Workshop Manual

Amarok 2011 ➤ , Beetle 2012 ➤ ,
Bora 1999 ➤ , CC 2010 ➤ , CC 2012 ➤ ,
Caddy 1997 ➤ , Caddy 2004 ➤ ,
Caddy 2011 ➤ ,
Caddy Kasten/Kombi 1996 ➤ ,
Caddy Pickup 1997 ➤ ,
California 2004 ➤ , California 2010 ➤ ,
Caravelle 2004 ➤ , Caravelle 2010 ➤ ,
Crafter 2006 ➤ , Eos 2006 ➤ ,
Fox 2005 ➤ , Golf 1992 ➤ , Golf 1998 ➤ ,
Golf 2004 ➤ , Golf 2009 ➤ ,
Golf 2013 ➤ , Golf Cabriolet 2012 ➤ ,
Golf Plus 2005 ➤ , Golf Plus 2009 ➤ ,
Golf Sportsvan 2015 ➤ ,
Golf Variant 1998 ➤ ,
Golf Variant 2007 ➤ ,
Golf Variant 2010 ➤ ,
Golf Variant 2014 ➤ , Jetta 2005 ➤ ,
Jetta 2011 ➤ , LT 1997 ➤ ,
Lupo 1999 ➤ , Lupo 3L 1999 ➤ ,
Multivan 2004 ➤ , Multivan 2010 ➤ ,
New Beetle 1999 ➤ ,
New Beetle Cabrio 2003 ➤ ,
Passat 1994 ➤ , Passat 1997 ➤ ,
Passat 2006 ➤ , Passat 2011 ➤ ,
Passat 2015 ➤ ,
Passat (NMS - US) 2012 ➤ ,
Passat CC 2009 ➤ ,
Passat Variant 1997 ➤ ,
Passat Variant 2011 ➤ ,

Passat Variant 2015 ➤ , Phaeton 2003 ➤ ,
Polo 1995 ➤ , Polo 2002 ➤ ,
Polo 2010 ➤ , Polo 2014 ➤ ,
Polo Classic 1996 ➤ ,
Polo KH IN 2010 ➤ , Polo KH IN 2015 ➤ ,
Polo KH MY 2014 ➤ ,
Polo KH MY 2015 ➤ ,
Polo Lim IN 2011 ➤ ,
Polo Lim MY 2014 ➤ ,
Polo Lim RUS 2011 ➤ ,
Polo Variant 1998 ➤ , Scirocco 2009 ➤ ,
Scirocco 2015 ➤ , Sharan 1996 ➤ ,
Sharan 2011 ➤ , Tiguan 2008 ➤ ,
Touareg 2003 ➤ , Touareg 2010 ➤ ,
Touareg 2015 ➤ , Touran 2003 ➤ ,
Transporter 1996 ➤ ,
Transporter 2003 ➤ ,
Transporter 2004 ➤ ,
Transporter 2010 ➤ , XL1 2015 ➤ ,
e-Golf 2014 ➤ , e-up! 2014 ➤ ,
up! 2012 ➤

Air conditioning system with refrigerant R134a

Edition 10.2014

List of Workshop Manual Repair GroupsList of Workshop Manual Repair GroupsList of Workshop Manual Repair Groups

Repair Group

00 - Technical data

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.

Contents

00 – Technical data

1 General notes on air conditioning systems

(VRL007231; Edition 10.2014)

1.1 Introduction

This repair manual is intended to provide technicians and fitters with the basic knowledge required for performing trained work on these systems.

Note

- *Successful completion of a training course such as AB160 or ST160 Air conditioning systems including "technical information" is required.*
- *This repair manual is a part of the training material.*

It should also be available to the responsible supervisory authorities upon request.

Caution

Non-authorised tools or materials (e.g. leak inhibitor additive) may cause damage or adversely influence the system.

Only tools and materials approved by the manufacturer may be used.

Use of non-approved tools or materials will render the warranty void.

1.2 Additional information

- Technical Service Handbook with measures for rectifying latest malfunctions.
- Workshop manual for service work specific to model ⇒ Heating, air conditioning; Rep. gr. 87 .
- ⇒ Current flow diagrams, Electrical fault finding and Fitting locations
- Self-study programme No. 208 is no longer up-to-date in some sections. E.g. the statement “The receiver must be renewed each time the refrigerant circuit is opened”. The following conditions apply ⇒ page 159
- Video programs for staff training.
- Catalogue of special tools / workshop testing.
- Service Organisation Volume 1 Additional equipment.
- Workshop manual for air conditioning system with R12 refrigerant (for vehicles that were manufactured up to model year 1993). This workshop manual is only available as a hard copy.

1.3 Basics of air conditioning

1.3.1 Physical basics:

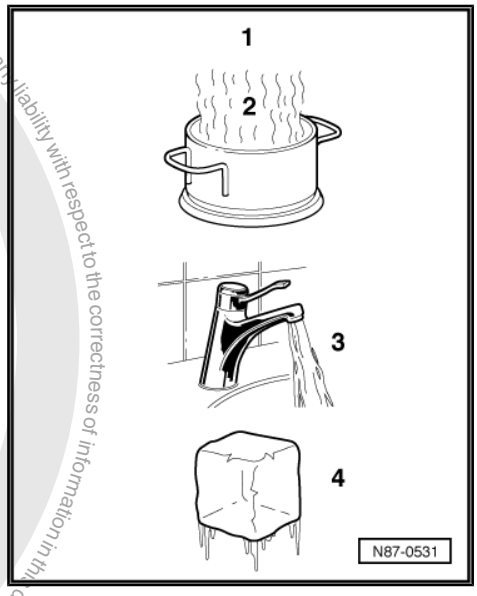
The four known physical states of water also apply to air conditioning refrigerants.

1 - Gas (invisible)

2 - Vapour

3 - Liquid

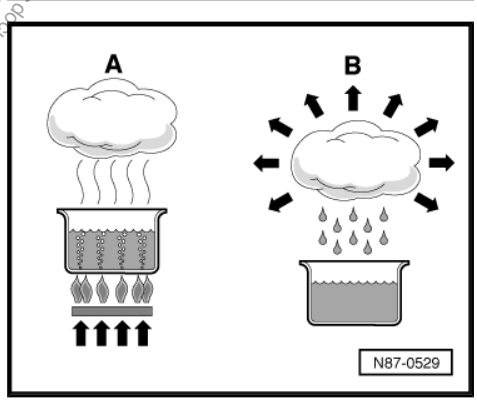
4 - Solid



When water is heated in a container (heat absorption), the rising water vapour is visible. If the vapour is heated by further heat absorption, the visible vapour becomes invisible gas. This process is reversible. If heat is extracted from gaseous water, it changes first to vapour, then to water and finally to ice.

A - Heat absorption

B - Heat dissipation



1.3.2 Heat always flows from warmer to colder material

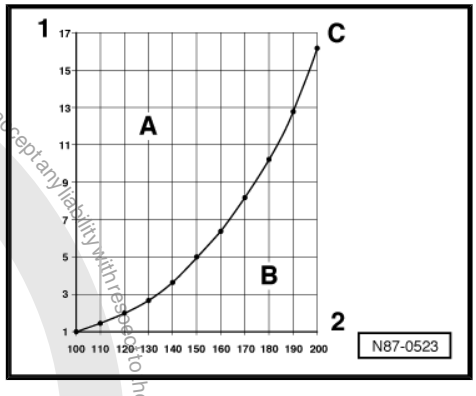
Every material consists of a mass of moving molecules. The fast moving molecules of a warmer material loose part of their energy to slower molecules possessing less heat. This slows down the molecules of the warmer material and accelerates those with less heat. This continues until the molecules in both materials are moving at the same speed. They have the same temperature, and no further exchange of heat occurs.

1.3.3 Pressure and boiling point

The boiling points given in the table below are always based on an atmospheric pressure of 1 bar. If the pressure on a liquid is changed, its boiling point changes also.

It is well known that, for example, the lower the pressure, the lower the temperature at which water boils.

The vapour pressure curves for water and for refrigerant R134a show that at constant pressure and falling temperature the vapour becomes liquid (in the condenser), and that when pressure drops, the refrigerant changes from liquid into the vapour state (evaporator).



Vapour pressure curve for water

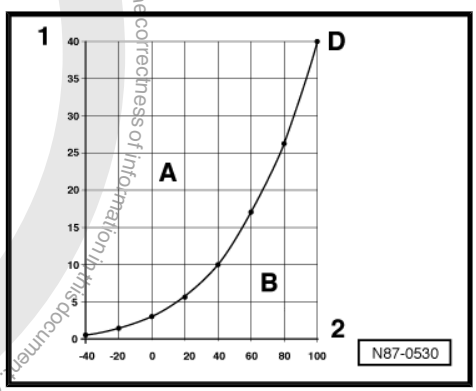
A - Liquid

B - Gaseous

C - Vapour pressure curve for water

1 - Pressure on the liquid in bar (absolute)

2 - Temperature in °C



Vapour pressure curve for refrigerant R134a

A - Liquid

B - Gaseous

D - Vapour pressure curve for refrigerant R134a

1 - Pressure on the liquid in bar (absolute)

2 - Temperature in °C

1.4 Vapour pressure table for refrigerant R134a

The vapour pressure table for each refrigerant is published in the literature for refrigeration engineers. This table shows the vapour pressure exerted on the liquid column in the container for a given temperature of the container.

Since a characteristic vapour pressure table is known for every refrigerant, one can determine what refrigerant is present by measuring pressure and temperature.

Note

Absolute pressure means that 0 bar corresponds to an absolute vacuum. The normal ambient pressure (positive pressure) corresponds to 1 bar absolute pressure. On most pressure gauges, a reading of 0 bar corresponds to an absolute pressure of one bar (which is confirmed by the existence of a -1 bar marking beneath the 0 scale marking).

Temperature in °C	Pressure in bar (positive pressure) R134a
-45	-0.61
-40	-0.49
-35	-0.34
-30	-0.16
-25	0.06
-20	0.32
-15	0.63
-10	1.00
-5	1.43
0	1.92

Temperature in °C	Pressure in bar (positive pressure) R134a
5	2.49
10	3.13
15	3.90
20	4.70
25	5.63
30	6.70
35	7.83
40	9.10
45	10.54
50	12.11
55	13.83
60	15.72
65	17.79
70	20.05
75	22.52
80	25.21
85	28.14
90	31.34

1.5 Refrigerant R134a

Air conditioners in vehicles use the evaporation and condensation process. The system contains a liquid with a low boiling point, called the refrigerant.

The refrigerant used is tetrafluoroethane R134a, which boils at -26.5°C with vapour pressure of 1 bar.

1.5.1 Physical data of refrigerant R134a

Chemical formula	CH2F–CF3 or CF3–CH2F
Chemical designation	Tetrafluoroethane
Boiling point at 1 bar	-26.5°C
Freezing point	-101.6°C
Critical temperature	100.6°C
Critical pressure	40.56 bar (technical) pressure equates to 39.5 bar (standard) pressure

1.5.2 Critical point

Critical point (critical temperature and critical pressure) means the point above which there is no longer a surface of separation between liquid and gas.

Above its critical point, a substance is always gaseous.

At temperatures below the critical point, all types of refrigerant contained within a pressure tank exhibit a liquid phase and a gas phase, so that there is a gas cushion above the liquid.

As long as there is gas in the pressure vessel alongside the liquid, the pressure depends directly on the ambient temperature
⇒ page 3 .

Note

Different types of refrigerants must not be mixed with each other. Only refrigerants specified for the respective air conditioning system may be used.

1.5.3 Environmental aspects of refrigerant R134a

- R134a is a fluorocarbon and contains no chlorine.
- R134a has a shorter atmospheric persistence than refrigerant R12.
- R134a does not damage the ozone layer, the potential to reduce the amount of ozone is zero.
- The Global Warming Potential (GWP) of R134a lies by approx. 1430 (the GWP for carbon dioxide lies by 1).
- The contribution of R134a to the greenhouse effect is less by a factor of 10 than that of refrigerant R12.

1.6 Characteristics of refrigerant R134a

1.6.1 Trade names and designations

Refrigerant R134a is currently available under the following trade designations:

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

Note

- *Other trade designations may be used in other countries.*
- *Among the large selection of various refrigerants, only this one may be used for vehicles. The designations Frigen or Freon are trade names. They apply also to refrigerants which must not be used in vehicles.*

1.6.2 Colour

Like water, the refrigerant is colourless both in the vapour state and the liquid state. Gases are invisible. Only the boundary layer between gas and liquid is visible. (Fluid level in indicator tube of charging cylinder for bubbles in sight glass.) Liquid refrigerant R134a may appear coloured (milky) in a sight glass. This cloudiness is caused by partially dissolved refrigerant oil and does not indicate a fault.

1.6.3 Vapour pressure

In an enclosed container that is not completely full, refrigerant evaporates as vapour at the surface in a quantity sufficient to form an equilibrium between vapour and liquid. This equilibrium develops under pressure and is often called vapour pressure. The vapour pressure is temperature-dependant ⇒ page 3 .

1.6.4 Physical properties of R134a

Because the vapour pressure curves of R134a and other refrigerants are in part very similar, unique identification on the basis of pressure alone is not possible.

The air conditioner compressor used for R134a is lubricated with special synthetic refrigerator oils, such as PAG oils (polyalkylene glycol oils).

1.6.5 Effects on metal

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

However, impurities such as chlorine compounds in the refrigerant do attack certain metals and plastics. This can lead to blockages, leaks and deposits on the air conditioner compressor piston.

1.6.6 Critical temperature and critical pressure

Up to a gas pressure of 39.5 bar positive pressure (corresponding to a temperature of 101°C) the refrigerant R134a remains chemically stable; however, above this temperature the refrigerant decomposes (see Combustibility).

1.6.7 Water content

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

Any water present in the refrigerant circuit will be carried along as droplets. The dryer, dryer bag or dryer cartridge in the receiver or reservoir are capable of holding approx. 7 grams of water before they are full and cannot absorb any more water. If there is further water in the circuit, it will flow to the expansion valve jet or to the restrictor and becomes ice.

The air conditioning system will stop cooling.

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

1.6.8 Combustibility

Refrigerant is non-flammable. On the contrary, it has a fire-inhibiting or fire-extinguishing effect. Refrigerant decomposes when exposed to flames or incandescent surfaces. UV light can also decompose refrigerants (UV is emitted by electric arc welding). Products of this decomposition are poisonous and must not be inhaled. However, these chemicals irritate the mucous membranes, giving adequate warning of their presence.

1.6.9 Charge factor

There must be space both for liquid and vapour in a container. As the temperature rises, the liquid expands. The space occupied by the vapour becomes smaller. Eventually, there will only be liquid in the container. After that time, even a small increase in temperature will result in a very large increase in pressure, since the liquid is seeking to expand further but there is no space for it to do so. The resulting forces are sufficient to burst the container. To prevent containers from being overcharged, regulations governing the storage of compressed gases specify how many kilograms may be charged into a container for every litre of container volume. This charge factor multiplied by the internal volume gives the permissible charge quantity. The charge factor for the refrigerants used in cars is 1.15 kg/l.

1.6.10 Detecting leaks

External damage can cause leaks in the refrigerant circuit. Because a small leak will involve only small quantities of refrigerant, leaks should be checked for using an electronic leak detector or by introducing a leak detection additive to the refrigerant circuit. Electronic leak detectors can detect leakage rates of less than 5 grams loss of refrigerant per year. The leak detector should be specific to the composition of the particular refrigerant in use. For example, a leak detector for R12 refrigerant is not appropriate for R134a refrigerant because R134a refrigerant has no chlorine atoms to which the lead detector responds.)

1.7 Refrigerant machine oil

Refrigerant machine oil is miscible (approx. 20%–40% depending on the type of air conditioner compressor and the quantity of refrigerant) in the refrigerant. It circulates continuously in the circuit and lubricates the moving parts.

Special synthetic refrigerant machine oils such as polyalkylene glycol (PAG) oil are used in conjunction with R134a air conditioning systems. This is necessary because ordinary mineral oils are immiscible in R134a. In addition the materials of the R134a air conditioning system could be attacked if the mixture circulated within the refrigerant circuit under pressure and at high temperatures, or the lubricant film in the air conditioner compressor broke down. The use of unapproved oils can lead to the failure of the air conditioning system, so only approved oils must be used.

⇒ Parts catalogue

Type of oil for R134a in cars: PAG

Note

- *Do not store refrigerant machine oils open to the atmosphere since they are very hygroscopic (they readily absorb water).*
- *Always keep oil containers tightly sealed.*
- *Do not reuse used refrigerant machine oil.*
- *Disposing of used oil: Volkswagen InfoNet; Operation; Manuals and dealership documentation; Service handbook; 15. Environmental Protection; Follow link “Environmental protection in the dealership and in the workshop” in "General notes"; 4. Waste disposal; 6. Disposal channels; g. Disposal of used oil; Refrigerant oils*
- *Used refrigerant machine oils from systems with halogenated hydrocarbons (at least one hydrogen atom has been replaced by e.g the halogens fluorine, chlorine, bromine or iodine) must be disposed of as waste requiring particular care. It is impermissible to mix such oils with other oils or materials. Proper storage and disposal must be performed according to guidelines in the country where the work is being performed. Observe, for example in the Federal Republic of Germany, the climate protective regulation concerning chemicals; closed substance cycle waste management and ensuring environmentally compatible waste disposal (in other countries other statutes and regulations may apply)*
- *Reference sources for technical rules and safety at work / accident prevention for the Federal Republic of Germany*
- *Sources in other countries may be obtained from the responsible authorities*
- *Ester-based oils are suitable only for larger systems (not for air conditioning systems in cars).*

1.7.1 Properties of refrigerant oils

The most important properties are high solubility in refrigerants, good lubrication characteristics, freedom from acid and very low water content. For this reason, only certain oils may be used. A list of approved refrigerant oils and quantities can be found in the vehicle-specific workshop manuals in ⇒ Rep. gr. 00 or ⇒ Rep. gr. 87 .

The PAG oils suitable for refrigerant R134a are strongly hygroscopic and are immiscible with other oils. Therefore, opened containers should be closed again immediately to protect them from moisture. Refrigerant oils age under the influence of moisture and acids; they become dark, viscous and aggressive towards metals.

Note

- *For refrigerant circuits with refrigerant R134a, use only the oil approved for the air conditioner compressor. See ⇒ Rep. gr. 00 or ⇒ Rep. gr. 87 in the repair manual for the specific vehicle.*
- *Disposing of used oil: Volkswagen InfoNet; Operation; Manuals and dealership documentation; Service handbook; 15. Environmental Protection; Follow link “Environmental protection in the dealership and in the workshop” in "General notes"; 4. Waste disposal; 6. Disposal channels; g. Disposal of used oil; Refrigerant oils*

1.8 Comfort

A basic requirement for concentrated and safe driving is the feeling of comfort in the passenger compartment. Especially when it is hot and humid, comfort can be attained only through the use of air conditioning. Of course, open windows, an open sunroof or increased air ventilation can contribute to comfort, but they all have certain disadvantages within the vehicle interior, such as additional noise, draughts, exhaust gases, unfiltered entry of pollen (unpleasant for allergy sufferers).

A well regulated air conditioning system in conjunction with a well thought-out heating and ventilation system can create a feeling of well-being and comfort by regulating the interior temperature, humidity and rate of air change, regardless of the external conditions. This must be available whether the vehicle is moving or not.

Other important advantages of air conditioning are

- The cleansing of the air directed into the passenger compartment. (Dust and pollen, for example, are washed out by the moist fins of the evaporator and carried off with the condensation water.)
- Temperatures in a mid-range car (for example, after a short period of driving, ambient temperature 30°C in the shade and the vehicle in direct sunlight).

	With air conditioning system	Without air conditioning system
Head region	23°C	42°C
Chest region	24°C	40°C
Footwell	30°C	35°C

1.8.1 Environmental aspects

Since about 1992, the air conditioning systems of newly manufactured cars have been successively changed to refrigerant R134a. This refrigerant contains no chlorine and thus does not damage the ozone layer.

Up until about 1992, air conditioning systems were charged with refrigerant R12. Due to its chlorine atoms, this CFC has a high potential for destroying ozone and, in addition, a potential for increasing the greenhouse effect.

There are programs for exchanging old air conditioning systems containing the ozone-damaging refrigerant R12.

⇒ Repair manual for air conditioning systems with refrigerant R12 . This workshop manual is only available as a hard copy.

To protect the environment, no refrigerant should be released into the atmosphere ⇒ page 39 (statutory texts and instructions).

1.9 How air conditioning works

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 order to maintain comfortable temperatures for the occupants on very warm days, part of the available heat must be pumped away.

Since heat spreads towards cooler bodies, a unit that can create low temperatures is fitted in the vehicle interior. Refrigerant is constantly being evaporated in it. The latent heat of evaporation is taken from the air passing through the evaporator.

The refrigerant carries the heat with it as it is pumped away by the air conditioner compressor. The work performed by the air con-

ditioner compressor on the refrigerant increases its heat content and its temperature. Its temperature is now considerably higher than that of the ambient air.

The hot refrigerant flows with its heat content to the condenser. There the refrigerant looses its heat through the condenser to the surrounding air due to the temperature gradient between the refrigerant and the surrounding air.

Thus, the refrigerant is a means of heat transport. Because it will be needed again, it returns to the evaporator.

All air conditioning systems basically depend on the circulation of refrigerant. However, there are differences in the construction of the system.

1.10 General safety

- In accordance with VBG 20, the Federation of Employers Liability Insurance Associations.
- Observe instructions specific to the workplace; ⇒ Volkswagen ServiceNet; Handbooks; Service handbook; Environmental protection . Refrigerant from air conditioning systems / refrigerant oils - to be displayed at refrigerant designated working area.

1.10.1 Product characteristics

Refrigerants used in car air conditioning systems belong to the new generation of refrigerants, the chlorine-free, partially-fluoridated hydrocarbons (H-CFC, R134a).

In regard to their physical behaviour, they are refrigerants which can be liquefied under pressure. They are subject to Regulations for Pressure Tanks and may be charged only into approved and identified pressurised gas containers.

Specific conditions which apply for safe and proper use must be maintained.

1.10.2 Handling refrigerants

WARNING

Danger of freezing injuries.

The refrigerant can emerge as liquid or as vapour.

Do not open containers in which this refrigerant is present.

If refrigerant containers are opened, the contents may escape in liquid or vapour form. The higher the pressure in the container, the more energetic the emergence will be.

How high the pressure is depends on two factors:

- What type of refrigerant is in the container. “This is because the lower the boiling point, the higher the pressure.”
- How high the temperature is. “This is because the higher the temperature, the higher the pressure.”

1.10.3 Wear protective glasses

Put on protective glasses. This will prevent the refrigerant entering the eyes, which in certain circumstances can cause severe injury due to frostbite.

1.10.4 Wear protective gloves and apron

Refrigerants dissolve fats and oils very well. Therefore, when they come in contact with the skin, they take away the protective layer of fat. Skin from which the natural oil and fat have been removed is vulnerable to cold and germs.

1.10.5 Do not allow liquid refrigerant to come in contact with the skin

The refrigerant will draw its latent heat of evaporation from its surroundings. That can be your skin. This can result in very low temperatures. The result is local frostbite (boiling point of R134a is -26.5°C at normal atmospheric pressure).

1.10.6 Do not breath in refrigerant vapour

Note

In high concentrations, emerging refrigerant vapours can mix with the air and displace the oxygen necessary for breathing.

1.10.7 Absolutely NO SMOKING

Refrigerant can decompose in a burning cigarette. The resulting substances are poisonous and must not be breathed in.

1.10.8 Welding and soldering on refrigeration systems

Before welding and brazing on vehicles (in the vicinity of the air conditioning system components), extract the refrigerant and then purge the system by blowing through with compressed air and using nitrogen.

The products of decomposition of refrigerants under heat are not only poisonous but are strongly corrosive, so that pipework and system parts could be attacked. This refers primarily to hydrogen fluoride.

1.10.9 Pungent smell

A pungent odour indicates that the products of decomposition mentioned above are already present. Breathing in these substances must be avoided under all circumstances, or the bronchial tubes, lungs and other organs could be injured.

1.10.10 First aid

- In the event of contact with the eyes or mucous membranes, wash immediately with copious running water and summon an eye specialist.
- In the event of contact with the skin, remove wetted clothing and wash the affected skin with copious water.
- If refrigerant vapours are breathed in high concentrations, take the patient immediately into the fresh air. Summon a doctor. If the patient has trouble breathing, administer oxygen. If the patient's breathing is restricted or stops, bend the head at the neck and commence resuscitation.

1.10.11 Handling pressure tanks

- Secure vessels against falling over!

Secure standing cylinders against falling over and lying cylinders from rolling away.

- Do not throw pressure vessels!

When falling, the containers may become severely deformed so that they may be torn open. The refrigerant evaporates immediately, releasing violent forces. Flying fragments of cylinders can cause severe injuries.

Bottle valves can brake during improper transport. To protect cylinder valves, bottles may be transported only with protective covers screwed on.

- Do not place near radiators!

High temperatures can occur near radiators. Higher temperatures however also mean higher pressures, which may exceed the rated pressure of the vessel.

1.10.12 Do not heat above 50°C

To prevent danger, the Regulations for Pressure Tanks provide that tanks shall not be heated to more than 50°C.

1.10.13 Do not apply uncontrolled heat

Do not heat with an open flame under any circumstance. The local overheating that will result can change the structure of the container's materials, thereby reducing the safe maximum pressure limit of the container. In addition, the danger arises that the refrigerant decomposes due to localised overheating.

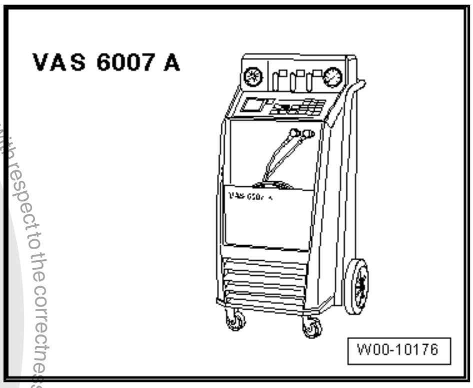
1.10.14 Seal empty containers

Empty refrigerant containers must in all cases be sealed so as to prevent intrusion of moisture. Moisture causes steel containers to rust. This weakens the walls of the containers. In addition, rust particles which enter the refrigerant system from the container cause malfunctions.

1.10.15 Safety instructions for using extraction and charging equipment

- Before connecting the charging system to the air conditioning system, make sure that all existing shut-off valves are closed.
- Before the charging equipment is decoupled from the air conditioning system, ensure that the process has finished. The reason for this is to ensure that no refrigerant oil escapes into the atmosphere.
- After the cleaned refrigerant from the charging system has been charged into an external pressurised gas cylinder, close the hand shut-off valves on the bottle and the charging system.
- Do not expose charging system to moisture or use it in a wet environment.
- Before performing service work and the charging system, disconnect the current supply.
- To reduce danger of fire, avoid using extension cords. If nevertheless it is necessary to use an extension cable, use an extension cable with a cross-section of at least 2.5 mm^2.
- In case of fire, remove external cylinder.
- If entrained oil from the air conditioning system suction accumulator is trapped in the measuring beaker supplied, be sure subsequently to pour the oil into a container that can be sealed, since the oil contains a small amount of refrigerant. Refrigerants must not be released into the environment.
- When the air conditioner service station is switched off, it must be secured against rolling away.

1.11 Safety precautions for when working on vehicles with air conditioning and when handling refrigerant R134a



Air conditioning service station - VAS 6007A- (and further service stations currently available)

⇒ Workshop equipment

> ⚠ WARNING
>
> ♦ *It is recommended that a bottle containing water be kept at hand for purging out the eyes.*
>
> ♦ *Should liquid refrigerant get into the eyes, thoroughly purge the eyes with water for about 15 minutes. Then administer eye drops and visit a doctor immediately even if the eyes do not hurt.*
>
> ♦ *The doctor must be informed that the frostbite has been caused by refrigerant R134a. If, in spite of these safety measures, refrigerant comes into contact with other body parts, these areas must also be immediately purge with cold water for at least 15 minutes.*
>
> ♦ *Work on the air conditioning system refrigerant circuit in well ventilated rooms only. Switch on exhaust gas fume extractor (if there is one).*
>
> ♦ *Refrigerant must not be stored in low-lying rooms (e.g. cellars) or their stairways or window shafts.*

- Do not weld, braze or soft-solder any parts of the charged air conditioning system. This also applies to welding and soldering work on the vehicle when the danger exists that parts of the air conditioning system may heat up. During painting operations, temperatures of objects in the drying oven or in its pre-heating zone must not exceed 80°C.

Reason:

Heating causes great excess pressure to develop in the system, which can cause the pressure release valve of the system to open.

Precautions:

– Use the air conditioner service station to evacuate the refrigerant circuit.

Note

Damaged or leaking components of the air conditioning system must not be repaired by welding or soldering. They must always be renewed.

Refrigerant containers (e.g. charging cylinders of air conditioner service station) must never be subjected to excessive heat or exposed to direct sunlight.

Precautions:

– Never charge a container completely with liquid refrigerant. Without sufficient expansion space (gas cushion), the container will burst should the temperature rise, with devastating consequences ⇒ page 5 .

Under no circumstances may refrigerant be charged into systems or vessels containing air.

Precautions:

– Evacuate systems and containers before charging with refrigerant.

1.12 Basics for working on refrigerant circuit

- Observe instructions specific to the workplace; ⇒ Volkswagen ServiceNet; Handbooks; Service handbook; Environmental protection . Refrigerant from air conditioning systems / refrigerant oils - to be displayed at refrigerant designated working area.
- Observe the utmost cleanliness when working.
- When handling refrigerants and nitrogen, wear protective clothing, protective glasses and protective gloves.
- Switch on exhaust gas fume extractor (if there is one).
- Extract the refrigerant circuit using only the air conditioner service station, and only then loosen the threaded joints and renew the defective components.
- Protect units and hoses against moisture and dirt using sealing caps.
- Use only tools and materials that are intended for use with refrigerant R134a.
- Protect refrigerant oil by sealing container to prevent ingress of moisture.

– Blow through refrigerant circuit with compressed air and nitrogen ⇒ page 65 :

– Purge refrigerant circuit with refrigerant R134a. ⇒ page 67

In vehicles that have an air conditioner compressor without a magnetic clutch: