆ Because the output of the evaporator in the battery cooling module is noticeably smaller than the output of the evaporator in the heater and A/C unit, because of too little refrigerant in the circuit the required specified temperature in the battery cooling module may be reached but the specified temperature in the heater and A/C unit is no longer reached (although the A/C compressor is activated with a higher speed). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

	essible Deviation from Specified Value, Cause and its Elimination	
•	The required cooling output is not at- tained in the heater and A/C unit evapo- rator (and in the evaporator for battery cooling module).	Refer to <u>⇒ page</u> 211
	High pressure remains constant or in- creases only slightly (above pressure with constant stopped) AG. AUDI AG does not gua with respect to the correctness of information in this document. Low pressure quickly drops to target val- ue or lower.	antee or accept any liability
*	The required cooling output is reached at first in the evaporator in the heater and A/C unit (and in the evaporator for bat- tery cooling) after some time or after a longer running time the cooling output is no longer sufficient.	Refer to <u>⇒ page</u> 213
٠	The high pressure and low pressure are normal.	
•	After some time the high pressure raises above the specified value, the low pres-	

Possible Deviation from Specified Value,]			
the Cause and its Elimination sure corresponds to the specified value		-			
or it falls under the specified value.					
 The required cooling output is not at- tained in the heater and A/C unit evapo- rator (and in the evaporator for battery cooling). 	Refer to <u>⇒ page</u> 215				
 The high pressure pipe corresponds to the specified value 					
 The low pressure is too low (lower than the target value) 					
 The A/C compressor noise (particularly after switch-on) 	Refer to <u>⇒ page</u> 216				
 The required cooling output is not at- tained in the heater and A/C unit evapo- rator and/or in the evaporator for battery cooling. 					
 High pressure normal or too high 					
 Low pressure too high (the specified value is not reached, 					
 The required cooling output is not at- tained in the heater and A/C unit evapo- rator (and in the evaporator for battery cooling). 	Refer to <u>⇒ page</u> 218				
 High pressure and low pressure are nor- mal (correspond to the specified value) 					
 The required cooling output is not at- tained in the heater and A/C unit evapo- rator (and in the evaporator for battery cooling). 	Refer to <u>⇒ page</u> 219				
 The high pressure pipe corresponds to the specified value 					
 The low pressure corresponds to the specified value or is too low 					
 The required cooling output is not at- tained in the heater and A/C unit evapo- rator (and in the evaporator for battery cooling). 	Refer to <u>⇒ page</u> 220				
 The high pressure pipe corresponds to the specified value 					
 Low pressure quickly drops to specified value or lower. 					part or in whole, is not
 The required cooling output is not at- tained in the heater and A/C unit evapo- rator (and in the evaporator for battery cooling). 	Refer to <mark>⊕ permitted unless au 221</mark>	norised by AUDI A e correctness of info	G. AUDI AG d	ioes not guarante s document. Cop	e or accept any liability yright by AUDI AG.
 The required cooling output is only not attained at the heater and A/C unit evap- orator (the cooling output on the evapo- rator for the cooling output is OK). 		er			

Refer to <u>⇒ page</u> 222	
Refer to <u>⇒ page</u> 224	
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	222 Refer to ⇒ page 224 ed by copyright. Copying for red unless authorised by AUE Refer.to ⇒ page s of

- The required cooling output is not attained in the heater and A/C unit evaporator (and in the evaporator for battery cooling module).
- High pressure remains constant or increases only slightly (above pressure with A/C compressor stopped).
- Low pressure quickly drops to target value or lower.

Possible causes for the deviation from specified value and their solutions

- There is too little refrigerant in the refrigerant circuit.
- Extract refrigerant from the refrigerant circuit. Refer to \Rightarrow "3.4 Refrigerant Circuit, Discharging", page 141. - If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz))
- If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz)) less). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), and look for leaks and correct. Refer to ⇒ "2.4 Leaks, Finding", page 63.
- The extracted refrigerant quantity corresponds approximately to the specified capacity, check the activation of the A/C compressor and the installed shut-off valve, if not malfunction is determined, replace the expansion valve for the evaporator in the heater and A/C unit. Refer to ⇒ Heater and A/C Unit; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ The activation of the a/C compressor (and if equipped the refrigerant shut-off valve 1 and the refrigerant shut-off valve 2) is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00;

Possible Deviation from Specified Value During the Pressure Test			
Repair Instructions; Checking Cooling Output (vehicle-specific repair manual), ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).			
 Check the activation and function of the A/C compressor (and if equipped the shut-off valves, for example the refrigerant shut-off valve 1, the refrigerant shut-off valve 2) and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C compressor and the battery regulation. If this is OK extract refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. The expansion valve for the evaporator in the heater and A/C unit is faulty. Refer to ⇒ Heating, Ventilation 			
and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) for replacing.			
 One if the refrigerant shut-off valves (if equipped) is faulty (closed), check the function. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to > Heating, Ventilation and Air Conditioning, Rep. Gr. 87, Refrigerant Circuit (vehicle specific repair manual) for replacing. 			
 Constriction or blockage in the refrigerant circuit (for example in the refrigerant line between the "low pressure side" service connection and the A/C compressor). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). 			
 If there is a blockage clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86. If the hose or pipe is kinked or constricted, replace this component. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). The expansion valve for the evaporator in the heater and A/C unit is faulty. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). 			
▲ A refrigerant shut-off value is faulty (closed) Ise the Vehicle Diagnostic Tester in the "Guided Fault Finding"			

A refrigerant shut-off valve is faulty (closed). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) for replacing.

Final Procedures

Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.

Repeat the test. Refer to \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

Note

- If for this complaint a malfunction is determined in the diagnostic, check the refrigerant circuit for a constriction or blockage (a constriction or a blockage in the refrigerant circuit can also lead to these complaints). If nothing is determined here, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- Check the measured values of the sensors for Evaporator Vent Temperature Sensor - G263- and if equipped the temperature sensor before hybrid battery evaporator and the temperature sensor before hybrid battery evaporator as well at the activation of the A/C compressor via the corresponding control module. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation.
- If there is an error in the measured value of the Evaporator Vent Temperature Sensor - G263-, the temperature sensor before hybrid battery evaporator or the temperature sensor after hybrid battery evaporator (depending on the vehicle use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation) this can lead to problems in the cooling output and the evaporator can freeze-up.

- With a malfunction on one of the temperature sensors, the evaporator may ice up even though the quantity of refrigerant in the refrigerant circuit is OK.
- If the A/C system function is not OK after repeating the test, for example after replacing expansion valve, clean the refrigerant circuit by flushing using the refrigerant R1234yf. Refer to ⇒ <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>. Replace the A/C compressor and dryer cartridge (or reservoir/receiver/dryer). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If the expansion valve in the heater and A/C unit evaporator or the shut-off valve is faulty (permanently closed or does not open sufficiently), the A/C compressor is actuated to maximum output and the low pressure drops to specification or below (compressor draws off refrigerant from low-pressure side). Since the refrigerant cannot flow via the expansion valve, the cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" Function for the A/C System and the Battery Regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ The evaporator in the heater and A/C Unit has considerably more output than the evaporator for battery cooling. The refrigerant shut-off valve 2 on the expansion valve in the battery cooling module depending on the version is activated for cooling the Electric Vehicle Battery A2- (depending on the vehicle use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation) first after a specific battery temperature by the corresponding control module) so that the energy transformation via the evaporator for battery cooling is not or only slightly raised. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation control module.

- The required cooling output is reached at first in the evaporator in the heater and A/C unit (and in the evaporator for battery cooling) after some time or after a longer running time the cooling output is no longer sufficient.
- The high pressure and low pressure are normal mitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.
- After some time the high pressure raises above the specified value, the low pressure corresponds to the specified value or it falls under the specified value.

Possible causes for the deviation from specified value and their solutions

- Radiator for coolant, condenser is contaminated or the activation of the radiator fan is not OK.
- Check the activation of the radiator fan and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system.
- Check the condenser and radiator for the condenser for contamination and if necessary clean. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Engine Mechanical; Rep. Gr. 19; Radiator/Radiator Fan.
- Activation of function of the A/C compressor (or if equipped the refrigerant shut-off valve 1 or the refrigerant shut-off valve 2) is faulty.

• Moisture in refrigerant circuit

Po	Possible Deviation from Specified Value During the Pressure Test		
_	Check the activation of the A/C compressor (and if equipped the refrigerant shut-off valve 1 and the re- frigerant shut-off valve 2) and the measured value of the Evaporator Vent Temperature Sensor - G263 Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. If the activation of the A/C compressor (and if equipped the refrigerant shut-off valve 1 and the refrigerant		
	shut-off valve 2) as well as the measured value of the Evaporator Vent Temperature Sensor - G263- is OK extract the refrigerant from the refrigerant circuit. Refer to <u>⇒ "3.4 Refrigerant Circuit, Discharging", page</u> 141.		
•	Too much refrigerant in the refrigerant circuit		
٠	Expansion valve malfunctioning		
•	If a shut-off valve installed in the refrigerant circuit does not open or opens incorrectly. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).		
٠	Moisture in refrigerant circuit		
-	Extract refrigerant from the refrigerant circuit. Refer to \Rightarrow "3.4 Refrigerant Circuit, Discharging", page 141.		
-	If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity there is too much refrigerant in the refrigerant circuit. Fill the refrigerant circuit and repeat the test. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).		
_	If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual). Clean the refrigerant circuit (flush with refrigerant R1234yf) and fill with the correct quantity of refrigerant and refrigerant oil and repeat the test. Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86.		
-	If equipped check the function of the installed shut-off valve. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).		
-	Replace the expansion valve and desiccant bag/dryer cartridge (or reservoir/receiver/dryer). Refer to \Rightarrow <u>"2.5 Components, Replacing", page 71</u> and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).		
Final Procedures			
-	Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.		
-	Repeat the test. Refer to \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.		

Note

- If too much refrigerant oil is located in the circuit, the A/C compressor must be discharges and replace the receiver/receiver/dryer (or dryer cartridge). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). After cleaning the refrigerant circuit (flushing with refrigerant R1234yf) fill it with the correct quantity of refrigerant oil in the refrigerant circuit. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- Check the measured values of the Evaporator Vent Temperature Sensor - G263- and the activation of the A/C compressor. If the measured value of the Evaporator Vent Temperature Sensor - G263- or the activation of the A/C compressor is faulty, the evaporator can treeze up or the cooling output Sccept any liability not reached. Use the Vehicle Diagnostic Tester in the Guided AUDIAG. Fault Finding" function for the A/C system and the battery regulation. Refer to > Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System and > Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).

- With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.
- Likewise, the refrigerant circuit may become iced if there is a malfunction on the Evaporator Vent Temperature Sensor G263- or/and on the temperature sensor after hybrid battery evaporator. For this concern also pay attention to the measured value of the Evaporator Vent Temperature Sensor G263- and the temperature sensor after hybrid battery evaporator (on vehicles with battery cooling module). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System (vehicle-specific repair manual).

- Attend the required cooling output is not attained in the heater and A/C unit evaporator (and in the evaporator for with rbattery cooling)s of information in this document. Copyright by AUDI AG.
- The high pressure pipe corresponds to the specified value
- The low pressure is too low (lower than the target value)

Possible causes for the deviation from specified value and their solutions

- There is too little refrigerant in the refrigerant circuit.
- Extract refrigerant from the refrigerant circuit. Refer to ⇒ <u>"3.4 Refrigerant Circuit, Discharging", page 141</u>.
 If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz) less). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), and look for leaks and correct. Refer to ⇒ <u>"2.4 Leaks, Finding", page 63</u>.
 The extracted refrigerant quantity corresponds approximately to the specified capacity, check the activation
- The extracted refrigerant quantity corresponds approximately to the specified capacity, check the activation of the A/C compressor and the installed shut-off valve, if not malfunction is determined, replace the expansion valve for the evaporator in the heater and A/C unit. Refer to ⇒ Heater and A/C Unit; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Activation of function of the A/C compressor or if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2 is faulty.
- If no malfunction can be determined, check the activation and function of the A/C compressor and if
 equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2. Use the Vehicle Diagnostic Tester
 in the "Guided Fault Finding" function for the A/C system and the battery regulation.
- in the "Guided Fault Finding" function for the A/C system and the battery regulation. – Clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning",</u> <u>page 86</u>.
- The expansion valve in the heater and A/C unit or if equipped the evaporator for battery cooling is faulty.
- Replace the expansion valve for the evaporator in the heater and A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer).
- A/C compressor faulty
- Replace the A/C compressor. Refer to <u>⇒ "2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
- If there is dirt in the refrigerant circuit, clean the refrigerant circuit (flush with refrigerant R1234yf) and replace the expansion valve and desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to <u>⇒</u> <u>"2.5 Components, Replacing", page 71</u> and <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>.

Final Procedures

- Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.



- For the malfunction "high pressure normal, low pressure too low" With this malfunction, evaporator may ice up, although quantity of refrigerant in circuit is OK.
- If there is a malfunction an the refrigerant circuit, it was not activated and operates nevertheless, it is not necessary to clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86. For this error it is sufficient to replace the A/C compressor (pay attention to the refrigerant oil quantity in the A/C compressor). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
- If there is a fault in the A/C compressor (the A/C compressor is activated by the A/C compressor control module at too high of a speed), it is not necessary to clean the refrigerant circuit (flushing with refrigerant R1234yf). For this malfunction it is sufficient to replace the A/C compressor (pay attention to the refrigerant oil quantity in the A/C compressor). Refer to ≥ <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>, ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If the expansion valve (or one of the two expansion valves) is faulty (permanently closed or does not open sufficiently), the A/C compressor is also actuated to maximum output and the pressure on the low pressure side drops to specified value or below (compressor draws off refrigerant from the low-pressure side). Since the refrigerant cannot flow via the faulty expansion valve, the cooling output in the downstream evaporator is not attained and the high pressure may also not increase or only increase slightly due to the absence of energy. The A/C compressor may thereby be activated with a higher speed since the required cooling output is not attained in an evaporator. The same applies if the function or the activation of the refrigerant shut-off valve 1 or the refrigerant shut-off valve 2 is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding"function for the A/C system and the battery regulation. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ Check the measured values for the Evaporator Vent Temperature Sensor - G263- (and the measured values for the Temperature Sensor Before Hybrid Battery Evaporator - G756and the Temperature Sensor After Hybrid Battery Evaporator - G757-) as well as the activation of the A/C compressor by the A/C Compressor Control Module . If the measured value of the Evaporator Vent Temperature Sensor -G263- (the Temperature Sensor Before Hybrid Battery Evaporator - G756-, Temperature Sensor After Hybrid Battery Evaporator - G756-, or the activation of the A/C compressor is faulty, the evaporator can freeze up or the required cooling output is not read. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation and refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System (vehiclespecific repair manual).

The A/C compressor noise (particularly after switch-on)

 Possible Deviation from Specified Value During the Pressure Test The required cooling output is not attained in the heater and A/C unit evaporator and/or in the evaporator for battery cooling. High pressure normal or too high Low pressure too high (the specified value is not reached, Possible causes for the deviation from specified value and their solutions Activation of function of the A/C compressor or if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2 is faulty. Too much refrigerant or refrigerant oil in the refrigerant circuit Check the activation and function of the A/C compressor and if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation and if necessary service. If no malfunction can be determined, extract the refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. Extract refrigerant from the refrigerant circuit. Refer to = "3.4 Refrigerant Circuit, Discharging", page 141. If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity there is too much refrigerant in the refrigerant circuit. Fill the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 0. () Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant circuit, Cleaning , page 86. Expansion valve malfunctioning Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer catridge (or receiver/receiver/dryer). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Co
 for battery cooling. High pressure normal or too high Low pressure too high (the specified value is not reached, Possible causes for the deviation from specified value and their solutions Activation of function of the A/C compressor or if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2 is faulty. Too much refrigerant or refrigerant oil in the refrigerant circuit Check the activation and function of the A/C compressor and if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation and if necessary service. If no malfunction can be determined, extract the refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity there is too much refrigerant quantity meets the specified capacity is only slightly greater than the specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specific erapair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specific erapair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specific erapair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant circuit, Cleaning ", page 86. Expansion valve malfunctioning Repeate the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or reciver/receiver/dryer). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ He
 Low pressure too high (the specified value is not reached, Possible causes for the deviation from specified value and their solutions Activation of function of the A/C compressor or if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2 is faulty. Too much refrigerant or refrigerant oil in the refrigerant circuit Check the activation and function of the A/C compressor and if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation and if necessary service. If no malfunction can be determined, extract the refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity there is too much refrigerant in the refrigerant circuit. III the refrigerant circuit and repeat the test. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). If the extracted refrigerant guantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant Circuit, Cleaning", page 8. Expansion valve malfunctioning Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle
 Possible causes for the deviation from specified value and their solutions Activation of function of the A/C compressor or if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2 is faulty. Too much refrigerant or refrigerant oil in the refrigerant circuit Check the activation and function of the A/C compressor and if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation and if necessary service. If no malfunction can be determined, extract the refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. Extract refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity there is too much refrigerant in the refrigerant circuit. Fill the refrigerant circuit and repeat the test. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant circuit, Cleaning", page 86. Expansion valve malfunctioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). Clean the refrigerant circuit (flush with refrigerant R1234yf) and fill with the correct quantity of refrigerant and refrigerant oil and repeat the test. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86. Expansion valve malfunctioning Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilat
 Activation of function of the A/C compressor or if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2 is faulty. Too much refrigerant or refrigerant oil in the refrigerant circuit Check the activation and function of the A/C compressor and if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation and if necessary service. If no malfunction can be determined, extract the refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. Extract refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity there is too much refrigerant in the refrigerant circuit. Fill the refrigerant circuit and repeat the test. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant Circuit, Cleaning", page 8. Expansion valve malfunctioning Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87
 shut-off valve 2 is faulty. Too much refrigerant or refrigerant oil in the refrigerant circuit Check the activation and function of the A/C compressor and if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation and if necessary service. If no malfunction can be determined, extract the refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. Extract refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity there is too much refrigerant in the refrigerant circuit. Fill the refrigerant circuit and repeat the test. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual). Clean the refrigerant circuit (flush with refrigerant R1234yf) and fill with the correct quantity of refrigerant and refrigerant circuit (flush with refrigerant Circuit, Cleaning", page 86. Expansion valve malfunctioning Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit A/C compressor faulty Replace the A/C compressor. Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventila
 Check the activation and function of the A/C compressor and if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation and if necessary service. If no malfunction can be determined, extract the refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. Extract refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity there is too much refrigerant in the refrigerant circuit. Fill the refrigerant circuit and repeat the test. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). Clean the refrigerant circuit (flush with refrigerant R1234yf) and fill with the correct quantity of refrigerant and refrigerant oil and repeat the test. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86 . Expansion valve malfunctioning Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ "2.5 Components, Re
 the refrigerant shut-off valve 2. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation and if necessary service. If no malfunction can be determined, extract the refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. Extract refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity there is too much refrigerant in the refrigerant circuit. Fill the refrigerant circuit and repeat the test. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). Clean the refrigerant circuit (flush with refrigerant R1234yf) and fill with the correct quantity of refrigerant and refrigerant and refrigerant circuit, Cleaning", page 86. Expansion valve malfunctioning Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). <li< td=""></li<>
 Extract refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141. If the extracted refrigerant quantity is substantially greater (more than 100 g (3.5 oz)) than the specified capacity there is too much refrigerant in the refrigerant circuit. Fill the refrigerant circuit and repeat the test. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual). If the extracted refrigerant quantity meets the specified capacity is only slightly greater than the specified capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual). Clean the refrigerant circuit (flush with refrigerant R1234yf) and fill with the correct quantity of refrigerant and refrigerant oil and repeat the test. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86. Expansion valve malfunctioning Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). A/C compressor faulty Replace the A/C compressor. Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation
 capacity (maximum 100 g (3.5 oz)) too much refrigerant oil is in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). Clean the refrigerant circuit (flush with refrigerant R1234yf) and fill with the correct quantity of refrigerant and refrigerant oil and repeat the test. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86. Expansion valve malfunctioning Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual). A/C compressor faulty Replace the A/C compressor. Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation
 as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ <u>"2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). A/C compressor faulty Replace the A/C compressor. Refer to ⇒ <u>"2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation
 Replace the A/C compressor. Refer to <u>⇒ "2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual).
 If there is dirt in the refrigerant circuit, clean the refrigerant circuit (flush with refrigerant R1234yf) and replace the expansion valve and desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ <u>"2.5 Components, Replacing", page 71</u> and <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>.
Final Procedures
− Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
 Repeat the test. Refer to <u>⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201</u>.



- This fault may also be caused by too much refrigerant oil in the refrigerant circuit. Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil. Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual). If there is too much refrigerant oil in the refrigerant circuit, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- If the expansion valve for the heater and A/C unit evaporator yright. Copying for private or commercial purposes, in part or in whole, is not (or for the evaporator in the battery cooling) is faulty: (permas authorised by AUDI AG. AUDI AG does not guarantee or accept any liability nently closed or does not open sufficiently), the A/C compress the correctness of information in this document. Copyright by AUDI AG. sor is actuated to maximum output and the low pressure drops to the target value or below (compressor draws off refrigerant

from low-pressure side). Since the refrigerant cannot flow via the expansion valve, the cooling output is not attained and the high pressure may also not increase or only increase slightly due to the absence of energy. The same applies if the function or the activation of the refrigerant shut-off valve 1 or the refrigerant shut-off valve 2 is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Possible Deviation from Specified Value during the Pressure Test

- The required cooling output is not attained in the heater and A/C unit evaporator (and in the evaporator for battery cooling).
- High pressure and low pressure are normal (correspond to the specified value)

Possible causes for the deviation from specified value and their solutions

- Activation of function of the A/C compressor and if equipped the refrigerant shut-off valve 1 or the refrigerant shut-off valve 2 is faulty.
- Not enough refrigerant in the refrigerant circuit.
- Check the activation and function of the A/C compressor and if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation and if necessary service. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). If no malfunction can be determined, extract the refrigerant from the refrigerant circuit.
- Extract refrigerant from the refrigerant circuit. Refer to <u>⇒ "3.4 Refrigerant Circuit, Discharging", page 141</u>
- If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz) less). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), and look for leaks and correct. Refer to ⇒ "2.4 Leaks, Finding", page 63.
- If the extracted refrigerant quantity corresponds to the specified capacity or is only slightly smaller (maximum 100 g (3.5 oz)) the expansion valve for the evaporator or a shut-off valve installed in the heater and A/C unit is faulty. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- ◆ The expansion valve for the evaporator in the heater and A/C unit is faulty. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ A refrigerant shut-off valves (if equipped) is faulty (closed), check the function. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) for replacing.
- If equipped check the function of the installed shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Replace the expansion valve for the evaporator in the heater and A/C unit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Too much refrigerant oil in the refrigerant circuit tor in whole, is not
- Clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ <u>"2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.

Repeat the test. Refer to \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

i Note

- ◆ This fault may also be caused by too much refrigerant oil in the refrigerant circuit. Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil. Refer to ⇒ "2.5 Components, Replacing", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual). If there is too much refrigerant oil in the refrigerant circuit, clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- If the expansion valve for the heater and A/C unit evaporator (or for the evaporator in the battery cooling) is faulty (permanently closed or does not open sufficiently), the A/C compressor is actuated to maximum output and the low pressure drops to the target value or below (compressor draws off refrigerant from low-pressure side). Since the refrigerant cannot flow via the expansion valve, the cooling output is not attained and the high pressure may also not increase or only increase slightly due to the absence of energy. The same applies if the function or the activation of the refrigerant shut-off valve 1 or the refrigerant shut-off valve 2 is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

Possible Deviation from Specified Value during the Pressure Test

- The required cooling output is not attained in the heater and A/C unit evaporator (and in the evaporator for battery cooling).
- The high pressure pipe corresponds to the specified value
- The low pressure corresponds to the specified value or is too low

- The activation of the A/C compressor and if equipped the refrigerant shut-off valve 1 the refrigerant shut-off valve 2 is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation.
- Check the activation and function of the A/C compressor (and if equipped the refrigerant shut-off valve 1 and the refrigerant shut-off valve 2) and if necessary service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C compressor and the battery regulation. If this is OK extract refrigerant from the refrigerant circuit.
- There is too little refrigerant in the refrigerant circuit.
- Extract refrigerant from the refrigerant circuit. Refer to ⇒ <u>"3.4 Refrigerant Circuit, Discharging", page 141</u>.
 If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz)). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific
- repair manual), and look for leaks and correct. Refer to ⇒ "2.4 Leaks, Finding", page 63.
 If the extracted refrigerant quantity corresponds to the specified capacity or is only slightly smaller (less than 100 g (3.5 oz)). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual) and pot Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data Data . Check the refrigerant shut-off valve for function. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data . Check the refrigerant shut-off valve for function. Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ The expansion valve for the evaporator in the heater and A/C unit is faulty. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- A refrigerant shut-off valve is faulty (closed). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Po	ossible Deviation from Specified Value during the Pressure Test
_	If equipped check the function of the installed shut-off valve. Refer to ⇒ Heating, Ventilation and Air Con- ditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). Replace the expansion valve for the evaporator in the heater and A/C unit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). Too much refrigerant oil in the refrigerant circuit
_	Clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to \Rightarrow <u>"2.6 Refrigerant Circuit, Cleaning"</u> , page 86.
_	Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to \Rightarrow "2.5 Components, Replacing", page 71 and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit

(vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201



Pay attention to the notes to do so. Refer to \Rightarrow page 212 and \Rightarrow <u>page 219</u> .

Possible Deviation from Specified Value During the Pressure Test

- The required cooling output is not attained in the heater and A/C unit evaporator (and in the evaporator for battery cooling).
- ٠ The high pressure pipe corresponds to the specified value
- Low pressure quickly drops to specified value or lower. ٠

Possible causes for the deviation from specified value, and their solutions commercial purposes, in part or in whole, is not

A/C compressor activation or functionality material autorised by AUDI AG. AUDI AG does not guarantee or accept any liability

- ٠ Constriction or obstruction in refrigerant circuit
- Check the activation and function of the A/C compressor and service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation. If not error can be determined run hand over refrigerant circuit to check for differences in temperature. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If difference in temperature is found at one component: If the hose or pipe is kinked or constricted, replace this component. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). If there is a blockage clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>.
- There is too little refrigerant in the refrigerant circuit. ٠
- Extract refrigerant from the refrigerant circuit. Refer to \Rightarrow "3.4 Refrigerant Circuit, Discharging", page 141 If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), and look for leaks and correct. Refer to \Rightarrow "2.4 Leaks, Finding", page 63. If the extracted refrigerant quantity corresponds to the capacity or is only slightly smaller (maximum 100 g
- (3.5 oz)) check the expansion valve and shut-off valve for function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual) and ⇒ Heating, Ventilation
- and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). The expansion valve for the evaporator in the heater and A/C unit is faulty. Refer to \Rightarrow Heating, Ventilation ٠ and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- A refrigerant shut-off valve is faulty (closed). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" ٠ function for the A/C system and the battery regulation. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- If equipped check the function of the installed shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Replace the expansion valve for the evaporator in the heater and A/C unit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

i Note

Pay attention to the notes to do so. Refer to \Rightarrow page 212 and \Rightarrow page 219.

Possible Deviation from Specified Value During the Pressure Test

- The required cooling output is not attained in the heater and A/C unit evaporator (and in the evaporator for battery cooling).
- The required cooling output is only not attained at the heater and A/C unit evaporator (the cooling output on the evaporator for the cooling output is OK).
- The high pressure only falls slightly (via the pressure with the A/C compressor stopped) or corresponds to the specified value.
- Low pressure quickly drops to target value or lower.

- There is too little refrigerant in the refrigerant circuit.
- Extract refrigerant from the refrigerant circuit. Refer to ⇒ <u>"3.4 Refrigerant Circuit, Discharging", page 141</u>.
 If the extracted refrigerant quantity is substantially smaller (more than 100 g (3.5 oz)) than the specified capacity (vehicle-specific repair manual), there is too much refrigerant in the refrigerant circuit. Refer to ⇒ <u>"2.4 Leaks, Finding", page 63</u> and ⇒ Heating, Ventilation and Air Conditioning, Rep. Gr. 00; Technical Data.
- If the extracted refrigerant quantity corresponds to the capacity or is only slightly smaller (maximum (3.5 oz)). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual). Check the expansion valve and shut-off valve for function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ The expansion valve for the evaporator in the heater and A/C unit is faulty. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- A refrigerant shut-off valve is faulty (closed), check the function. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) for replacing.
- If equipped check the function of the installed shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Replace the expansion valve for the evaporator in the heater and A/C unit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
 Constriction or blockage in the refrigerant circuit (for example in the refrigerant line between the "low pres-
- ◆ Constriction or blockage in the refrigerant circuit (for example in the refrigerant line between the "low pressure side" service connection and the A/C compressor). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Activation of the A/C compressor is malfunctioning. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation.
- Check the activation and function of the A/C compressor and service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation. If not error can be

Possible Deviation from Specified Value During the Pressure Test
determined run hand over refrigerant circuit to check for differences in temperature. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
 If difference in temperature is found at one component: If the hose or pipe is kinked or constricted, replace this component and replace a faulty expansion valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). If there is a blockage clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
 If there is a blockage clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>. Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to <u>⇒ <u>"2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).</u>
Final Procedures
- Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

Note

Read the supporting information. Refer to \Rightarrow page 212.

Possible Deviation from Specified Value during the Pressure Test

- The required cooling output is not attained in the heater and A/C unit evaporator (and in the evaporator for battery cooling).
- The high pressure increases above specification
- Low pressure quickly drops to specified value or lower.

- A/C compressor activation or functionality malfunctioning.
- Constriction or obstruction in refrigerant circuit
- Expansion valve malfunctioning
- Check the activation and function of the A/C compressor and service. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation. If not error can be determined run hand over refrigerant circuit to check for differences in temperature. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If difference in temperature is found at one component: If the hose or pipe is kinked or constricted, replace this component and replace a faulty expansion valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) of private or commercial purposes, in part or in whole, is not approximate or commercial purposes.
- If there is a blockage clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>> 2.6 Refrigerant</u> <u>Circuit, Cleaning</u>, page 86. Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to <u>> "2.5 Components, Replacing</u>", page 71 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- There is too little refrigerant in the refrigerant circuit.
- Extract refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141.
- If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz)) and look for leaks and correct. Refer to ⇒ "2.4 Leaks, Finding", page 63/2. and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- If the extracted refrigerant quantity corresponds to the capacity or is only slightly smaller (maximum 100 g (3.5 oz)) and check the refrigerant shut-off valve for function. Refer to ⇒ Heating, Ventilation and Air Con-

ditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

Note

- If the A/C system function when repeating the test is not OK, replace the expansion valve and desiccant bag/dryer cartridge (or receiver/receiver/dryer) and if equipped refrigerant shut-off valve. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.
- If the expansion valve in the heater and A/C unit evaporator or the refrigerant shut-off valve 1 is malfunctioning (permanently closed or does not open sufficiently), the A/C compressor is actuated to maximum output and the low pressure drops to specification or below (compressor draws off refrigerant from low-pressure side). As the refrigerant cannot flow via the expansion valve (the refrigerant shut-off valve), if the cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If the expansion valve on the evaporator for the battery cooling is faulty (or if the functionality or activation of the refrigerant shut-off valve 2 is malfunctioning), constantly closed or does not open enough, then the A/C compressor is likewise activated with the maximum output (the required temperatures in the battery cooling module are not attained). The pressure on the low pressure side only falls to the specified value or lower when there is no cooling output requested at the same time in the heater and A/C unit (the refrigerant shut-off valve 1 is activated and is closed). The A/C compressor extracts the refrigerant from the low pressure side from both evaporators). Since, however, no refrigerant can flow over the expansion valve in the A/C unit (the refrigerant shut-off valve 1) and the cooling output for the battery cooling is not attained (there is a malfunction in the area of the battery cooling), the electrical orised by AUDI AG. AUDI AG does not guarantee or accept any liability A/C compressor will be activated with a higher speed Since correctness of information in this document. Copyright by AUDI AG. however, no refrigerant can flow through, the pressure on the low pressure side falls below the specified value. In addition, the high pressure may never or only slightly increase, due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and the battery regulation. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Since the evaporator output for the battery cooling is noticeably smaller than the evaporator output in the A/C unit, the required specified temperature may still be reached for the battery cooling with too little refrigerant in the circuit, but the specified temperature in the heater and A/C unit evaporator will no longer be attainable (even though the A/C compressor is activated with an increased speed).

- If there is too much refrigerant oil in the circuit, the A/C compressor must be emptied and the desiccant bag (the dryer cartridge) or the receiver/receiver/dryer must be replaced. After cleaning (flushing with refrigerant R1234yf) and fill the refrigerant circuit with the correct quantity of refrigerant oil. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86, ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data; Approved Refrigerant Oil and Capacities for Refrigerant Oil (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Refer to <u>⇒ page 212</u> for further information.

- The required cooling output is only not attained at the evaporator for the battery cooling module components (the cooling output at the heater and A/C unit evaporator is OK).
- The high pressure corresponds to the specified value or increases only slightly (above pressure with engine stopped).
- Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not Low pressure drops to specified value or dower authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with respect to the correctness of information in this document. Copyright by AUDI AG.

Possible causes for the deviation from specified value and their solutions

- Check the activation and function of the refrigerant shut-off valve 2, an adjustment motor, the blower or a temperature sensor in or on a battery cooling module is faulty service if necessary. use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation. Refer to → Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If the expansion valve for the expansion valve in the battery cooling module is faulty.
- Replace the expansion valve for the evaporator for battery cooling. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If no malfunction can be determined, check the function and activation of the components for battery cooling. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system and check the battery regulation and refrigerant lines.
- Constriction or blockage in the refrigerant line either to or from the expansion valve on the evaporator for battery cooling.
- If there is a blockage clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>. Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to <u>⇒ "2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If the hose or pipe is kinked or constricted, replace this component. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Not enough refrigerant in refrigerant circuit
- ◆ Extract refrigerant from the refrigerant circuit. Refer to <u>⇒ "3.4 Refrigerant Circuit, Discharging", page 141</u>.
- ♦ If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz)). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), and look for leaks and correct. Refer to ⇒ "2.4 Leaks, Finding", page 63.
- If the extracted refrigerant quantity corresponds to the capacity or is only slightly smaller (maximum 100 g (3.5 oz)). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), refrigerant shut-off valve 1. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function for the A/C system function and the battery regulation. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

⁻ Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.

Possible Deviation from Specified Value during the Pressure Test Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201

i Note

- For cooling the Electric Vehicle Battery A2- (hybrid battery) the refrigerant shut-off valve 1 is currently activated from a specific battery temperature for example from the battery regulation control module. If the A/C system driver is not already activated at this time, the Electrical A/C Compressor V470-is activated via the A/C Compressor Control Module J842-for example by the battery regulation control module. The temperature of the air (or the coolant) before and after the evap-al purposes, in part or in whole, is not orator for battery cooling module is calculated by the UDI AG does not guarantee or accept any liability respective control module. If at the same time it is determined that the cooling is not sufficient this is stored for example in the battery regulation control module. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C system and the battery regulation.
- The temperature of the air (or the coolant) and the evaporator cooling output in the battery cooling module is determined via the installed temperature sensor (it currently cannot be measured using a thermometer while operating) and may only for this reason be checked using the Guided Fault Finding. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C System and the battery regulation.
- ◆ Refer to <u>⇒ page 212</u> for further information.

Possible Deviation from Specified Value during the Pressure Test

- The required cooling output is not attained in the heater and A/C unit evaporator (and in the evaporator for battery cooling).
- The high pressure does not increase or only increases slightly above pressure with engine stopped.
- The low pressure does not drop or drops only slightly.

- No activation of the A/C compressor. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- If equipped, the refrigerant shut-off valve 1 is faulty (closed)
- Check the activation and function of the A/C compressor (and the refrigerant shut-off valve 1, the refrigerant shut-off valve 2). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function of the A/C compressor and the battery regulation. If no malfunction can be determined replace the expansion valve on the evaporator in the heater and A/C unit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Constriction or obstruction in refrigerant circuit (for example, inside the refrigerant line between the service connection "low pressure side" and the A/C compressor).
- If there is a blockage clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>. Replace the expansion valve for the evaporator in the A/C unit (and for the evaporator for battery cooling) as well as the desiccant bag/dryer cartridge (or receiver/receiver/dryer). Refer to ⇒ <u>"2.5 Components, Replacing", page 71</u> and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If the hose or pipe is kinked or constricted, replace this component. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- A/C compressor faulty.

Replace the A/C compressor. Refer to \Rightarrow "2.5 Components, Replacing", page 71 and \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; A/C Compressor (vehicle-specific repair manual)

Final Procedures

- Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to = "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201 .

Refrigerant Circuit Pressures Specified Values, Vehicles with Heat Pump



Note

On vehicles with a high-voltage system and heat pump installed in the refrigerant circuit and electrically activated vehicles which regulate the flow of the refrigerant in the refrigerant circuit depending on the current operating condition. There are different versions of these values. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Control of Control of State of

tic Tester in the "Guided Fault Finding" function.

- On vehicles with the "heat pump" function and/or "high-voltage battery cooling" in not all operating conditions is the A/C system high pressure on the service connection of the high pressure side. Depending on the A/C system operating condition, the refrigerant circuit pressure on the high pressure side can only be measured via the pressure/temperature sensor installed in the refrigerant circuit on these vehicles. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- On these vehicles the refrigerant circuit of the A/C system is used not only to cool the vehicle interior but also to cool the hybrid battery unit (via the refrigerant circuit for the high-voltage system) and to heat the vehicle interior (at low ambient temperature) via the heat pump function. So in order for these functions to be performed, the various valves, pressure and temperature sensors as well as the pumps in the refrigerant circuit and in the high-voltage system coolant circuit must be installed correctly and function correctly. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Engine Mechanical; Rep. Gr. 19; Cooling System/Coolant; Coolant .
- To determine the possible cause of a malfunction, different routines are stored in the basic setting of the thermal management control module, which activate these functions: "Cooling the A/C system", "heat pump", and "Cooling the com-ponents of the high-voltage system". Use the Vehicle Diag-nostic Tester in the "Guided Fault Finding" function.

High-Pressure Side:

Rep. Gr.87 - Air Conditioning

Increasing from initial pressure (when connecting the pressure gauges) to a maximum of 20 bar (290 psi).



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(vehicle-specific repair manual) and use the Vehicle Diagnost to the correctness of information in this document. Copyright by AUDI AG.

Depending on the layout of the high pressure side service connection and the operating condition, the high pressure can only be measured via the pressure/temperature sensor installed in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Low-Pressure Side:

Decreasing from initial pressure (when connecting the pressure gauges) to a value between 1.5 and 2.3 bar (21.76 to 33.36 psi) absolute pressure (depending on the required cooling output).

A/C Compressor Speed:

Depending on the required cooling output between 800 and 8500/ min (currently a maximum of 5000/min for parked vehicles).



- ◆ The temperature of the air downstream of the evaporator, the current A/C compressor speed and the pressure of the refrigerant on the high pressure side are displayed as the measured value by various control modules (for example, by the thermal management control module, the front A/C display control head or the Climatronic Control Module J255-), depending on the vehicle. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- If a high cooling output is required (for example, a high outside temperature and the blower speed set on high), then the A/Cy compressor will not bring the pressure on the low pressure side to the required value (for example, for a certain time after turning on the A/C). The A/C compressor is not actuated at the maximum specified speed (of approximately 8500/min) on a stationary or slow moving vehicle (up to a speed of approxi-mately 45 km/h (28 mph)) (the A/C compressor speed is limited to approximately 5000/min). After a vehicle reaches a speed of more than approximately 45 km/h (28 mph), the limit for the maximum permissible A/C compressor speed is lifted. At a A/C compressor speed of 5000/min, a high outside temperature and a high fresh air blower speed (inefficient environmental controls), the A/C compressor output (the delivery volume) is no longer sufficient to reduce the pressure on the low pressure side to the target value. To check the A/C compressor control under these conditions, for example, the fresh air blower is activated only with approximately 40% of the maximum voltage, check the pressures at a lower fresh air blower speed. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function (for A/C system and the battery regulation). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- Under unfavorable conditions (very high ambient temperatures, high humidity), pressure on high-pressure side may increase to max. 29 bar (421 psi).
- The specified speed of the A/C compressor is displayed and the measured value for example from the thermal management control module using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- The refrigerant circuit pressure (low or high pressure) measured by the different pressure/temperature sensors depending on the respective operating condition is displayed as the measured value by the respective control module. Use the

Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- The low pressure settles depending on the A/C compressor speed and the control characteristic of the expansion valve (on the evaporator of the front heater and A/C unit) within the compressor output range in tolerance range (1.5 to 2.3 bar (21.76 to 33.36 psi) positive pressure).
- The target speed for the A/C compressor must be greater than 1500/min for this test.
- In setting "maximum cooling output" the target speed is regulated to approximately 4000 up to 5000/min. This value is vehicle-specific and is displayed and the measured value of the respective control module using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- At absolute pressure, 0 bar (0 psi) corresponds to absolute vacuum. Normal ambient pressure corresponds to 1 bar (14.5 psi) absolute pressure. 0 bar (0 psi) pressure corresponds to an absolute pressure of 1 bar (14.5 psi) on most pressure gauges (indicated by -1 bar (-14.5 psi) below 0).
- If on a vehicle with two evaporators (one in the heater and A/ C unit and one for cooling the heater and A/C unit for example the heat exchanger for the high-voltage battery) and two condensers (one in the front end for the A/C system and one as the heat exchanger for the heat pump function) depending on the selected function on a component the measured temperature or pressure, the specified value corresponds to another component whose specifications are not achieved, check the activation of the electrically activated valves installed in the refrigerant circuit. At the same time, also pay attention to the pressure distribution in the refrigerant circuit depending on the installed check valves. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).
- ◆ For the correct A/C function it is also necessary that dependingor commercial purposes, in part or in whole, is not on the selected functions of the respective heater cores of AC AUDI AG does not guarantee or accept any liability enough heat is supplied or removed. Therefore also pay at-tention to the incorporation of the heater core into the respective coolant circuit for the engine and high-voltage system and the function of the pumps and valves installed in it. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning;
- Since the evaporator for cooling the high-voltage components output (in the battery cooling module and in the high-voltage battery heat exchanger) is smaller than the evaporator output in the heater and A/C unit, the required target temperature may still be reached in the evaporator for cooling the high-voltage battery with too little refrigerant in the refrigerant circuit, but the target temperature in the heater and A/C unit evaporator will no longer be attainable (even though the A/C compressor is activated with increased A/C unit speed).

Rep. Gr. 87; Coolant Circuit (vehicle-specific repair manual).

Possible Deviation from Specified Value, the Cause and Its Elimination		
		Refer to <u>⇒ page</u> 230
	 Low pressure quickly drops to target value or lower. 	

P	ssible Deviation from Specified Value,	
the	e Cause and Its Elimination	
•	The required cooling output is not at- tained in the heater and A/C unit evapo- rator and in the evaporator for cooling the high-voltage components.	
•	High pressure normal	Refer to <u>⇒ page</u> 233
•	Low pressure corresponds with the tar- get value,	200
•	The requested cooling output is not at- tained.	
•	High pressure normal	Refer to <u>⇒ page</u>
•	Low pressure normal or too low (less than the specified value)	<u>233</u>
•	The required cooling output is only not attained at the heater and A/C unit evaporator (the cooling output on the evaporator for cooling the high-voltage components is OK).	
•	High pressure normal	Refer to <u>⇒ page</u>
•	Low pressure normal or too low (less than the specified value)	<u>234</u>
•	The required cooling output is only not attained at the evaporator for cooling the high-voltage components (the cooling output at the front heater and A/C unit evaporator is OK).	
•	High pressure does not increase or only increases slightly above pressure with engine stopped.	Refer to <u>⇒ page</u> <u>235</u>
•	Low pressure does not drop or drops only slightly.	
•	The required cooling output is not at- tained in the heater and A/C unit evapo- rator (and in the evaporator for cooling the high-voltage components).	
•	High pressure increases above specification	Refer to <u>⇒ page</u> 236
•	The low pressure quickly falls to the target value,	
•	The required cooling output is not at- tained in the front heater and A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components).	
• rotec	High pressure and low pressure normal at first, after some time high pressure in- creases above the specified value and the low pressure falls to the specified the low pressure falls to the specified by AUDI AG does not guarant	in part or in whole, is not
•wit	The required cooling output is not or no longer attained in the heater and A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components).	

Pr	ssible Deviation from Specified Value,]
the	e Cause and Its Elimination		
•	High pressure and lower pressure nor- mal first, after a long period of driving, the low pressure falls below the specified value (the evaporator in the heater and A/C unit iced up).	Refer to <u>⇒ page</u> 238	
•	High pressure normal	Refer to <u>⇒ page</u>	
•	Low pressure too low,	240	
•	The required cooling output is not at- tained in the heater and A/C unit evapo- rator (and/or in the evaporator for cooling the high-voltage components).		
•	High pressure normal or too high	Refer to <u>⇒ page</u>	
•	Low pressure too high.	241	
•	A/C compressor noise (particularly after switch-on)		
•	The required cooling output is not at- tained in the front heater and A/C unit evaporator and/or in the evaporator for cooling the high-voltage components.		
•	High and low pressure normal	Refer to <u>⇒ page</u>	
•	The required cooling output is not at- tained in the heater and A/C unit evapo- rator (and in the evaporator for cooling the high-voltage components).	<u>242</u>	
or •	High and low pressure normal		
	A/C compressor noise (particularly after		
	switch-on)		
•	The required cooling output is not at- tained in the heater and A/C unit evapo- rator (and/or in the evaporator for cooling the high-voltage components).		
•	High and low pressure normal	Refer to <u>⇒ page</u>	1
•	The required cooling output is attained in the front heater and A/C unit evaporator (and on the evaporator for cooling the high-voltage components). Copying for private	or commercial purposes, in p	art or in whole, is not
•	The required cooling output is not at norm tained on the heater core for the heat pump output.	AUDI AG does not guarantee ation in this document. Copy	or accept any liabilit ight by AUDI AG.

• High pressure remains constant or increases only slightly (above pressure with engine stopped),

- Low pressure quickly drops to target value or lower.
- The required cooling output is not attained in the heater and A/C unit evaporator and in the evaporator for cooling the high-voltage components.

- ♦ One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System.
- Not enough refrigerant in refrigerant circuit
- Activation of the A/C compressor or a valve installed in the refrigerant circuit is faulty.
- Check the measured values of the different pressure/temperature sensor and temperature sensor when operating the A/C system, and replace the components with incorrect measured values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System. If no errors can be detected, evacuate the refrigerant.
- Extract refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141.
- If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz) less). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Technical Data (vehicle-specific repair manual), and look for leaks and correct. Refer to ⇒ A244 Leaks, Finding page 63.
- The extracted refrigerant quantity corresponds approximately to the specified capacity, check the activation
 of the A/C compressor and the installed shut-off valve, if not malfunction is determined, replace the expansion valve for the evaporator in the heater and A/C unit. Refer to ⇒ Heater and A/C Unit; Rep. Gr. 87;
 Refrigerant Circuit (vehicle-specific repair manual).
- Depending on the results, service the activation or replace the faulty component (A/C compressor, shutoff valve, expansion valve). Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

i Note

To determine the possible cause of a malfunction, different routines are stored in the basic setting of the control module (for example in the thermal management control module) which activate these functions: "cooling the A/C system", "heat pump", and "cooling the components of the high-voltage system". Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Refrigerant Circuit (vehicle-specific repair manual).

- If for this concern no malfunction can be determined, check the activation of the electrically activated valves installed in the refrigerant circuit next. If no error can be detected here, remove and check the check valves installed in the refrigerant circuit, if no error can be detected here clean the refrigerant circuit (flush with refrigerant R1234yf). One of these malfunctions may arise due to a constriction or a blockage in the refrigerant circuit. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page</u> <u>86</u>.
- On vehicles with the "heat pump" function and/or "high-voltage battery cooling" in not all operating conditions is the A/C system high pressure on the service connection of the high pressure side. Depending on the A/C system operating condition, the refrigerant circuit pressure on the high pressure side can only be measured via the pressure/temperature sensor installed in the refrigerant circuit on these vehicles. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Re-

frigerant Circuit (vehicle-specific repair manual) and use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.

- ◆ Before beginning the repair work check the measured values of the different pressure/temperature sensors installed in the refrigerant circuit. If there is an error in the measured value of a pressure/temperature sensor, this can lead to problems in the cooling output, or the evaporator in the front heater and A/ C unit can ice over. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual), and ⇒ Wiring diagrams, Troubleshooting & Component locations.
- ♦ When checking the different functions (heat pump or cooling ercial purposes, in part or in whole, is not the high-voltage battery), also pay attention to the activation does not guarantee or accept any liability and function of the coolant circuit components that are in- in this document. Copyright by AUDI AG. volved with these functions. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Coolant Circuit (vehiclespecific repair manual).
- If the A/C system function is not OK after repeating the test, for example after replacing expansion valve (reinstalling the old expansion valve), clean the refrigerant circuit by flushing using the refrigerant R134a. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86. Then replace the A/C compressor and receiver/dryer or dryer cartridge.
- With a malfunction on one of the temperature sensors, the evaporator may ice up even though the quantity of refrigerant in the circuit is OK.
- If the expansion valve on the evaporator in the A/C unit is faulty (constantly closed or does not open far enough), the A/C compressor is activated to maximum output and the low pressure drops to the value in the graph or below (A/C compressor draws off the refrigerant from the low pressure side). Since the refrigerant cannot flow via the expansion valve, the cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- The evaporator in the heater and A/C unit has a larger output than the evaporator for cooling the high-voltage battery. Depending on the version to cool the electric vehicle battery/ hybrid battery unit (hybrid battery), the expansion valve in front of this evaporator (the heat exchanger for cooling the highvoltage system components) is currently activated only from or up to a certain battery temperature by the respective control module, so that the exchange of energy via this evaporator does not increase, or only slightly. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to => Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- If there is too much refrigerant oil in the circuit, the compressor must be drained (flushed) and the receiver/dryer/dryer cartridge must be replaced. After cleaning the refrigerant circuit (flushing with refrigerant R134a) and fill it with the correct quantity of refrigerant oil in the circuit (in the A/C compressor). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).

- High pressure normal
- Low pressure corresponds with the target value,
- The requested cooling output is not attained.

Possible causes for the deviation from specified value and their solutions

- ♦ One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System.
- Not enough refrigerant in refrigerant circuit pyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability
- The shut-off valve in front of the expansion valve for the evaporator in the front heater and A/C unit is faulty.
- If one of the other valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- The expansion valve for the evaporator in the front heater and A/C unit is faulty.
- Check the measured values of the different pressure/temperature sensor and temperature sensor when operating the A/C system, and replace the components with incorrect measured values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System. If no errors can be detected, evacuate the refrigerant.
- Extract refrigerant from the refrigerant circuit. Refer to \Rightarrow "3.4 Refrigerant Circuit, Discharging", page 141
- If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz) less). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), and look for leaks and correct. Refer to ⇒ <u>"2.4 Leaks, Finding", page 63</u>.
- The extracted refrigerant quantity corresponds approximately to the specified capacity, check the activation of the A/C compressor and the installed shut-off valve if no malfunction is determined. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual)
- Charge the refrigerant circuit. Refer to ⇒ "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.
- Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Depending on the results, service the activation or replace the faulty component (shut-off valve/expansion valve). Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.



Read the supporting information. Refer to \Rightarrow page 231.

- High pressure normal
- Low pressure normal or too low (less than the specified value)
- The required cooling output is only not attained at the heater and A/C unit evaporator (the cooling output on the evaporator for cooling the high-voltage components is OK).

Possible causes for the deviation from specified value and their solutions

- ♦ One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System.
- Not enough refrigerant in refrigerant circuit
- Activation of the A/C compressor is faulty.
- The expansion valve for the evaporator in the front heater and A/O unit is faulty of
- The shut-off valve in front of the expansion valve for the evaporator in the front heater and A/C unit is faulty.
- One or the other valves installed in the refrigerant circuit is faulty or does not work correctly.
- Check the measured values of the different pressure/temperature sensor and temperature sensor when operating the A/C system, and replace the components with incorrect measured values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System. If no errors can be detected, evacuate the refrigerant.
- Extract refrigerant from the refrigerant circuit. Refer to ⇒ "3.4 Refrigerant Circuit, Discharging", page 141.
- If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz) less). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), and look for leaks and correct. Refer to ⇒ <u>"2.4 Leaks, Finding", page 63</u>.
- The extracted refrigerant quantity corresponds approximately to the specified capacity, check the activation of the A/C compressor and the installed shut-off valve if no malfunction is determined. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual)
- Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.
- Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Depending on the results, service the activation or replace the faulty component (shut-off valve/expansion valve). Refer to the ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

Final Procedures

- Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.



Read the supporting information. Refer to \rightarrow page 231.

- High pressure normal
- Low pressure normal or too low (less than the specified value)
- The required cooling output is only not attained at the evaporator for cooling the high-voltage components (the cooling output at the front heater and A/C unit evaporator is OK).

Possible causes for the deviation from specified value and their solutions

- If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- One of the pumps or one of the valves in the high-voltage system coolant circuit is faulty or does not function correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Coolant Circuit (vehiclespecific repair manual).
- ♦ One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System.
- Constriction of blockage in the refrigerant line to or from the expansion valve on the evaporator for cooling the high-voltage components.
- Check the measured values of the different pressure/temperature sensor and temperature sensor when operating the A/C system, and replace the components with incorrect measured values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System.
- Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning, Rep. Gr. 87, Refrigerant Circuit (vehicle-specific repair manual).
- Check the function and activation of the components for cooling the high-voltage components. Use Vehicle
 Diagnostic Tester in the "Guided Fault Finding" for the air conditioner, the A/C Compressor and the Battery
 Regulation.
- Depending on the result, service the activation or a faulty component (shut-off valve, expansion valve, coolant pump, coolant shut-off valve). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual) and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Check the refrigerant circuit lines, if they are kinked or constricted replace the hose or pipe of this component.
- If no malfunction can be determined clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>.

Final Procedures

- Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

i) Note

Read the supporting information. Refer to \Rightarrow page 231.

Possible Deviation from Specified Value during the Pressure Test

- High pressure does not increase or only increases slightly above pressure with engine stopped.
- Low pressure does not drop or drops only slightly.

Po	ossible Deviation from Specified Value during the Pressure Test
•	The required cooling output is not attained in the heater and A/C unit evaporator (and in the evaporator fo cooling the high-voltage components).
Po	ossible causes for the deviation from specified value and their solutions
٠	No activation of the A/C compressor, the A/C compressor is not driven.
•	If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to \Rightarrow Heating Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
•	Constriction or obstruction in refrigerant circuit (for example, inside the refrigerant line between the service connection "low pressure side" and the A/C compressor).
-	Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Teste in the "Guided Fault Finding" function.
-	Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
-	Depending on the results, service the activation or replace the faulty component (A/C compressor, shut- off valve, expansion valve). Refer to the \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Re- frigerant Circuit (vehicle-specific repair manual).
-	Check the refrigerant circuit lines. If the hose or pipe is kinked or constricted, remove this component. Refe to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
-	Run hand over refrigerant circuit to check for differences in temperature (position with a blockage). If there is a blockage clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to \Rightarrow "2.6 Refrigerant Circuit Cleaning", page 86.
-	If a malfunction is determined on the A/C compressor, replace the A/C compressor. Refer to \Rightarrow "2.5 Components, Replacing", page 71.
-	If no malfunction can be determined clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to \Rightarrow "2:6" Refrigerant Circuit, Cleaning " Capage 86 arantee or accept any liability
Fi	nal Procedures
_	Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
-	Repeat the test. Refer to \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

Note

Read the supporting information. Refer to \Rightarrow page 231.

Possible Deviation from Specified Value during the Pressure Test

- · High pressure increases above specification
- The low pressure quickly falls to the target value,
- The required cooling output is not attained in the front heater and A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components).

- A/C compressor activation or functionality malfunctioning.
- If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- Constriction or obstruction in refrigerant circuit
- Expansion valve malfunctioning
- Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Check the refrigerant circuit lines. If the hose or pipe is kinked or constricted, remove this component. Refer to ⇒ Heating, Ventilation and Air Conditioning, Rep. Gr. 87, Refrigerant Circuit (vehicle-specific repair manual).
- Run hand over refrigerant circuit to check for differences in temperature (position with a blockage). If there
 is a blockage clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to <u>⇒ "2.6 Refrigerant Circuit,</u>
 <u>Cleaning", page 86</u>.

Final Procedures

- Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

i Note

- With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.
- If the expansion valve in the heater and A/C unit evaporator or the installed shut-off valve is malfunctioning (permanently closed or does not open sufficiently), the A/C compressor is actuated to maximum output and the low pressure drops to specification or below (compressor draws off refrigerant from low-pressure side). Since no (or little) the refrigerant can flow via the expansion valve, the cooling output is not attained, high pressure may also not increase or only increase slightly due to the absence of energy. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00 ; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- If the expansion valve for the evaporator for cooling the highvoltage components is faulty (or the function and activation is faulty) is always closed or does not open wide enough the A/ C compressor is also activated with the maximum output (the required temperatures in the heat exchanger are not reached). The pressure on the low pressure side only then falls to the specified value or lower when at the same time the front heater and A/C unit no cooling output is needed. The A/C compressor extracts the refrigerant from the low pressure side from both evaporators. Because no refrigerant can low over the expansion valve in the front heater and A/C unit and the cooling output in the evaporator for cooling the high voltage battery is not reached (there is a malfunction in the area of the evaporator for the cooling of the high voltage battery) the electric A/ C compressor is activated with a higher speed. If not refrigerant can flow the pressure on the low pressure side falls under the specified value, high pressure may also not increase or only increase slightly due to the absence of energy. The same applies if a valve in the refrigerant circuit is not OK a malfunction in the incorporation of the evaporator for cooling the highvoltage battery in the high-voltage system refrigerant circuit or the pump or a valve installed there is not OK. Then the High-

Voltage Battery Heat Exchanger is cooled, but the cooled coolant reached the high-voltage battery heat exchanger which should not be cooled. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Coolant Circuit (vehicle-specific repair manual).

◆ Refer to <u>⇒ page 231</u> for additional information.

Possible Deviation from Specified Value during the Pressure Test

- High pressure and low pressure normal at first, after some time high pressure increases above the specified value and the low pressure falls to the specified value or lower.
- The required cooling output is not or no longer attained in the heater and A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components).

Possible causes for the deviation from specified value and their solutions

- One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System.
- Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Moisture in refrigerant circuit
- Check the measured values of the different pressure/temperature sensor and temperature sensor when operating the A/C system, and replace the components with incorrect measured values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview MA/CoSystem mercial purposes, in part or in whole, is not permitted unless authorised by AUDIAG. AUDIAG does not quarantee or accent any liability
- Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- If no malfunction can be determined clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to
 <u>⇒ "2.6 Refrigerant Circuit, Cleaning", page 86</u>.

Final Procedures

- Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.

Repeat the test. Refer to \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.



Read the supporting information. Refer to \Rightarrow page 231.

Possible Deviation from Specified Value during the Pressure Test

High pressure and lower pressure normal first, after a long period of driving, the low pressure falls below the specified value (the evaporator in the heater and A/C unit iced up).

Possible Deviation from Specified Value during the Pressure Test Possible causes for the deviation from specified value and their solutions One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System . Moisture in refrigerant circuit Check the measured values of the different pressure/temperature sensor and temperature sensor when operating the A/C system, and replace the components with incorrect measured values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Condi-tioning; Rep. Gr. 87 ; Component Location Overview - A/C System . Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). If no malfunction can be determined, replace the desiccant bag/dryer cartridge (or reservoir/receiver/dryer) and evacuate the refrigerant circuit for at least three hours. Final Procedures Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.

Repeat the test. Refer to a 314.5 Electrically Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201

Note

- ◆ First, it is not necessary to clean the refrigerant circuit (flushing with refrigerant R1234yf) in case of this complaint because generally only a small amount of moisture is in the system and this can be removed by a long evacuation. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.
- If a problem involving moisture in refrigerant circuit only occurs after a lengthy operating period or only infrequently (low pressure drops below specification and evaporator ices up), it is sufficient to replace the dryer installed in receiver/dryer (adjust quantity of refrigerant oil). Refrigerant circuit is then to be evacuated for at least three hours.
- With this malfunction, evaporator may ice up although the quantity of refrigerant in circuit is OK.
- ♦ A malfunction on the Evaporator Vent Temperature Sensor -G263- or/and on the pressure/temperature sensor the can lead to the refrigerant circuit freezing-up. For this concern also pay attention to the measured values of the different pressure/ temperature sensor in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- Refer to \Rightarrow page 231 for additional information.

Po	ossible Deviation from Specified Value During the Pressure Test
•	High pressure normal
•	Low pressure too low,
•	The required cooling output is not attained in the heater and A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components).
P	ossible causes for the deviation from specified value and their solutions
•	Not enough refrigerant in refrigerant circuit
•	If the activation or function of the A/C compressor faulty use the Vehicle Diagnostic Tester in "Guided Fault Finding" function.
•	If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
•	One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87 ; Component Location Overview - A/C System .
-	Check the measured values of the different pressure/temperature sensor and temperature sensor when operating the A/C system, and replace the components with incorrect measured values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System. If no errors can be detected, evacuate the refrigerant.
-	Extract refrigerant from the refrigerant circuit. Refer to \Rightarrow "3.4 Refrigerant Circuit, Discharging", page 141.
-	If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz) less). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), and look for leaks and correct Refer to $\frac{324942}{224942}$. Sector and the specific repair manual), and look for leaks and correct Refer to $\frac{324942}{224942}$.
-	with respect to the correctness of information in this document. Copyright by AUDLAG. The extracted refrigerant quantity corresponds approximately to the specified capacity, check the activation of the A/C compressor and the installed shut-off valve if no malfunction is determined. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual)
-	Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
-	Repeat the test. Refer to \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.
-	Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
-	Check the function and activation of the various valves installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
-	Depending on the results, service the activation or replace the faulty component (A/C compressor, shut- off valve, expansion valve, pressure/temperature sensor). Refer to the \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
-	If no malfunction can be determined clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86
Fi	nal Procedures
-	Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149 .
_	Repeat the test. Refer to \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.
[Note

- For the malfunction "high pressure normal, low pressure too low", note the following: With this fault, it may be that the evaporator in the heater and A/C unit is icing up although the refrigerant quantity in the circuit is OK.
- If there is a fault in the A/C compressor (the A/C compressor is activated by the A/C compressor control module at too high of a speed), it is not necessary to clean the refrigerant circuit by flushing with refrigerant R1234yf. In this case, it is sufficient to replace the A/C compressor (observe quantity of refrigerant oil in A/C compressor and if necessary adjust). Refer to <u>⇒</u> <u>"2.6 Refrigerant Circuit, Cleaning", page 86</u>.
- If the expansion valve for the evaporator for cooling the highvoltage components is faulty (or the function and activation is faulty) is always closed or does not open wide enough the A/ C compressor is also activated with the maximum output (the required temperatures in the heat exchanger are not reached). The pressure on the low pressure side only then falls to the specified value or lower when at the same time the front heater and A/C unit no cooling output is needed. The A/C compressor extracts the refrigerant from the low pressure side from both evaporators. Because no refrigerant can low over the expansion valve in the front heater and A/C unit and the cooling output in the evaporator for cooling the high voltage battery is not reached (there is a malfunction in the area of the evaporator for the cooling of the high voltage battery) the electric A/ C compressor is activated with a higher speed. If not refrigerant can flow the pressure on the low pressure side falls under the specified value, high pressure may also not increase or only increase slightly due to the absence of energy. The same applies if a valve in the refrigerant circuit is not OK a malfunction in the incorporation of the evaporator for cooling the highvoltage battery in the high-voltage system refrigerant circuit or the pump or a valve installed there is not OK. Then the High-Voltage Battery Heat Exchanger is cooled, but the cooled coolant reached the high-voltage battery heat exchanger which should not be cooled. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Coolant Circuit (vehicle-specific repair manual).
- A malfunction on the Evaporator Vent Temperature Sensor -G263- or/and on the pressure/temperature sensor the can lead to this concern. Also pay attention to the measured values of the different pressure/temperature sensor in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Repair Instructions; Checking Cooling Output (vehicle-specific repair manual).
- Refer to \Rightarrow page 231 for additional information.

- High pressure normal or too high
- Low pressure too high.

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- A/C compressor noise (particularly after switchpon) the correctness of information in this document. Copyright by AUDI AG.
- The required cooling output is not attained in the front heater and A/C unit evaporator and/or in the evaporator for cooling the high-voltage components.

(ossible Deviation from Specified Value during the Pressure Test
•	Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding function.
	If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to \Rightarrow Heating Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
•	One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System.
	Too much refrigerant in the circuit.
	Too much refrigerant oil in the circuit.
-	Check the measured values of the different pressure/temperature sensor and temperature sensor when operating the A/C system, and replace the components with incorrect measured values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning: Rep, Gr, GR
-	Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Teste in the "Guided Fault Finding" function.
-	Check the function and activation of the various valves and pressure/temperature sensors installed in th refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Teste in the "Guided Fault Finding" function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87 Refrigerant Circuit (vehicle-specific repair manual).
-	If no malfunction can be determined, extract the refrigerant from the refrigerant circuit.
	If quantity of refrigerant extracted is substantially greater than specified capacity:
-	Fill the refrigerant circuit and repeat the test.
	If quantity of refrigerant extracted roughly corresponds to specified capacity:
-	Check the activation and function of the A/C compressor and the valves installed in the refrigerant circu (shut-off valve and expansion valve). Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
-	Depending on the result, service the activation or replace the faulty component (shut-off valve, expansion valve, or A/C compressor as well as the receiver/dryer/dryer). Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
-	If no malfunction can be determined, there may be too much refrigerant oil in the circuit, clean the refrigerant circuit (flush with refrigerant R1234yf. Refer to \Rightarrow "2.6 Refrigerant Circuit, Cleaning", page 86.
Fil	nal Procedures
-	Charge the refrigerant circuit. Refer to \Rightarrow "3.6 Refrigerant Circuit, Charging", page 149.
-	Repeat the test. Refer to \Rightarrow "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

i Note

- This fault may also be caused by too much refrigerant oil in the circuit. Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.
- Refer to \Rightarrow page 231 for additional information.

Possible Deviation from Specified Value during the Pressure Test

• High and low pressure normal

Possible Deviation from Specified Value during the Pressure Test The required cooling output is not attained in the heater and A/C unit evaporator (and in the evaporator for cooling the high-voltage components). or High and low pressure normal A/C compressor noise (particularly after switch-on) The required cooling output is not attained in the heater and A/C unit evaporator (and/or in the evaporator for cooling the high-voltage components). Possible causes for the deviation from specified value and their solutions One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual). Too much refrigerant in the circuit. The expansion valve for the evaporator in the front heater and A/C unit is faulty. Too much refrigerant oil in the circuit. Check the measured values of the different pressure/temperature sensor and temperature sensor when operating the A/C system, and replace the components with incorrect measured values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System . Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Check the function and activation of the various valves and pressure/temperature sensors installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).

- If no malfunction can be determined, extract the refrigerant from the refrigerant circuit.
- If quantity of refrigerant extracted is substantially greater than specified capacity:
- Fill the refrigerant circuit and repeat the test.
- · If quantity of refrigerant extracted roughly corresponds to specified capacity:
- Clean the refrigerant circuit (flush with refrigerant R1234yf). Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86.

Fill in correct quantity of refrigerant oil into circuit (see note).

Final Procedures

- Charge the refrigerant circuit. Refer to ⇒ "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 20.1 less authorised by AUDI AG. AUDI AG does not guarantee or accept any liability

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Note

- Overfilling with refrigerant oil can occur if, for example, the compressor has been replaced without adjusting the quantity of refrigerant oil.
- If for example the expansion valve for the evaporator in the heater and A/C unit or for the evaporator for cooling the high-

voltage battery is faulty (always open) the evaporator temperature (in the heater and A/C unit) is no longer regulated that only refrigerant in gaseous state exits from the evaporator. Under certain usage conditions, liquid droplets may then be drawn in by the compressor and cause noise (liquid cannot be compressed).

- If there is too much refrigerant oil in the circuit, the compressor must be drained and the receiver/dryer must be replaced. After cleaning the refrigerant circuit (flushing with refrigerant R1234yf) and fill it with the correct quantity of refrigerant oil in the circuit. Refer to ⇒ "2.6 Refrigerant Circuit, Cleaning", page 86 and ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual).
- ◆ Refer to <u>⇒ page 231</u> for additional information.

Possible Deviation from Specified Value during the Pressure Test

- · High and low pressure normal
- The required cooling output is attained in the front heater and A/C unit evaporator (and on the evaporator protocoling the high-voltage components) is not protocoling the high-voltage addition of the evaporator accept any liability
- The required cooling output is not attained on the heater core for the heat pump output.

- One in or on the removed refrigerant circuit pressure/temperature sensor or temperature sensor sends incorrect values. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview - A/C System.
- ♦ One of the pumps or one of the valves in the coolant circuit for the high-voltage system or the engine is faulty or does not function correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Coolant Circuit (vehicle-specific repair manual).
- Activation of the A/C compressor is faulty. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- If one of the valves installed in the refrigerant circuit is faulty or does not work correctly. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Check the measured values of the different pressure/temperature sensor and temperature sensor when
 operating the A/C system, and replace the components with incorrect measured values. Use the Vehicle
 Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Component Location Overview A/C System.
- Check the incorporation of the heat exchanger in the coolant circuit of the engine as well as the function and activation of the different pumps and valves. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Coolant Circuit (vehicle-specific repair manual).
- Check the activation and function of the A/C compressor and service using the Vehicle Diagnostic Tester in the "Guided Fault Finding" function.
- Check the function and activation of the various valves and pressure/temperature sensors installed in the refrigerant circuit via the pressure distribution in the refrigerant circuit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual).
- Check the function and activation of the components for cooling the high-voltage components. Use the Vehicle Diagnostic Tester "Guided Fault Finding" for the air conditioner, the A/C Compressor and the Battery Regulation.
- If no malfunction can be determined, extract the refrigerant from the refrigerant circuit.
- Extract refrigerant from the refrigerant circuit. Refer to <u>⇒ "3.4 Refrigerant Circuit, Discharging", page 141</u>.

- If the extracted refrigerant quantity is significantly less than the specified capacity (more that 100 g (3.5 oz) less). Refer to ⇒ Heating, Ventilation and Air Conditioning; Rep. Gr. 00; Technical Data (vehicle-specific repair manual), and look for leaks and correct. Refer to <u>⇒ "2.4 Leaks, Finding", page 63</u>.
- The extracted refrigerant quantity corresponds approximately to the specified capacity, check the activation
 of the A/C compressor and the installed shut-off valve again if no malfunction is determined. Refer to ⇒
 Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Refrigerant Circuit (vehicle-specific repair manual)
- Charge the refrigerant circuit. Refer to ⇒ "3.6 Refrigerant Circuit, Charging", page 149.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

Final Procedures

- Charge the refrigerant circuit. Refer to <u>⇒ "3.6 Refrigerant Circuit, Charging", page 149</u>.
- Repeat the test. Refer to ⇒ "3.14.5 Electrically-Driven A/C Compressor, Checking Pressure with A/C System Switched On", page 201.

i Note

- If the required cooling output on the evaporator, in the front private or commercial purposes, in part or in whole, is not heater and A/C unit (and on the evaporator for cooling the UDI AG. AUDI AG does not guarantee or accept any liability high-voltage battery is OK) and there is a concern due to insufficient heating performance on the heat exchanger for the heat pump operation. The cause may be in the high-voltage system coolant circuit or in the engine coolant circuit. If the pumps and valves in the high-voltage system coolant circuit is not activated correctly or its function is not OK via the evaporator (heat exchanger) for the high-voltage system components not enough heat energy is absorbed from the coolant. If the pumps and valves in the coolant circuit of the engine are not started correctly or its function are not OK via the heat exchanger for the heat pump function for absorbing the heat energy is not transferred to the coolant flowing to the heat exchanger in the heater and A/C unit. Use the Vehicle Diagnostic Tester in the "Guided Fault Finding" function. Refer to \Rightarrow Heating, Ventilation and Air Conditioning; Rep. Gr. 87; Coolant Circuit (vehicle-specific repair manual).
- ♦ Refer to <u>⇒ page 231</u> for additional information.

4 Tools and Testing Equipment

\Rightarrow "4.1 Tools and Materials, Obtainable from Distribution Center or Importer", page 246

 \Rightarrow "4.2 Commercially Available Tools and Materials", page 246

⇒ "4.3 Improvised Tools", page 247

4.1 Tools and Materials, Obtainable from Distribution Center or Importer

Tools and materials can be obtained. Refer to the Parts Catalog.

Overview
 A/C service station with flushing device With program installed for flushing the refrigerant circuit using refrigerant R1234yf, and corresponding flushing equipment pyright. Copying for private or commercial purposes, in part or in whole, is not permitted unless authorised by AUDI AG. AUDI AG does not guarantee or accept any liability With the analyzer installed to determine the contamination of refrigerant R1234yf.
Refrigerant R1234yf. Refer to the Parts Catalog.
Extractor (for refrigerant R1234yf)- dry ice box. Refer to the Parts Catalog.
 VW/Audi - passenger vehicle adapter set. Refer to the Parts Catalog. To connect the A/C service station on the refrigerant circuit to flush and to bridge removed components when flushing.
- To connect specific components to a pressure hose to blow through with compressed air or nitrogen.
R1234yf/R134a leak detector. Refer to Parts Catalog.
Combined fine filter unit for compressed-air system (oil, dirt and water separator as used for painting facilities). Refer to the Parts Catalog.
Seals (different versions, pay attention to the allocation). Refer to the Parts Catalog.
Refrigerant oil (different versions, pay attention to the allocation). Refer to the Parts Catalog.
Leak detection system with the following contents. Refer to the Parts Catalog. ♦ Cleaning Solution
♦ UV Leak Detection Lamp
◆ Leak Detection Lamp - Replacement Bulb
♦ Protective Eyewear
♦ Sticker
◆ Safety Gloves
◆ System Case
Tracer refill cartridge. Refer to the Parts Catalog.
Release tools for refrigerant line with quick-release coupling. Refer to the Parts Catalog.
Removal tool for the refrigerant lines quick-release coupling. Refer to the Parts Catalog.
Socket for removing and installing the valves. Refer to the Parts Catalog.

4.2 Commercially Available Tools and Materials



This list outlines the testers, tools and materials required for expert refrigerant circuit repair work.

Overview
Fin comb
Charging hoses, 5/8"-18 UNF thread
Charging hoses, M12 x 1.5-6G according to SAE J639 external thread (included in the A/C service station delivery package).
Connection piece for refrigerant cylinder and seal with quick-release coupling connection or threaded con- nection (included in the A/C service station delivery package).
Valve caps 5/8"-18 UNF
Pressure gauge set with pressure reducer for nitrogen
Quick-release coupling connection for the service connections (Included in the A/C service station delivery package).
The wrench size depends on the threaded connections on the refrigerant lines.
Connecting nipple for conical seal 5/8"-18 UNF
Compressed-air gun with rubber end piece
Hand shut-off valve 5/8"-18 UNF
Recycling bottles for contaminated refrigerant R1234yf (for the respective gas supplier)
Digital thermometer
Protective gloves
Protective Eyewear Protected by copyright. Copying for private or commercial purposes, in part or in whole, is not
Dry ice as pellets (from the respective gas supplier of internets of the data by AUDI AG does not guarantee or accept any liability

4.3 Improvised Tools



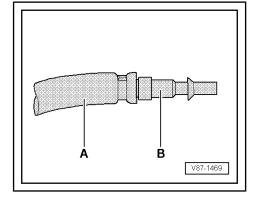
This list outlines the testers, tools and materials required for expert refrigerant circuit repair work.

Charging Hose with Connection for Workshop Compressed-Air System

A - Charging hose 5/8" - 18 UNF** (version with large inner diameter)

B - Connection for workshop compressed-air system ** (always use filter)

** Tools and materials, which are commercially available.



5 Revision History

DRUCK NUMBER: A005A001521

Fac- tory Edi- tion	Edit Edi- tion	Job Type	Fe ed- ba ck	Notes	Quality Checke d By
03.2 020	04/2 1/20 20	Fac- tory Up- date	N/ A	Added 8Y content	Eric P.
01.2 020	01/3 0/20 20	Fac- tory Up- date	N/ A		Eric P.
10.2 018	07/2 6/20 19	Lo- cal Feed back	14 46 77 1		Eric P.
10.2 018	01/2 2/20 19	Fac- tory Up- date	N/ A		Eric P.
07.2 018	08/3 1/20 18	Fac- tory Up- date	N/ A		Juan S.
04.2 018	07/2 3/20 18	Fac- tory Up- date	N/ A		Eric P.
01.2 018	01/0 9/20 18	Fac- tory Up- date	N/ A		Joe Y
07.2 017	08/2 2/20 17	Fac- tory Up- date	N/ A		Joe Y
10.2 016	11/0 1/20 16	Fac- tory Up- date	N/ A		Eric P.
07.2 016	08/0 8/20 16	Fac- tory New	N/ A		Tom Perry permitted with res



Cautions & Warnings

Please read these WARNINGS and CAUTIONS before proceeding with maintenance and repair work. You must answer that you have read and you understand these WARNINGS and CAUTIONS before you will be allowed to view this information.

- 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 Audi retailer or other qualified shop. We especially urge you to consult an authorized Audi retailer before beginning repairs on any vehicle that may still be covered wholly or in part by any of the extensive warranties issued by Audi.
- Disconnect the battery negative terminal (ground strap) whenever you work on the fuel system or the electrical system. Do not smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher handy.
- Audi is constantly improving its vehicles and sometimes these changes, both in parts and specifications, are made applicable to earlier models. Therefore, part numbers listed in this manual are for reference only. Always check with your authorized Audi retailer parts department for the latest information.
- Any time the battery has been disconnected on an automatic transmission vehicle, it will be necessary to reestablish Transmission Control Module^o (TCM)^o basic settings^o usingⁱⁿ the^o Audi^{it} Factory Approved Scan Tool (ST)^{ith} respect to the correctness of information in this document. Copyright by AUDI AG.
- Never work under a lifted vehicle unless it is solidly supported on stands designed for the purpose. Do not support a vehicle on cinder blocks, hollow tiles or other props that may crumble under continuous load. Never work under a vehicle that is supported solely by a jack. Never work under the vehicle while the engine is running.
- For vehicles equipped with an anti-theft radio, be sure of the correct radio activation code before disconnecting the battery or removing the radio. If the wrong code is entered when the power is restored, the radio may lock up and become inoperable, even if the correct code is used in a later attempt.
- If you are going to work under a vehicle on the ground, make sure that the ground is level. Block the wheels to keep the vehicle from rolling. Disconnect the battery negative terminal (ground strap) to prevent others from starting the vehicle while you are under it.
- Do not attempt to work on your vehicle if you do not feel well. You increase the danger of injury to yourself and others if you are tired, upset or have taken medicine or any other substances that may impair you or keep you from being fully alert.
- Never run the engine unless the work area is well ventilated. Carbon monoxide (CO) kills.
- Always observe good workshop practices. Wear goggles when you operate machine tools or work with acid. Wear goggles, gloves and other protective clothing whenever the job requires working with harmful substances.
- Tie long hair behind your head. 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.

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Cautions & Warnings

- Do not re-use any fasteners that are worn or deformed in normal use. Some fasteners are
 designed to be used only once and are unreliable and may fail if used a second time. This
 includes, but is not limited to, nuts, bolts, washers, circlips and cotter pins. Always follow the
 recommendations in this manual replace these fasteners with new parts where indicated,
 and any other time it is deemed necessary by inspection.
- Illuminate the work area adequately but safely. Use a portable safety light for working inside or under the vehicle. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel or oil.
- Friction materials such as brake pads and clutch discs may contain asbestos fibers. Do not create dust by grinding, sanding, or by cleaning with compressed air. Avoid breathing asbestos fibers and asbestos dust. Breathing asbestos can cause serious diseases such as asbestosis or cancer, and may result in death.
- Finger rings should be removed so that they cannot cause electrical shorts, iget caught in not running machinery, or be crushed miss authorised by AUDI AG. AUDI AG does not guarantee or accept any liability with espect to he correctness of information in this document. Copyright by AUDI AG.
- Before starting a job, make certain that you have all the necessary tools and parts on hand. Read all the instructions thoroughly, do not attempt shortcuts. Use tools that are appropriate to the work and use only replacement parts meeting Audi specifications. Makeshift tools, parts and procedures will not make good repairs.
- Catch draining fuel, oil or brake fluid in suitable containers. Do not use empty 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 the oily rags, which can ignite and burn spontaneously.
- 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 listed.
- Keep sparks, lighted matches, and open flame away from the top of the battery. If escaping hydrogen gas is ignited, it will ignite gas trapped in the cells and cause the battery to explode.
- 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. Consult local ordinances that govern the disposal of wastes.
- The air-conditioning (A/C) system is filled with a chemical refrigerant that is hazardous. The A/C system should be serviced only by trained automotive service 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.
- Before doing any electrical welding on vehicles equipped with anti-lock brakes (ABS), disconnect the battery negative terminal (ground strap) and the ABS control module connector.
- Do not expose any part of the A/C system to high temperatures such as open flame. Excessive heat will increase system pressure and may cause the system to burst.

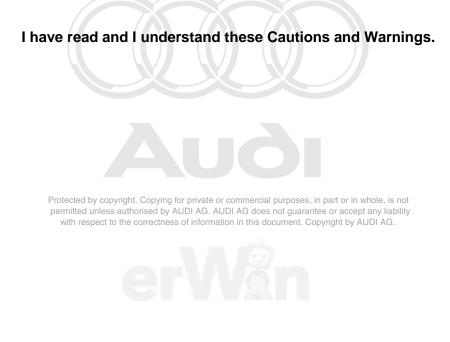
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Cautions & Warnings

- When boost-charging the battery, first remove the fuses for the Engine Control Module (ECM), the Transmission Control Module (TCM), the ABS control module, and the trip computer. In cases where one or more of these components is not separately fused, disconnect the control module connector(s).
- Some of the vehicles covered by this manual are equipped with a supplemental restraint system (SRS), that automatically deploys an airbag in the event of a frontal impact. The airbag is operated by an explosive device. Handled improperly or without adequate safeguards, it can be accidentally activated and cause serious personal injury. To guard against personal injury or airbag system failure, only trained Audi Service technicians should test, disassemble or service the airbag system.
- Do not quick-charge the battery (for boost starting) for longer than one minute, and do not exceed 16.5 volts at the battery with the boosting cables attached. Wait at least one minute before boosting the battery a second time.
- Never use a test light to conduct electrical tests of the airbag system. The system must only
 be tested by trained Audi Service technicians using the Audi Factory Approved Scan Tool (ST)
 or an approved equivalent. The airbag unit must never be electrically tested while it is not
 installed in the vehicle.
- 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.
- When driving or riding in an airbag-equipped vehicle, never hold test equipment in your hands or lap while the vehicle is in motion. Objects between you and the airbag can increase the risk of injury in an accident.



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