



## Workshop Manual

Audi A3 2013 ➤

Audi A4 2015 ➤

Audi A5 2016 ➤

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### Natural gas engines - General information

| Engine ID | CPW<br>A | CVLA | DHF<br>A |  |  |  |  |  |
|-----------|----------|------|----------|--|--|--|--|--|
|-----------|----------|------|----------|--|--|--|--|--|

Edition 04.2019



## List of Workshop Manual Repair Groups

### Repair Group

00 - Technical data

20 - Fuel supply system

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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 – Technical data

### 1 Safety precautions

(ARL006345; Edition 04.2019)

⇒ **"1.1 Safety precautions when working on the natural gas system", page 1**

#### 1.1 Safety precautions when working on the natural gas system

**Risk of explosion due to uncontrolled gas escape in connection with ignition sources and electrostatic discharge - risk of death!**

Danger of severe or fatal injuries due to explosion.

- Never drive a vehicle with a natural gas system into the workshop if you can clearly hear gas escaping. Instead, park the vehicle outside and set up a protected area ⇒ Natural gas engines - General information; Rep. gr. 20 ; Fuel tanks; Setting up and marking a protected area .
- Work on natural gas systems may only be performed by specially trained persons ⇒ Natural gas engines - General information; Rep. gr. 00 ; Safety briefing/employee qualification .
- Gas tank must be closed manually on vehicles with natural gas systems if gas can be heard escaping and smelt ⇒ Fuel supply system - g-tron; Rep. gr. 20 ; Fuel tanks; Closing fuel tank shut-off valves mechanically.

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**Risk of explosion due to ignition sources - risk of death!**

Risk of explosion due to ignition sources near natural gas systems - risk of death! Escaping natural gas may ignite and cause an explosion. Danger of severe or fatal injuries due to explosion.

- Keep any ignition sources away from the vicinity of natural gas systems.

**Risk of explosion due to flammable natural gas - risk of death!**

Risk of explosion due to static discharge near natural gas systems - risk of death! Escaping natural gas may ignite and cause an explosion. Danger of severe or fatal injuries due to explosion.

- Wear protective clothing consisting of at least 35% cotton.
- Wear protective gloves consisting of at least 35% cotton.
- Wear safety shoes with ESD protection.

**Risk of injury due to high pressure**

Uncontrolled gas escape may occur under high pressure. Danger of frostbite to hands and other parts of the body.

- Dissipate high pressure in natural gas system before performing work on natural gas system ⇒ Fuel supply system - g-tron;



Rep. gr. 20 ; Fuel tanks; Dissipating pressure in natural gas high-pressure pipe .

- Check for leaks after performing work on the natural gas system.



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## 2 General notes

⇒ [“2.1 General information on natural gas engines”, page 3](#)

⇒ [“2.2 Controlled gas release and uncontrolled gas escape”, page 3](#)

### 2.1 General information on natural gas engines

- ◆ A3: Self-study programme no. 621 ⇒ Self-study programme No. 621 ;
- ◆ A4, A5: Self-study programme no. 659 ⇒ Self-study programme No. 659 ;

### 2.2 Controlled gas release and uncontrolled gas escape

#### Controlled gas release

- Switch on ignition.

Controlled gas release refers, for example, to opening the mechanical tank shut-off valve on a repaired and closed gas system briefly with the hand wheel and then closing it again in order to subsequently perform a leak test. In this case, the largest amount of gas that could escape from a leaking gas system would, at most, be the amount of gas in the pipe. This procedure is permissible at the work station for natural gas vehicles.

- Switch ignition off again after controlled gas release.

#### Uncontrolled gas escape

Uncontrolled gas escape refers to gas continuing to escape from the fuel tank even though the ignition has been switched off or the tank shut-off valves have been closed, or to a leak where the tanks are not closed electrically or manually.

#### DANGER

**Risk of explosion due to uncontrolled gas escape in connection with ignition sources and electrostatic discharge - risk of death!**

**Danger of severe or fatal injuries due to explosion.**

- Never bring vehicles with uncontrolled gas escape into the workshop.
- Leave vehicles with uncontrolled gas escape outdoors.
- Set up a protected area of 10x10 m.
- The protected area must be kept under permanent supervision.
- Never bring ignition sources into the protected area.

- Set up a protected area ⇒ [page 31](#) .



### 3 Safety briefing/employee qualification

Which qualifications are required?

| Work                                       | Qualifications/requirements                                                                                                           |
|--------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| General work on the vehicle                | <ul style="list-style-type: none"><li>◆ Instruction at dealership</li><li>◆ Country-specific requirements</li></ul>                   |
| Work on natural gas system                 | <ul style="list-style-type: none"><li>◆ Training by Audi</li><li>◆ Country-specific requirements</li></ul>                            |
| Leak test, approving or starting up system | <ul style="list-style-type: none"><li>◆ Training by Audi</li><li>◆ Country-specific requirements</li><li>◆ Legal provisions</li></ul> |



#### Note

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*The information in ELSA and the Offboard Diagnosis Information System (ODIS) must be observed and followed when working on vehicles with natural gas system.*

#### Who must receive a safety briefing?

- ◆ All employees of dealerships/workshops who come into contact with vehicles with natural gas system must be appropriately instructed on how to work safely with natural gas vehicles.
- ◆ The safety briefing must be repeated at least once a year.

#### Why is a safety briefing necessary?

- ◆ In some countries, every employer is obliged to inform and instruct their employees about dangers in the workshop as part of their duty of care.
- ◆ Audi requests employers to provide a safety briefing even if this obligation does not apply in their country.
- ◆ Note country-specific regulations.
- ◆ The safety briefing must be updated if necessary, e.g. when new vehicle technologies are introduced or when new legal requirements come into force.

#### Content of the safety briefing

- ◆ How do I recognise a natural gas vehicle?
- ◆ Which components contain gas?
- ◆ Which repairs/tasks on components on the vehicle which do not contain gas am I permitted to perform as an instructed person?
- ◆ How do I recognise a vehicle with a leak?
- ◆ How should I behave around a vehicle with a leak?
- ◆ What safety regulations need to be adhered to? For example, avoiding ignition sources or covering components.
- ◆ How do I recognise a vehicle with a leak?



- ◆ How can I secure a vehicle with a leak? For example, by closing the tank shut-off valves with the hand wheel.
- ◆ Which training course do I need to take to be permitted to work on components containing gas?
- ◆ What is controlled gas release and uncontrolled gas escape ⇒ [page 3](#) ?

#### **Who can perform the safety briefing?**

- ◆ Anyone in the dealership who is qualified to work on the natural gas system can instruct the other dealership employees.

#### **Documentation of safety briefing**

- ◆ The documentation must specify (in writing) who was instructed, what content was presented and when the briefing took place. The documentation of the safety briefing must be administered in the dealership documentation by the responsible senior staff member.



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## 4 Reception of vehicles with natural gas system



### Note

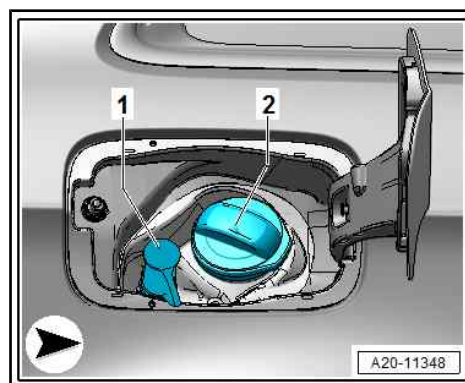
*The information in ELSA and the Offboard Diagnosis Information System (ODIS) must be observed and followed when working on vehicles with natural gas system.*

### Identifying a natural gas vehicle

A reliable method of identifying a vehicle with natural gas system is to check for the additional filler neck for gas -1- behind the tank flap next to the filler neck for petrol -2-.

### Reception of vehicles with natural gas system

- When vehicles are taken in for repair, check for any indications of leaks in the gas system.
- If there is reason to suspect leaks in the gas system, any further measures or repairs must be performed outdoors or at the work station for vehicles with natural gas system.
- If the leak CANNOT be stopped by switching off the ignition or closing the tank shut-off valves, the vehicle must remain outdoors and be kept under observation.



### DANGER

**Risk of explosion due to uncontrolled gas escape in connection with ignition sources and electrostatic discharge - risk of death!**

**Danger of severe or fatal injuries due to explosion.**

- Never bring vehicles with uncontrolled gas escape into the workshop.
  - Leave vehicles with uncontrolled gas escape outdoors.
  - Set up a protected area of 10x10 m.
  - The protected area must be kept under permanent supervision.
  - Never bring ignition sources into the protected area.
- If the leak can be stopped by switching off the ignition or closing the tank shut-off valves, all further work can be performed at the work station for vehicles with natural gas system.
  - The vehicle can also be worked on at a normal work station if there is no reason to suspect leaks and if work on the gas system is not necessary.



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## 5 Laws and regulations

⇒ [“5.1 Legal regulations and guidelines”, page 7](#)

⇒ [“5.2 Requirements for the work station for vehicles with natural gas system”, page 7](#)

### 5.1 Legal regulations and guidelines

Country-specific laws, regulations and guidelines apply to work with natural gas and natural gas systems.

Some examples of the regulations which apply in Germany are:

- ◆ Technical regulations for technical gases (pressurised gases) = TRG
- ◆ Technical Rules for Hazardous Substances = TRGS
- ◆ Technical workplace safety regulations = TRBS

### 5.2 Requirements for the work station for vehicles with natural gas system

- ◆ Sufficient natural or technical ventilation of the work station for vehicles with natural gas system means that air exchange must be guaranteed at least three times an hour for the duration of controlled gas release. Definition of controlled gas release ⇒ [page 3](#)
- ◆ It is advisable to locate the work station near doors, windows and/or skylights if the work station is to be ventilated naturally.
- ◆ It is advisable to install a gas detector at the work station for vehicles with natural gas system. The gas detector (which is fitted on the ceiling) ensures that a warning is given before the lower explosive limit is reached.
- ◆ Always follow country-specific regulations.



## 6 Basic technical and physical principles

⇒ [“6.1 Physical properties”, page 8](#)

### 6.1 Physical properties

#### Physical data of dry natural gas



#### Note

*Dry natural gas does not form methane hydrates. Methane hydrates can lead to deposits in the components.*

|                            |                                                                                                                                      |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| Chemical formula           | CH <sub>4</sub>                                                                                                                      |
| Methane content            | 79-99 %                                                                                                                              |
| Properties                 | Colourless                                                                                                                           |
| Odour                      | Odourless but can be odorised (odorant mixed in)                                                                                     |
| Boiling point at 1 bar     | -161 °C                                                                                                                              |
| Ignition temperature       | Approx. 575 °C to 625 °C                                                                                                             |
| Ignition threshold         | Lower explosive limit (LEL): 4 vol.-%<br>Upper explosive limit (UEL): 17 vol.-%                                                      |
| Relative density (air = 1) | 0.55 to 0.75 (therefore lighter than air)                                                                                            |
| RON                        | 130-140                                                                                                                              |
| Energy content             | 1 kg: approx. 13.5 kWh                                                                                                               |
| Colour                     | Natural gas is invisible                                                                                                             |
| Reaction with metals       | Gas impurities can lead to certain metals and plastics corroding. This can cause blockages, leaks and deposits on springs and valves |
| Water content              | Only very small amounts of water are soluble in liquid gas                                                                           |
| Combustibility             | Natural gas is a highly flammable gas. It can form explosive/flammable vapour/air mixtures                                           |



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## 7 Repair instructions

⇒ [“7.1 Rules for cleanliness”, page 9](#)

⇒ [“7.2 Painting work on vehicles with natural gas system”, page 9](#)

### 7.1 Rules for cleanliness

Even small quantities of dirt can lead to defects. For this reason, please observe the following rules when working on the fuel supply system and injection system:

- ◆ Clean connections and surrounding areas thoroughly with cleaning agent - D 009 401 04- before loosening; commercially available brake cleaner can damage the surfaces. Dry cleaned area thoroughly.
- ◆ Seal off open pipes and connections immediately with clean plugs, e.g. from engine bung set - VAS 6122- .
- ◆ After removal, place parts on a clean surface and cover them. Only use lint-free cloths.
- ◆ Carefully cover or seal open components if repairs cannot be carried out immediately.
- ◆ Only install clean components; replacement parts should only be unpacked immediately prior to installation. Do not use any parts that have been unpacked previously and stored away loosely (e.g. in a tool box).
- ◆ Do not work with compressed air when the system is open.
- ◆ Do not move vehicle.
- ◆ Immediately seal open lines and unions with clean plugs, for example from engine bung set - VAS 6122- .
- ◆ Protect unplugged electrical connectors against dirt and moisture and make sure connections are dry when attaching.

### 7.2 Painting work on vehicles with natural gas system

- When performing paintwork repairs, object temperatures of 60 °C (80 °C in a painting oven) must not be exceeded in drying ovens or their preheating zones. Do not expose vehicles to high temperatures for more than one hour.
- The vehicle must only be placed in the drying oven once it has cooled down from its operating temperature.
- The vehicle's natural gas fuel tanks must be a maximum of  $\frac{7}{8}$  full when the vehicle is put in the drying oven. The fill level indicator must have already gone down by one segment.



## 8 Checking natural gas system

⇒ [“8.1 Test requirements for gas systems”, page 10](#)

⇒ [“8.2 Checking natural gas system for leaks”, page 10](#)

⇒ [“8.3 Leak test with gas leak detector”, page 15](#)

⇒ [“8.4 Leak test with leak detection spray”, page 16](#)

### 8.1 Test requirements for gas systems

- At least 160 bar of pressure in the natural gas fuel tanks (i.e. filled to at least 80%).
- The exhaust emissions warning lamp in the dash panel insert must not light up.
- There must not be any entries in the event memory of the engine control unit relating to the natural gas system ⇒ Vehicle diagnostic tester.
- No cut-off criteria for the gas system in **Measured values** in “Guided Fault Finding” ⇒ Vehicle diagnostic tester.
- All areas of gas system that require testing must be accessible.
- A draught over 0.5 m/s (slow gust of air) will cause incorrect measurement results. It is therefore very important to ensure that the work area is free of draughts.

### 8.2 Checking natural gas system for leaks

⇒ [“8.2.1 Checking natural gas system for leaks”, page 10](#)

⇒ [“8.2.2 Checking natural gas system for leaks after working on high-pressure section”, page 12](#)

⇒ [“8.2.3 Checking natural gas system for leaks after working on low-pressure section”, page 13](#)

#### 8.2.1 Checking natural gas system for leaks

- ◆ This Workshop Manual describes different methods of checking for leaks in the gas system. These methods have been tested and, when applied correctly for particular problems, lead to reliable results under various operating conditions.
- ◆ Minor leaks can be detected with an electronic leak detector or leak detection spray, for example.
- ◆ There are numerous methods available on the open market for the detection of leaks. They do not always deliver clear results and may also cause various components of the gas system to be identified as leaking when they are not. In addition, certain procedures may damage or cause excessive wear to gas system components.

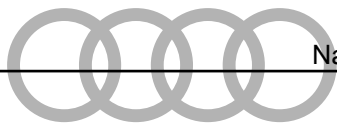
#### DANGER

**Risk of explosion due to uncontrolled gas escape in connection with ignition sources and electrostatic discharge - risk of death!**

**Danger of severe or fatal injuries due to explosion.**

- Never repair components on which a leak has been found.
- Never fill a leaking gas system with gas.

- Check pressure of natural gas system ⇒ [page 14](#) .



## Test requirements

- Natural gas fuel tanks must be filled to min. 80% if the natural gas fuel supply system is to be checked for leaks.
- The vehicle must be filled up at a filling station to achieve this.
- The vehicle must not be driven in natural gas mode without successfully passing the leak test.
- To make sure that no uncontrolled escape of natural gas occurs after refilling and before the leak test, the relay for gas shut-off valves - J908- must be removed from the relay carrier.



### Note

- ◆ *Pulling out the relay for gas shut-off valves - J908- closes the gas shut-off valves electrically. It is still possible to refill the tank.*
  - ◆ *The natural gas system is deactivated and it is no longer possible for larger amounts of gas to escape at locations where there are leaks.*
- Drive to filling station in petrol mode.

## After refilling

- Drive back to workshop (vehicle must be in petrol mode).
- Before driving into the workshop, re-activate natural gas mode by inserting relay for gas shut-off valves - J908- .
- ◆ Fuel tank shut-off valves are only actuated for approx. 2 seconds when the ignition is switched on.
- ◆ A mechanical »clicking« noise can be heard.
- ◆ While the fuel tank shut-off valves are being actuated, you must listen for the sound of gas escaping at the area being worked on.
- ◆ If the valves are not actuated, an adaption drive must be performed to activate the natural gas system.
- ◆ The adaption drive can only be performed successfully by entering the engine's part-load zone several times.
- ◆ You can check that the natural gas system has been activated by examining the natural gas system's fuel level display.
- Before driving the vehicle into the workshop, check whether you can hear the sound of gas escaping.

## If you can hear sound of gas escaping:



### DANGER

**Risk of explosion due to escaping natural gas - risk of death!**  
The sound of gas escaping indicates that there are leaks in the natural gas system. Leaks in the natural gas system can cause uncontrolled escape of natural gas.

**Danger of severe or fatal injuries due to explosion.**

- Never work on a natural gas system if you can hear gas escaping.
- Never drive the vehicle into the workshop if you can hear gas escaping.
- Park the vehicle outside and set up a protected area.



- Set up a protected area (observe safety measures  
⇒ [“1.1 Safety precautions when working on the natural gas system”, page 1](#) ).
- Activate petrol mode using the following adaption: Switch mode ⇒ Vehicle diagnostic tester.
- Wait until sound of gas escaping can no longer be heard.

**If sound of gas escaping can no longer be heard:**

- Drive vehicle into workshop.
- Loosen all bolted connections which were previously loosened during repair work and then tighten to specified torque
- Drive vehicle out of workshop
- Deactivate petrol mode using the following adaption:  
Switch mode ⇒ Vehicle diagnostic tester.
- Check whether you can hear sound of gas escaping.

**If sound of gas escaping cannot be heard:**

- Drive vehicle into workshop.
- Perform leak test after working on high-pressure section  
⇒ [“8.2.2 Checking natural gas system for leaks after working on high-pressure section”, page 12](#) , or after working on low-pressure section  
⇒ [“8.2.3 Checking natural gas system for leaks after working on low-pressure section”, page 13](#) .

## 8.2.2 Checking natural gas system for leaks after working on high-pressure section

### DANGER

**Risk of explosion due to escaping natural gas - risk of death!**  
The sound of gas escaping indicates that there are leaks in the natural gas system. Leaks in the natural gas system can cause uncontrolled escape of natural gas.

**Danger of severe or fatal injuries due to explosion.**

- Never work on a natural gas system if you can hear gas escaping.
- Never drive the vehicle into the workshop if you can hear gas escaping.
- Park the vehicle outside and set up a protected area.

- Perform gas system inspection:
  - ♦ A3 ⇒ Maintenance ; Booklet 821 ; Maintenance; Natural gas system: checking for damage and leaks .
  - ♦ A4, A5 ⇒ Maintenance ; Booklet 830 ; Maintenance; Natural gas system: checking for damage and leaks .
- Natural gas fuel tanks must be filled to min. 80% if the natural gas fuel supply system is to be checked for leaks.

### DANGER

**Risk of explosion due to escaping natural gas - risk of death!**  
Leaks in the natural gas system can cause uncontrolled escape of natural gas. Danger of severe or fatal injuries due to explosion.

- Check natural gas system for leaks.



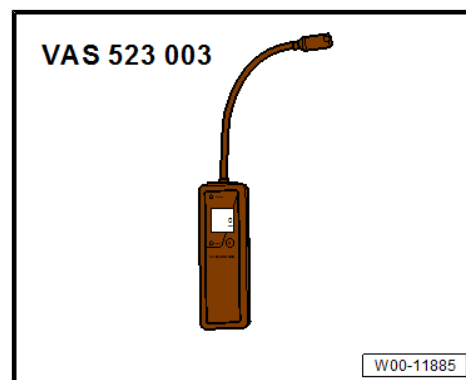
The vehicle must only be handed over to the customer after the leak test has been passed successfully.

### 8.2.3 Checking natural gas system for leaks after working on low-pressure section

- Checking the natural gas system for leaks after working on the low-pressure section does not replace the necessity to check for leaks as part of maintenance work.
- Only specially trained staff may perform work and check for leaks on natural gas systems.
- The natural gas system must be checked for leaks if gas-conveying components are loosened or renewed in the low-pressure section.

#### Special tools and workshop equipment required

- ◆ Gas leak detector - VAS 523 003-



- ◆ Leak detection spray (commercially available)

#### Test requirements

- Test pressure: low-pressure section approx. 5 bar, transition between low-pressure section and high-pressure section 160 ... 200 bar  
⇒ ["8.2.2 Checking natural gas system for leaks after working on high-pressure section", page 12](#)
- As soon as the system is activated, it can be expected that the required minimum pressure of 5 ... 12 bar will be reached.
- If the system is not activated, it is not possible to perform a reliable test. Fill natural gas system.
- All bolted connections must be tightened to specified torque.

If the fuel tank shut-off valves were previously closed electrically or mechanically:

- Re-install relay for gas shut-off valves - J908- .
- Open all fuel tank shut-off valves.

- Activate natural gas mode using the following **adaption**:  
**Switch mode** ⇒ Vehicle diagnostic tester.

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**! DANGER**

**Risk of explosion due to escaping natural gas - risk of death!**  
The sound of gas escaping indicates that there are leaks in the natural gas system. Leaks in the natural gas system can cause uncontrolled escape of natural gas.

**Danger of severe or fatal injuries due to explosion.**

- Never work on a natural gas system if you can hear gas escaping.
- Never drive the vehicle into the workshop if you can hear gas escaping.
- Park the vehicle outside and set up a protected area.

- Observe safety precautions  
⇒ ["1 Safety precautions", page 1](#) .
- Gas leak detector - VAS 523 003- can only detect whether there is natural gas in the ambient air.
- The results of the test using the gas leak detector are only satisfactory if the green LED for "O.K." lights up.
- If a yellow or red LED lights up, a leak detector spray must be used to verify definitively whether gas is actually escaping from the vehicle's natural gas system.
- When using the leak detector spray, bubbles must not emerge from the sprayed area during a test period of three minutes.
- If any leaks appear, a repair measure must be carried out to rectify the problem, and the leak test must then be repeated.

**Procedure**

- Determine pressure of natural gas system via [Read measured values](#) function by reading off current pressure of tank pressure sensor ⇒ Vehicle diagnostic tester.
- All connections and components which have been opened or renewed must be checked using the gas leak detector - VAS 523 003- and a leak detector spray.

**! DANGER**

**Risk of explosion due to escaping natural gas - risk of death!**  
Leaks in the natural gas system can cause uncontrolled escape of natural gas. Danger of severe or fatal injuries due to explosion.

- Check natural gas system for leaks.

- Move gas leak detector around the location being checked for leaks by 90°, keeping it at each point for at least 5 seconds.
- If leaks are found using gas leak detector - VAS 523 003- :**

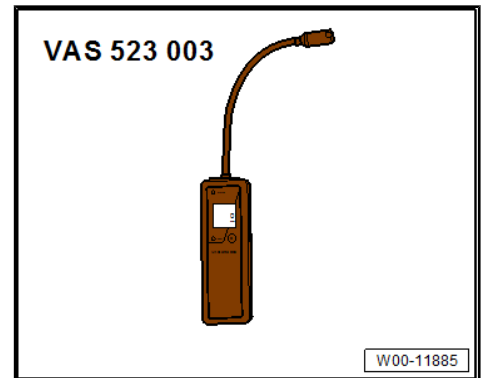
- Spray connection or component with leak detector spray and observe for approx. 3 minutes. No bubbles must form.
- If no natural gas concentration and therefore no losses of gas are found in the leak test, the vehicle can be made ready for operation.
- If any losses of gas are determined in the leak test, the cause of the fault must be determined and eliminated. Once this has been done, a new leak test must be performed.
- The vehicle must only be handed over to the customer after the leak test has been passed successfully.



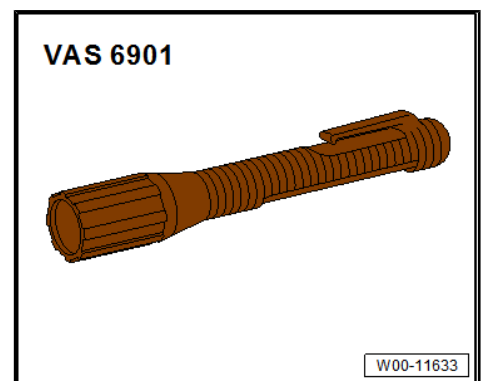
## 8.3 Leak test with gas leak detector

### Special tools and workshop equipment required

- ◆ Gas leak detector - VAS 523 003-



- ◆ Explosion-proof LED battery lamp - VAS 6901-



- ◆ Mirror

### Detecting leaks



#### Note

- ◆ *The gas leak detector - VAS 6227- can only detect whether there is gas in the ambient air in its immediate vicinity.*
- ◆ *If the green LED does not light up, the leak detection spray must be used to confirm the location of the leak*  
⇒ [page 16](#).

- Observe safety precautions ⇒ [page 1](#) .
- Test requirements for gas systems ⇒ [page 10](#) .
- Start gas leak detector ⇒ operating instructions .
- Hold probe tip above the suspected leak for 5 seconds in several different locations.

The leak has been found when the following occurs (depending on gas leak detector version) ⇒ operating instructions :

- ◆ the frequency of the acoustic signal increases,
- ◆ a warning tone sounds,
- ◆ or LEDs light up.

Locations where the gas system must be checked for leaks:

- ◆ A3 ⇒ Maintenance ; Booklet 821 ; Maintenance; Natural gas system: checking for damage and leaks .



- ◆ A4, A5 ⇒ Maintenance ; Booklet 830 ; Maintenance; Natural gas system: checking for damage and leaks .

## 8.4 Leak test with leak detection spray

- Observe safety precautions ⇒ [page 1](#) .
- Test requirements for gas systems ⇒ [page 10](#) .
- Spray leak detection spray around connections and observe for three minutes.
- In the three minute checking time, no bubbles whatsoever must emerge from the sprayed area.

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## 20 – Fuel supply system

### 1 Fuel tanks

⇒ [“1.1 Handling natural gas fuel tanks”, page 17](#)

⇒ [“1.2 Assessing damage to fuel tanks”, page 18](#)

⇒ [“1.3 Storing natural gas fuel tanks”, page 29](#)

⇒ [“1.4 Handling unpressurised natural gas fuel tanks made of composite fibre materials”, page 30](#)

⇒ [“1.6 Discharging natural gas fuel tanks”, page 33](#)

⇒ [“1.7 Determining residual pressure in natural gas fuel tank”, page 33](#)

⇒ [“1.8 Rendering natural gas fuel tanks inert”, page 41](#)

⇒ [“1.9 Disposing of natural gas fuel tanks”, page 43](#)

#### 1.1 Handling natural gas fuel tanks

##### DANGER

Natural gas fuel tanks may explode if handled improperly - risk of death!

Danger of severe or fatal injuries due to explosion.

- Secure tanks to prevent them from falling or tipping.
- Store unsecured tanks in horizontal position and ensure that they cannot roll away.
- Never throw tanks.
- Protect tanks before heating them to more than 60 °C. Object temperatures of 60 °C (80 °C in a painting oven) must not be exceeded for periods of more than 1 hour. It may be necessary to cover the tanks or put them in the shade.
- Only transport tanks when they are secured with tensioning straps. This protects the tank shut-off valves.

- Tanks that have tipped over or fallen may be so severely damaged that they burst. Pressure releases suddenly, releasing substantial force. Debris from a burst tank can cause serious injuries.

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## 1.2 Assessing damage to fuel tanks

⇒ [“1.2.1 Assessing damage to fuel tanks after accident damage”, page 18](#)

⇒ [“1.2.2 Assessing damage to fuel tanks made of steel”, page 18](#)

⇒ [“1.2.3 Assessing damage to fuel tanks made of composite fibre materials”, page 18](#)

⇒ [“1.2.4 Assessing damage to fuel tanks - A3”, page 19](#)

⇒ [“1.2.5 Assessing damage to fuel tanks - A4/A5”, page 21](#)

### 1.2.1 Assessing damage to fuel tanks after accident damage



Note

*Note country-specific regulations.*

- If the vehicle structure (e.g. longitudinal member) is not damaged, it is sufficient to perform a visual check on the gas system/fuel tanks according to the damage assessment and a leak test ⇒ Maintenance ; Booklet 821 ; Maintenance; Natural gas system: checking for damage and leaks or ⇒ Maintenance ; Booklet 830 ; Maintenance; Natural gas system: checking for damage and leaks . If result is OK; no components of the gas system need to be renewed.
- If the vehicle structure (e.g. longitudinal member) is damaged, the fuel tanks must be removed, checked and, if necessary, renewed.
- If load-bearing gas system components (mounting, securing straps) have become deformed, the fuel tanks must be renewed.
- If the stainless steel pipe system is bent/damaged, the corresponding components must be renewed.

### 1.2.2 Assessing damage to fuel tanks made of steel

- ◆ The fuel tank must be renewed at the first signs of damage or rust. The fuel tank must not be repaired.
- ◆ The fuel tank will be irreparably damaged if salt and water enters it.
- ◆ For fuel tanks made of steel, there must be a layer of wax between the fuel tank and the tank shut-off valve to protect against corrosion.

### 1.2.3 Assessing damage to fuel tanks made of composite fibre materials



Note

*Note country-specific regulations.*

- ◆ The following images should be used to assess whether damage to a fuel tank requires it to be renewed. The fuel tank must not be repaired.



- ◆ Thermal influences can negatively affect the structure of the fuel tank.
- ◆ The fuel tank will be irreparably damaged if salt and water enters it.

The following criteria are used in the damage guide:

| Green                                                               | Red                                     |
|---------------------------------------------------------------------|-----------------------------------------|
| Fuel tank is OK until next inspection, unless further damage occurs | Fuel tank is not OK and must be renewed |

⇒ [“1.2.4 Assessing damage to fuel tanks - A3”, page 19](#)

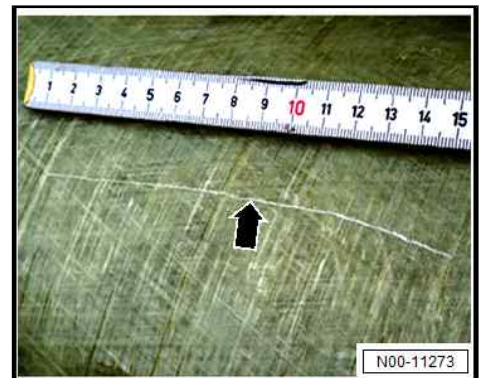
⇒ [“1.2.5 Assessing damage to fuel tanks - A4/A5”, page 21](#)

## 1.2.4 Assessing damage to fuel tanks - A3

### Scratch

Has no effect if no fibres are damaged

- Evaluation: Green



### Minor storage marks on the surface

Has no effect.

- Evaluation: Green



### Deep cut

Has an effect.

- Evaluation: Red



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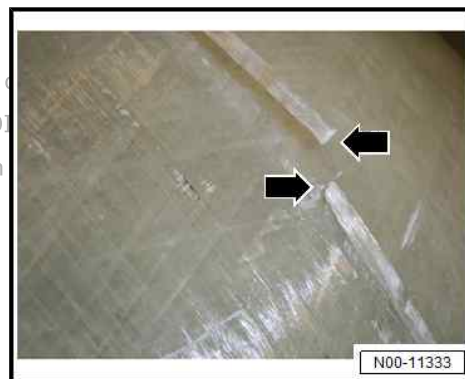


### Tear in fibres

Has an effect.

- Evaluation: Red

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### Abrasion

Has an effect.

- Evaluation: Red



### Impact

Has an effect.

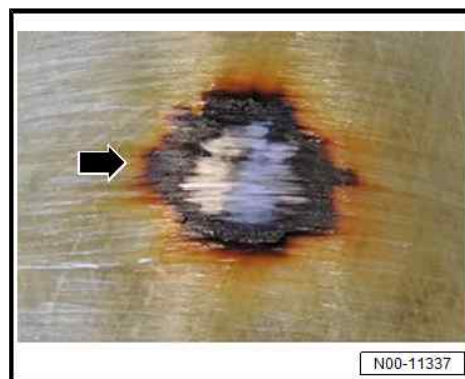
- Evaluation: Red



### Temperature

Has an effect.

- Evaluation: Red

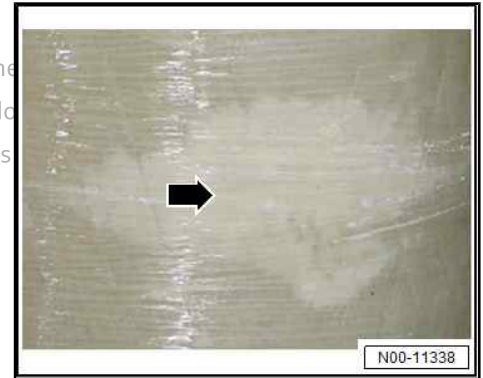




## Infiltration, e.g. of air, water

Has an effect.

- Evaluation: Red



## 1.2.5 Assessing damage to fuel tanks - A4/A5

### Marking, stamps, stickers and tags

The necessary information is present and readable. The sticker and the matrix code on the valve mounting can be read easily.

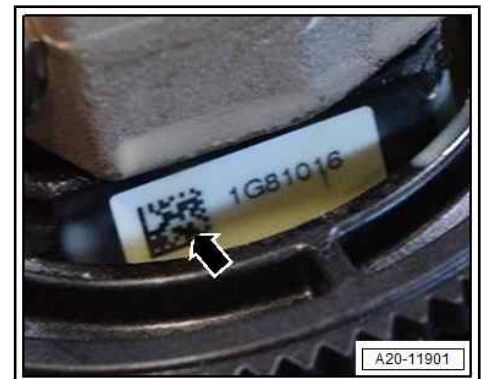
- Evaluation: Green



### Marking, stamps, stickers and tags

The necessary information is present and readable. The sticker and the matrix code on the valve mounting can be read easily.

- Evaluation: Green



### Marking, stamps, stickers and tags

The necessary information is not readable/traceability is not guaranteed.

The serial number, matrix code and tank sticker are no longer readable. Repairs are not permitted.

- Evaluation: Red





### Marking, stamps, stickers and tags

The necessary information is not readable/traceability is not guaranteed.

The serial number, matrix code and tank sticker are no longer readable. Repairs are not permitted.

- Evaluation: Red



### Cuts, scratches, grooves

Surface is slightly damaged, but fibres have not been exposed or cut through.

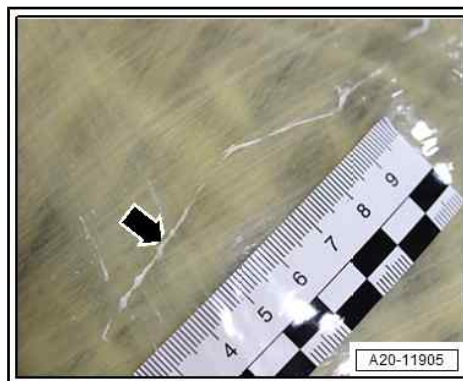
- Evaluation: Green



### Cuts, scratches, grooves

Surface is slightly damaged, but fibres have not been exposed or cut through.

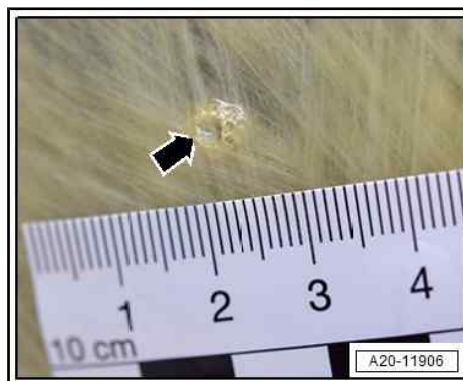
- Evaluation: Green



### Cuts, scratches, grooves

Surface is slightly damaged, but fibres have not been exposed or cut through.

- Evaluation: Green



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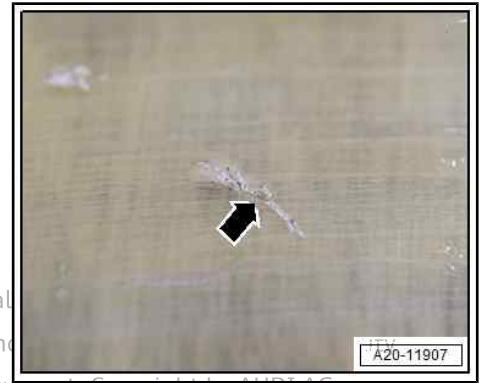
### Cuts, scratches, grooves

Fibres have been exposed and/or cut through. It cannot be definitively ruled out that the fibres have been damaged/exposed.

- Evaluation: Red



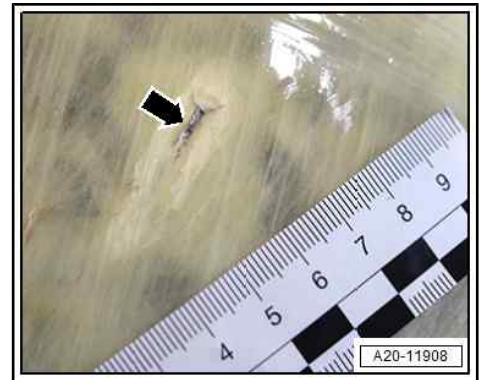
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### Cuts, scratches, grooves

Fibres have been exposed and/or cut through. It cannot be definitively ruled out that the fibres have been damaged/exposed.

- Evaluation: Red



### Cuts, scratches, grooves

Fibres have been exposed and/or cut through. It cannot be definitively ruled out that the fibres have been damaged/exposed.

- Evaluation: Red

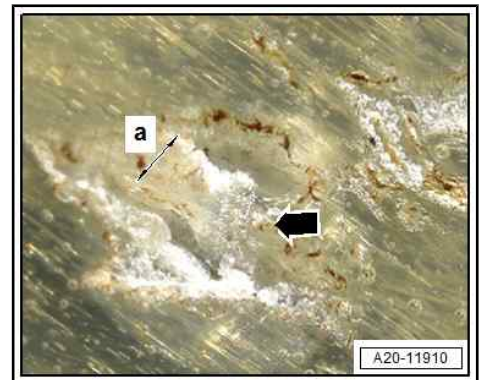


### Cuts, scratches, grooves

Fibres have been exposed and/or cut through. It cannot be definitively ruled out that the fibres have been damaged/exposed.

Dimension -a- = 1 mm

- Evaluation: Red





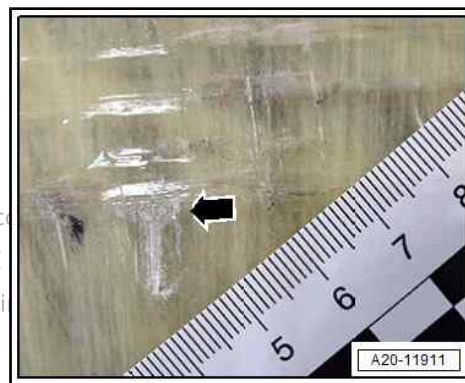
### Abrasion

Surface is slightly damaged, but fibres have not been exposed or cut through.

- Evaluation: Green



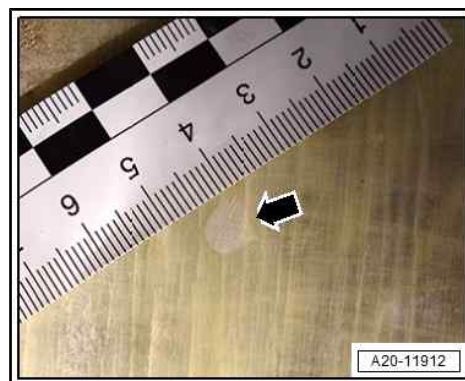
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### Abrasion

Surface is slightly damaged, but fibres have not been exposed or cut through.

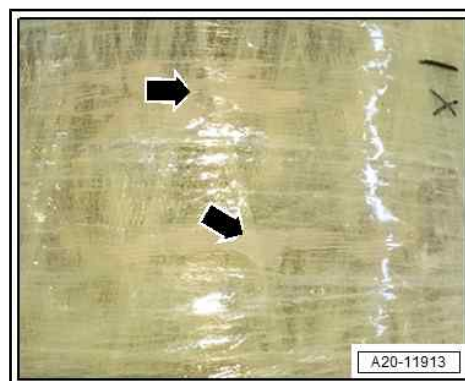
- Evaluation: Green



### Abrasion

Surface is slightly damaged, but fibres have not been exposed or cut through.

- Evaluation: Green



### Abrasion

Fibres have been exposed and/or cut through. It cannot be definitively ruled out that the fibres have been damaged/exposed.

- Evaluation: Red





### Charring/soot

No noticeable discolouration or browning. Deposits or dirt can be washed off.

- Evaluation: Green

Discolouration or darkened areas are present locally or over large surfaces; they cannot be washed/wiped off. The surface shows the effects of heat.

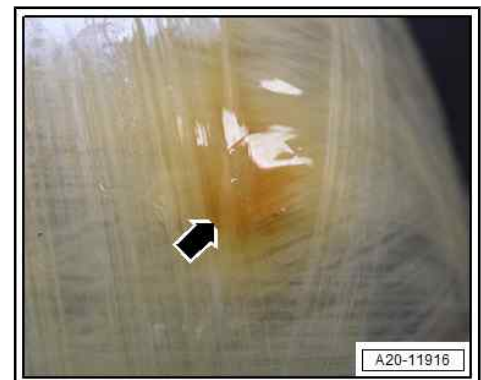
- Evaluation: Red



### Charring/soot

Discolouration or darkened areas are present locally or over large surfaces; they cannot be washed/wiped off. The surface shows the effects of heat.

- Evaluation: Red



### Charring/soot

Discolouration or darkened areas are present locally or over large surfaces; they cannot be washed/wiped off. The surface shows the effects of heat.

- Evaluation: Red

### Effect of chemicals

The surface can be cleaned; no residue remains on the surface. The chemical can definitely not have had an effect on the cylinder material.

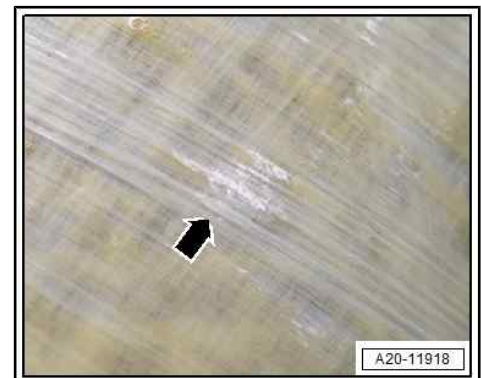
- Evaluation: Green



### Effect of chemicals

The chemical cannot be identified or it cannot be ruled out that the cylinder has been adversely affected. There is visible discolouration/roughness on the surface, fibres are exposed, surface shows signs of delamination.

- Evaluation: Red

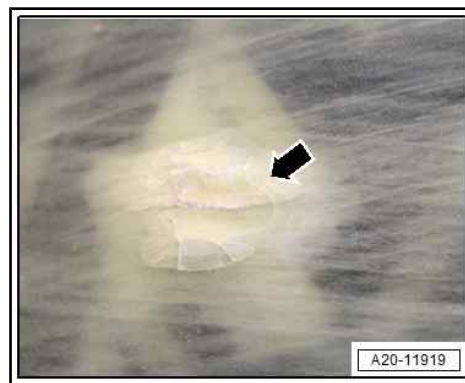




### Effect of chemicals

The chemical cannot be identified or it cannot be ruled out that the cylinder has been adversely affected. There is visible discolouration/roughness on the surface, fibres are exposed, surface shows signs of delamination.

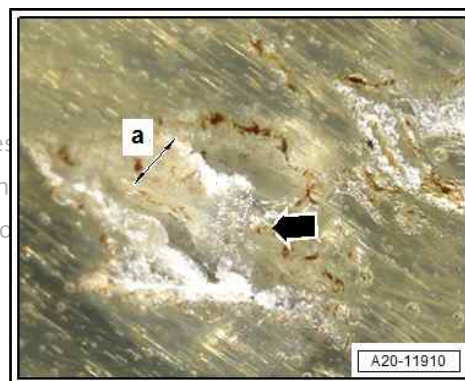
- Evaluation: Red



### Effect of chemicals

The chemical cannot be identified or it cannot be ruled out that the cylinder has been adversely affected. There is visible discolouration/roughness on the surface, fibres are exposed, surface shows signs of delamination.

- Evaluation: Red



### Effect of chemicals

The chemical cannot be identified or it cannot be ruled out that the cylinder has been adversely affected. There is visible discolouration/roughness on the surface, fibres are exposed, surface shows signs of delamination.

- Evaluation: Red

### Disintegration

The tank shows an even disintegration. It has a slight loss of shine or may appear chalky. The surface is not similar to other damage images.

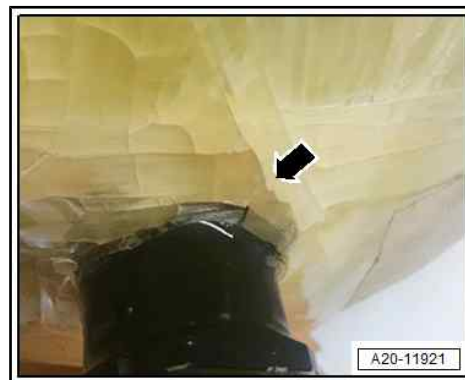
- Evaluation: Green



### Disintegration

The surface shows cracks; the material can be scratched off without significant force. The fibres are exposed, the surface is no longer sealed. There is a noticeable discolouration/browning of the surface.

- Evaluation: Red





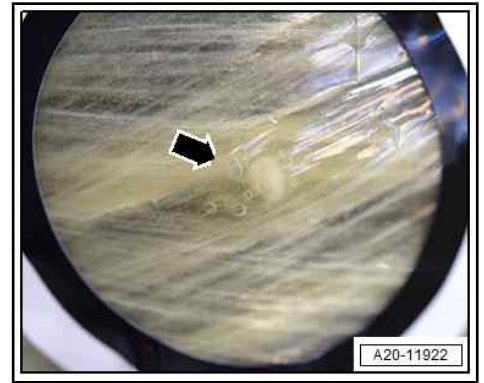
#### Impact, e.g. due to collision or accident

##### Note

- ◆ Tank material was hit by something and grazed.
- ◆ The resin may appear broken.

The damage is only on the surface. It can be ruled out that the damage has reached the fibres. The area affected does not show any discolouration at the point of impact.

- Evaluation: Green



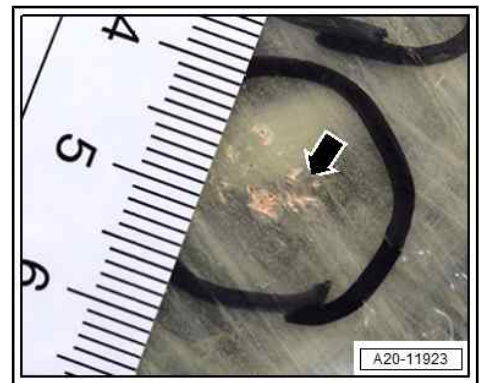
#### Impact, e.g. due to collision or accident

##### Note

- ◆ Tank material was hit by something and grazed.
- ◆ The resin may appear broken.

The surface has been penetrated as far as the fibres; the fibres are exposed and/or damaged. There is discolouration (delamination) around the point of impact.

- Evaluation: Red



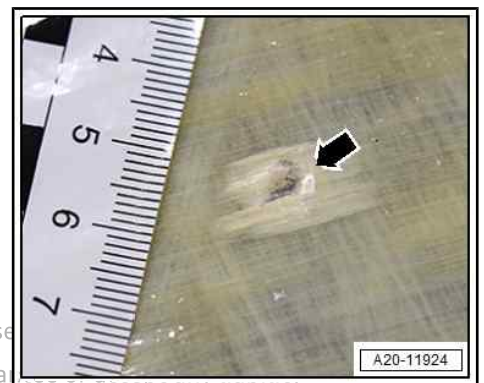
#### Impact, e.g. due to collision or accident

##### Note

- ◆ Tank material was hit by something and grazed.
- ◆ The resin may appear broken.

The surface has been penetrated as far as the fibres; the fibres are exposed and/or damaged. There is discolouration (delamination) around the point of impact.

- Evaluation: Red



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#### Impact, e.g. due to collision or accident

##### Note

- ◆ Tank material was hit by something and grazed.
- ◆ The resin may appear broken.

The surface has been penetrated as far as the fibres; the fibres are exposed and/or damaged. There is discolouration (delamination) around the point of impact.

- Evaluation: Red





## Impact, e.g. due to collision or accident

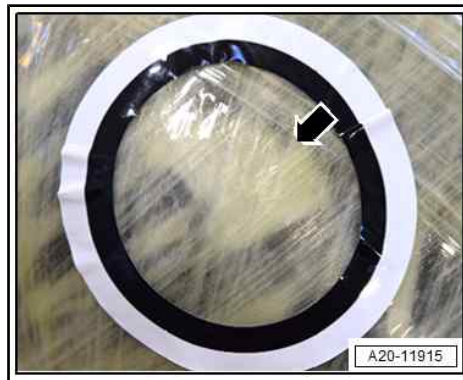


### Note

- ◆ *Tank material was hit by something and grazed.*
- ◆ *The resin may appear broken.*

The surface has been penetrated as far as the fibres; the fibres are exposed and/or damaged. There is discolouration (delamination) around the point of impact.

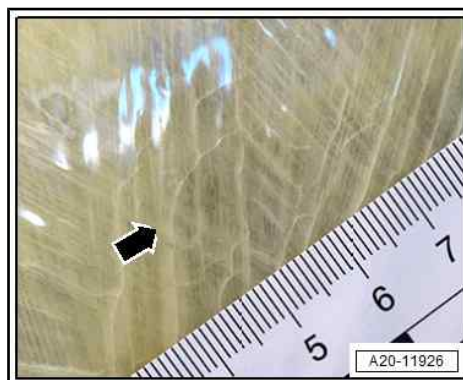
- Evaluation: Red



## Tensioning crack with or without corrosion

There are noticeable surface cracks; the fibres are not damaged or exposed.

- Evaluation: Green



## Tensioning crack with or without corrosion

There are noticeable surface cracks; the fibres are not damaged or exposed.

- Evaluation: Green



## Tensioning crack with or without corrosion

The fibres have been damaged; blow-outs are noticeable in the surface; fibres have been exposed.

- Evaluation: Red



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### Tensioning crack with or without corrosion

The fibres have been damaged; blow-outs are noticeable in the surface; fibres have been exposed.

- Evaluation: Red

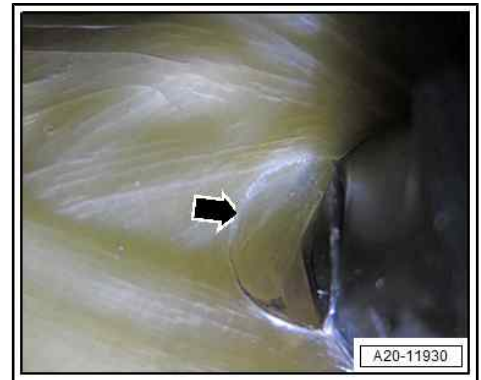
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### Corrosion, hole

Signs of surface corrosion present; deeper corrosion cannot be ruled out. Surface may also have blown out.

- Evaluation: Red



## 1.3 Storing natural gas fuel tanks

### DANGER

**Filled natural gas fuel tanks constitute an explosion risk - risk of death!**

**Danger of severe or fatal injuries due to explosion.**

- In the event of a fire, remove filled natural gas fuel tanks from the burning area or spray them with water.
- Inform the fire brigade of any stored, filled natural gas fuel tanks.

### Where to store

- Filled natural gas fuel tanks must only be stored in well ventilated areas which are protected from unauthorised access.
- They should preferably be stored outdoors, e.g. in a wire-mesh cage. The gas must be able to escape upwards unobstructed.
- Locate the wire-mesh cage so that no object temperatures greater than 60 °C in the shade can occur.

Applies to Germany:

- Filled and non-leaking natural gas fuel tanks which have been removed from a vehicle and which will be reinstalled in the vehicle on the same day (8 hours) may be stored next to the vehicle for this period.



### Note

*If, in exceptional cases, it is necessary to store tanks inside, technical measures must be taken to ensure that an explosive atmosphere cannot under any circumstances form.*



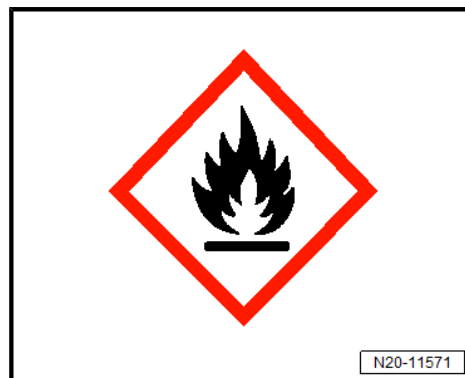
## How to store

- Removed natural gas fuel tanks must be secured to prevent them from falling or tipping.
- Store the tanks in such a way that they cannot be damaged.

### Signs for storage area

The storage area (e.g. wire-mesh cage) must be marked as follows:

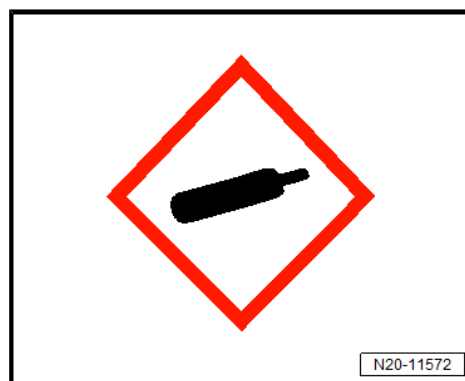
- ◆ GHS “flame” pictogram



- ◆ GHS “gas cylinder” pictogram

The following safety notices must be displayed at the storage area:

- ◆ F+: R12.
- ◆ Highly flammable
- ◆ May cause suffocation in high concentrations
- ◆ Compressed gas



### Signs for natural gas fuel tanks

The following information must be clearly displayed on removed fuel tanks and fuel tanks that have not been discharged/rendered inert (e.g. by hanging signs on them).

- ◆ Fuel tank (natural gas/CNG)
- ◆ Fill level of fuel tank
- ◆ Vehicle number plate or vehicle identification number

## 1.4 Handling unpressurised natural gas fuel tanks made of composite fibre materials



**Natural gas fuel tanks made of composite fibre materials can be damaged irreparably if they are unpressurised when stored.**

- **Never store natural gas fuel tanks unpressurised.**

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## 1.5 Setting up and marking a protected area

Always follow country-specific laws, regulations and guidelines

⇒ [“5 Laws and regulations”, page 7](#) .



**! DANGER**

**Risk of explosion due to gas escape in connection with ignition sources and electrostatic discharge - risk of death!**

**Danger of severe or fatal injuries due to explosion.**

- Never discharge natural gas fuel tanks in enclosed areas.
- Never discharge natural gas fuel tanks if a thunderstorm is approaching.
- Set up a protected area of 10x10 m.
- The protected area must be kept under permanent supervision.
- Never bring ignition sources into the protected area.
- Equalise potential between mechanic and natural gas fuel tank.

**Setting up a protected area**

- A protected area of 10x10 m must be set up around the discharge opening. Requirements:
  - No buildings in the protected area.
  - No mobile phones switched on in the protected area.
  - No active ignition sources (e.g. open fire, hot surfaces or electrostatically charged objects) in the protected area.
  - No persons in the protected area who are not actively performing work.
  - The gas must not be able to enter cellars, neighbouring buildings, open doors, open windows, or any other openings.

**Signs for protected area**



- ◆ Sign for area with explosion risk
- ◆ Gas cylinder
- ◆ Sign prohibiting unauthorised entry
- ◆ Sign prohibiting mobile phones
- ◆ Sign prohibiting fire and naked flames
- ◆ Sign prohibiting smoking

#### Precautions against electrostatic charging

- Do not change your work clothing or protective clothing in the protected area and do not take anything off or put anything on.
- The mechanic must wear dissipative shoes and gloves.
- Equalise potential between mechanic and natural gas fuel tank before fitting exhaust -VAS 523 001- .



## 1.6 Discharging natural gas fuel tanks

### DANGER

Risk of explosion due to gas escape in connection with ignition sources and electrostatic discharge - risk of death!

Danger of severe or fatal injuries due to explosion.

- Never discharge natural gas fuel tanks in enclosed areas.
- Never discharge natural gas fuel tanks if a thunderstorm is approaching.
- Set up a protected area of 10x10 m.
- The protected area must be kept under permanent supervision.
- Never bring ignition sources into the protected area.
- Equalise potential between mechanic and natural gas fuel tank.

#### Setting up and marking a protected area

- Set up and mark a protected area  
⇒ ["1.5 Setting up and marking a protected area" page 30](#)

#### Requirements for discharging

- Discharging must be performed outdoors.
- Permitted outside temperature: -10 ... 40 °C
- Permitted wind speed: less than 15 m/s
- Gas must only be discharged from natural gas fuel tanks using the prescribed gas discharge tube - VAS 523 001- .
- The discharge opening must be at least 3 metres above ground level.
- After discharging is complete, determine the residual pressure in the natural gas fuel tank to ensure that the fuel tank has been discharged to a non-hazardous residual pressure  
⇒ [page 38](#) .

All further procedures are described in ⇒ Fuel supply system - g-tron; Rep. gr. 20 ; Fuel tanks; Discharging natural gas fuel tanks .

## 1.7 Determining residual pressure in natural gas fuel tank

⇒ ["1.7.1 Procedure for determining residual pressure in natural gas fuel tank", page 33](#)

⇒ ["1.7.2 Checking and modifying adapter for checking residual pressure in natural gas tank", page 34](#)

⇒ ["1.7.3 Self-test for cooling system tester V.A.G 1274 B ", page 36](#)

⇒ ["1.7.4 Self-test for adapter V.A.G 1274B/12 A ", page 36](#)

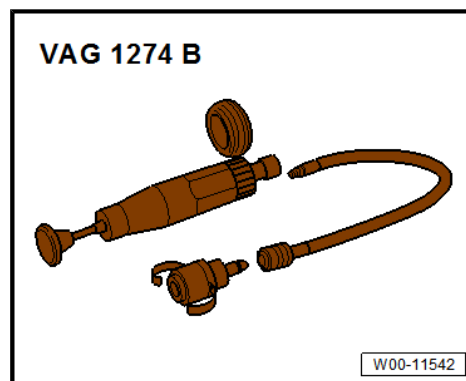
⇒ ["1.7.5 Determining residual pressure in natural gas fuel tank", page 38](#)

### 1.7.1 Procedure for determining residual pressure in natural gas fuel tank

Special tools and workshop equipment required



- ◆ Cooling system tester - V.A.G 1274 B-



- ◆ Adapter - V.A.G 1274B/12 A- (not illustrated)

#### Procedure

- Natural gas fuel tank discharged  
⇒ [“1.6 Discharging natural gas fuel tanks”, page 33](#) .

The residual pressure of the natural gas fuel tank must be determined after the tank has been discharged to ensure that there is no residual pressure remaining. A counter-pressure test is used to determine the residual pressure in the natural gas fuel tank. This involves attempting to force air into the natural gas fuel tank using the cooling system tester and a suitable adapter  
⇒ [page 34](#) .

- ◆ If air can be forced in, the residual pressure in the natural gas fuel tank has been dissipated.
- ◆ If air cannot be forced in, there is still residual pressure in the natural gas fuel tank.

To ensure that the test is reliable, a self-test must be performed first to check the cooling system tester and the adapter  
⇒ [page 36](#) and ⇒ [page 36](#) . The residual pressure can then be determined ⇒ [page 38](#) .

### 1.7.2 Checking and modifying adapter for checking residual pressure in natural gas tank

#### DANGER

**Risk of explosion due to gas escape from natural gas fuel tanks that have not been sufficiently discharged in connection with ignition sources and electrostatic discharge - risk of death!**

**Danger of severe or fatal injuries due to explosion.**

- Only used approved adapters to determine residual pressure in natural gas fuel tank.



- Before using the adapter for checking residual pressure in natural gas tank, it is important to check that you have the correct version of this tool ➔ [page 35](#) .
- Only the adapter - V.A.G 1274B/12 A- may be used.
- The older adapter - V.A.G 1274B/12- may also be used if an adapter with pressure relief valve has been retrofitted ➔ [page 35](#) .

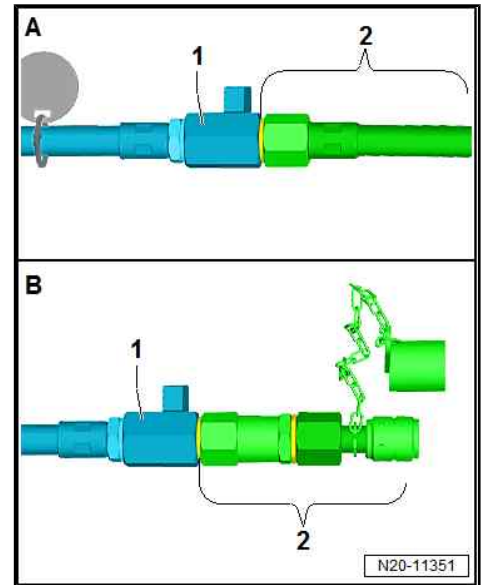
#### Identifying different versions

A - Non-approved old version: Adapter - V.A.G 1274B/12-  
-item 1- without pressure relief valve in connection -2-

- ◆ The old version -A- does not have a pressure relief valve and must only be used if it has been fitted with an adapter with pressure relief valve.

B - Adapter - V.A.G 1274B/12 A- with pressure relief valve in connection piece -2-

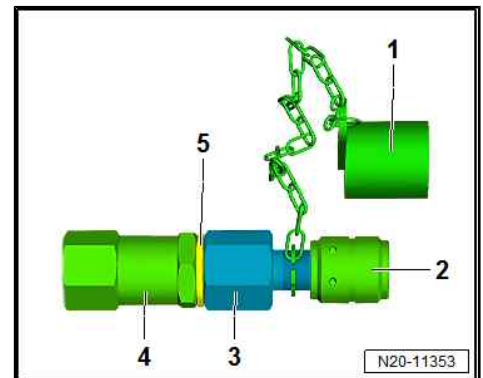
- ◆ The new version -B- is significantly longer in area -2-. The pressure relief valve is located in this area.



#### Modifying adapter -V.A.G 1274B/12- to correspond to new version

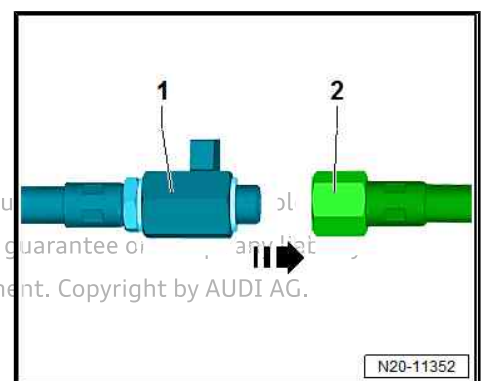
Adapter - V.A.G 1274B/12A-1- is required for the modification; it consists of:

- 1 - Cap
- 2 - Screw-type connection to fuel tank shut-off valve
- 3 - Connection piece
- 4 - Pressure relief valve
- 5 - Seal



#### Procedure

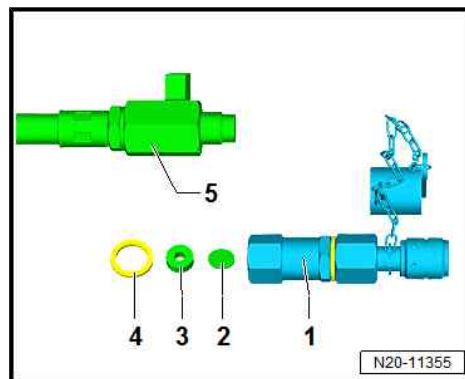
- Observe safety precautions when working on the natural gas system ➔ [page 1](#) .
- Observe rules for cleanliness ➔ [page 9](#) .
- Counterhold at connection -1- and unscrew union nut -2- on adapter - V.A.G 1274B/12- .
- Detach spacer ring from connection -1-.



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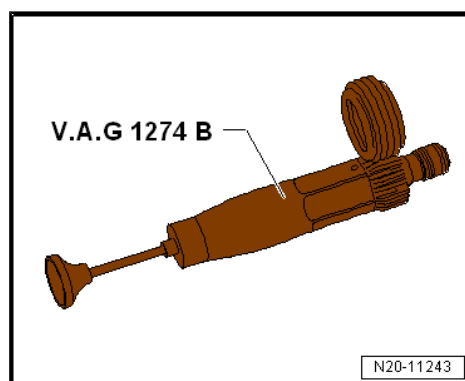
- Fit filter strainer -2- in adapter - V.A.G 1274B/12A-1- -item 1-.
- Fit seal -3- in adapter - V.A.G 1274B/12A-1- -item 1-.
- Push spacer ring -4- onto threaded piece of adapter -V.A.G 1274B/12- -item 5-.
- Screw adapter - V.A.G 1274B/12 A-1- -item 1- onto adapter - V.A.G 1274B/12- -item 5- and tighten to 20 Nm (counterhold at connection -5-).
- Perform self-test on modified adapter for checking residual pressure in natural gas tank ➔ [page 36](#) .



### 1.7.3 Self-test for cooling system tester - V.A.G 1274 B-

#### Procedure

- Disconnect any adapter lines connected to cooling system tester - V.A.G 1274 B- .
- Operate cooling system tester - V.A.G 1274 B- several times.



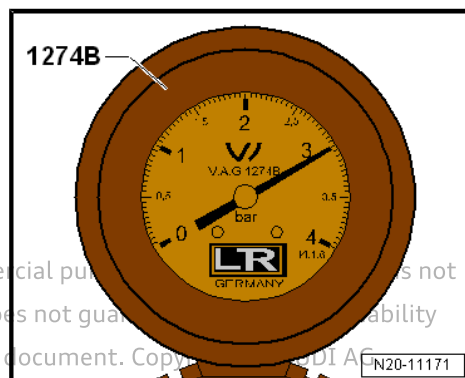
- Build up a pressure of 3.0 bar on cooling system tester - V.A.G 1274 B- .
- Monitor pressure on pressure gauge of cooling system tester - V.A.G 1274 B- for 30 seconds.

#### If pressure does not build up, or if pressure dissipates again:

- Cooling system tester - V.A.G 1274 B- is not OK and must not be used to check residual pressure.

#### If pressure builds up and does not dissipate:

- Cooling system tester - V.A.G 1274 B- is OK and may be used.



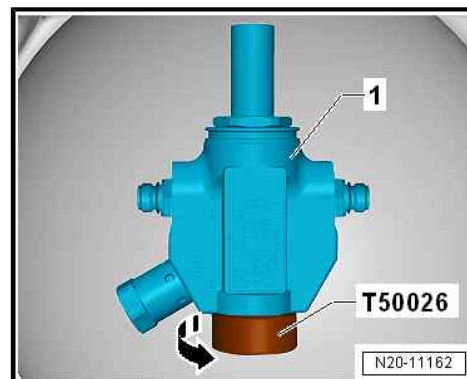
### 1.7.4 Self-test for adapter - V.A.G 1274B/12 A-

#### Procedure

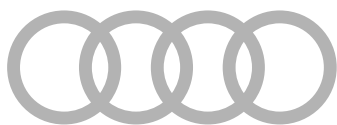
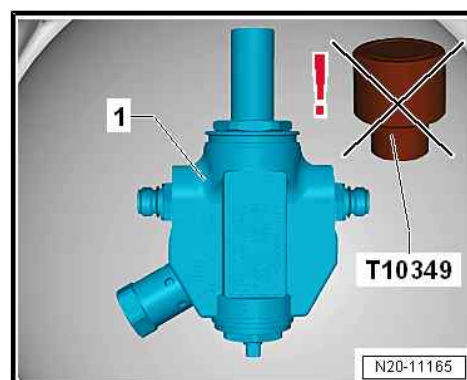
- Different types of fuel tank shut-off valve may be fitted.
- Depending on the version, the fuel tank shut-off valve may have one or two pipe connections.
- On fuel tank shut-off valves with two connections, both connections must be closed off using the adapter for checking residual pressure in natural gas tank and the additional sealing cap.



- Check that mechanical shut-off valve on fuel tank shut-off valve -1- is closed.
- If necessary, close it with hand wheel - T50026- -arrow-.

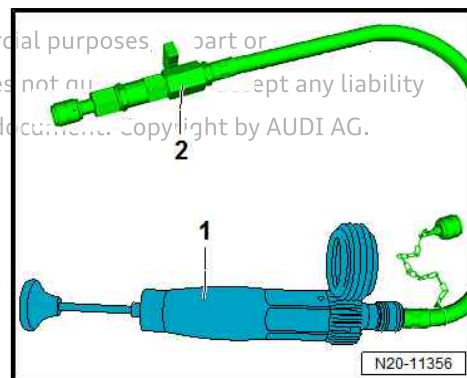


- If fitted, detach magnetic release tool - T10349- .

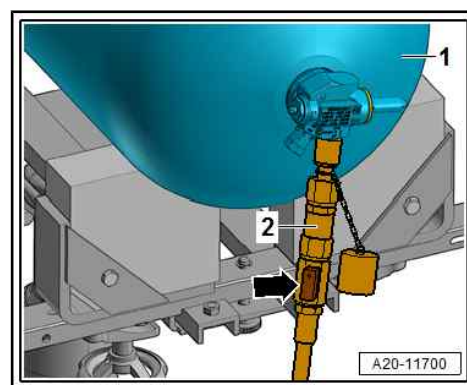


- Connect adapter - V.A.G 1274B/12 A- -item 2- to cooling system tester - V.A.G 1274 B- -item 1-.

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- Connect adapter - V.A.G 1274B/12 A- -item 2- to gas tank shut-off valve -1-.
- Open cut-off valve -arrow- on adapter - V.A.G 1274B/12 A- .
- Lever points in direction of flow.





- Build up a pressure of 3.0 bar on cooling system tester - V.A.G 1274 B- by operating it repeatedly.
- Monitor pressure on pressure gauge of cooling system tester - V.A.G 1274 B- for 30 seconds.

**If pressure does not build up, or if pressure dissipates again:**

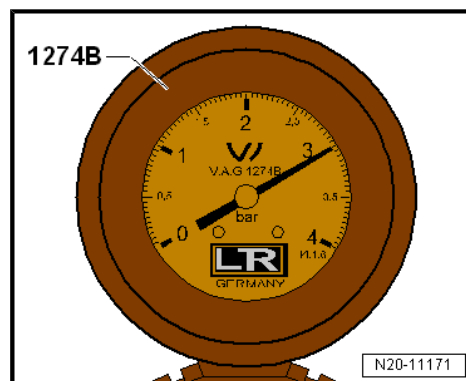
- Check connection between tank shut-off valve, adapter - V.A.G 1274B/12 A- and, if necessary, cap. Tighten if necessary.
- Perform check (self-test) again.

**If pressure still does not build up, or if pressure dissipates again:**

- Adapter - V.A.G 1274B/12 A- is not OK and must not be used to check residual pressure.

**If pressure builds up and does not dissipate:**

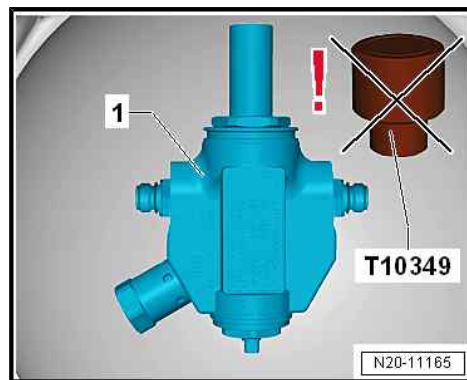
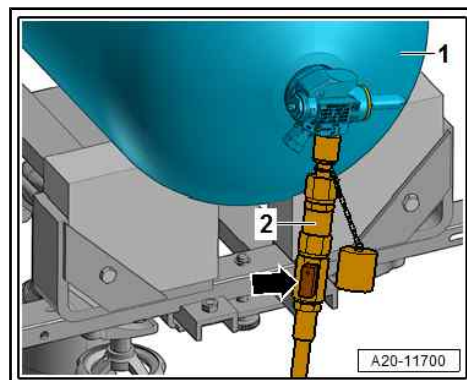
- Cooling system tester - V.A.G 1274 B- and adapter - V.A.G 1274B/12 A- are OK and can be used to check residual pressure.
- Press the button for pressure equalisation on the cooling system tester - V.A.G 1274 B- . This will dissipate the pressure in the cooling system tester - V.A.G 1274 B- and the adapter - V.A.G 1274B/12 A- .



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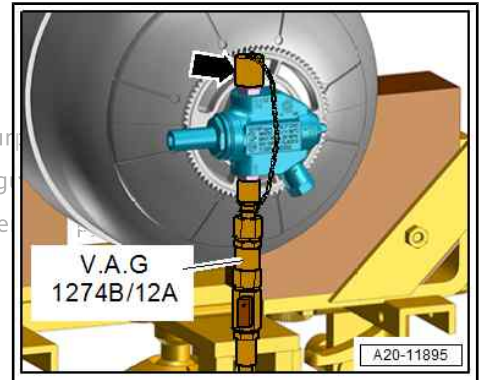
## 1.7.5 Determining residual pressure in natural gas fuel tank

### Test requirements



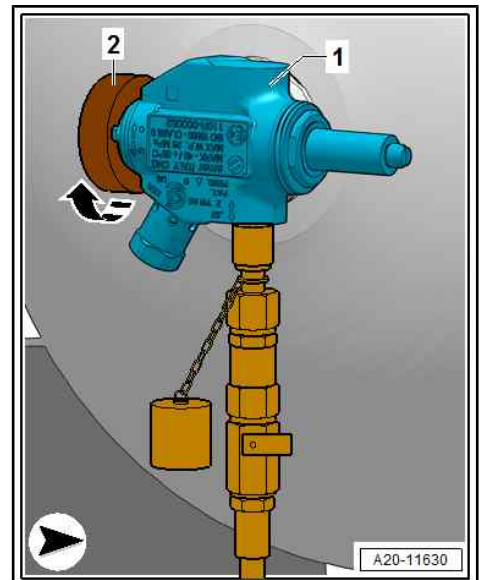


- Self-test performed for cooling system tester - V.A.G 1274 B-  
⇒ [page 36](#) .
- Self-test performed for adapter - V.A.G 1274B/12 A-  
⇒ [page 36](#) .
- Cooling system tester - V.A.G 1274 B- and adapter - V.A.G 1274B/12 A- -item 2- connected to tank shut-off valve -1-.
- Magnetic release tool - T10349- detached.
- On tank shut-off valves with two connections, the second connection must be sealed with cap -arrow- from adapter - V.A.G 1274B/12 A- .

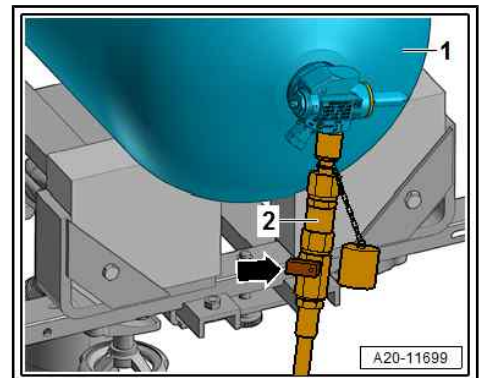


## Procedure

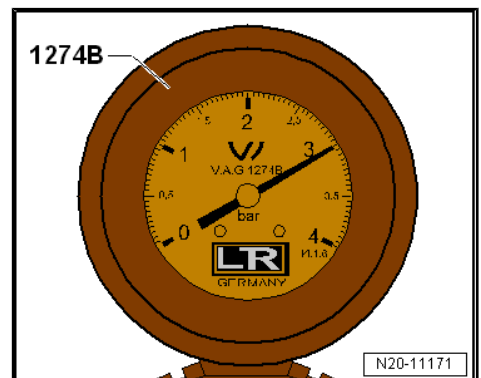
- Using hand wheel - T50026- -item 2-, carefully open -arrow- mechanical shut-off valve on tank shut-off valve -1-.



- Close cut-off valve -arrow- on adapter - V.A.G 1274B/12 A- -item 2-.
- The lever should point perpendicular to direction of flow.



- Build up a pressure of 3.0 bar on cooling system tester - V.A.G 1274 B- by operating it repeatedly.





- Open cut-off valve -arrow- on adapter - V.A.G 1274B/12 A-item 2-.
- Lever points in direction of flow.
- Monitor pressure on pressure gauge of cooling system tester - V.A.G 1274 B- for 30 seconds.

**If pressure does not drop below 1.0 bar immediately:**

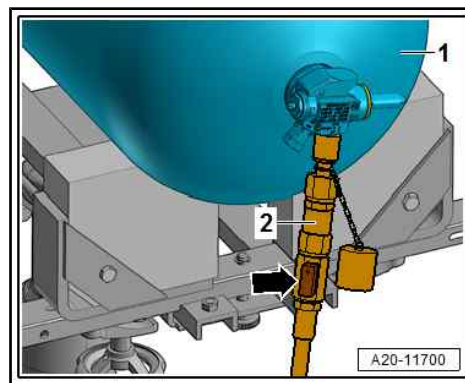
- The pressure in the fuel tank is too high.
- The fuel tank has not been sufficiently discharged.

### **DANGER**

**Risk of explosion due to gas escape from natural gas fuel tanks that have not been sufficiently discharged in connection with ignition sources and electrostatic discharge - risk of death!**

**Danger of severe or fatal injuries due to explosion.**

- **Never work on natural gas fuel tanks that have not been sufficiently discharged and are still under pressure.**



- Repeat discharging procedure for fuel tank ⇒ Fuel supply system - g-tron; Rep. gr. 20 ; Fuel tank; Discharging natural gas fuel tanks .
- Determine residual pressure in natural gas fuel tank  
⇒ [page 39](#) .

**If pressure drops below 1.0 bar immediately:**

- To ensure that the test was performed correctly, determine the residual pressure in the natural gas fuel tank again  
⇒ [page 39](#) .
- Operate cooling system tester - V.A.G 1274 B- again several times after checking residual pressure.
- Air will be pumped audibly into the tank.
- Pressure should not build up when doing so.
- If pressure builds up, determine the residual pressure in the natural gas fuel tank again ⇒ [page 39](#) .

**If pressure continues to build up:**

### **DANGER**

**Risk of explosion due to gas escape from natural gas fuel tanks that have not been sufficiently discharged in connection with ignition sources and electrostatic discharge - risk of death!**

**Danger of severe or fatal injuries due to explosion.**

- **Never perform further work on a natural gas fuel tank if it was not possible to reduce the residual pressure to 1.0 bar or below.**

- In this case, the fuel tank with tank shut-off valve must be disposed of by a specialist company.

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- ♦ Ask your distribution centre or Importer which company is responsible for doing this.
- ♦ In Germany, the company responsible is a bomb disposal organisation.



**! DANGER**

Risk of explosion due to gas escape from natural gas fuel tanks that have not been sufficiently discharged in connection with ignition sources and electrostatic discharge - risk of death!

Danger of severe or fatal injuries due to explosion.

- Further work may only be performed after the residual pressure in the natural gas fuel tank has been successfully reduced to 1.0 bar or below.

- Natural gas fuel tank is discharged sufficiently and pressure is dissipated.

**! DANGER**

Risk of explosion due to gas escape in connection with ignition sources and electrostatic discharge - risk of death!

Danger of severe or fatal injuries due to explosion.

- Never dispose of a natural gas fuel tank which has not been fully discharged.
- Render discharged natural gas fuel tanks inert before disposal.

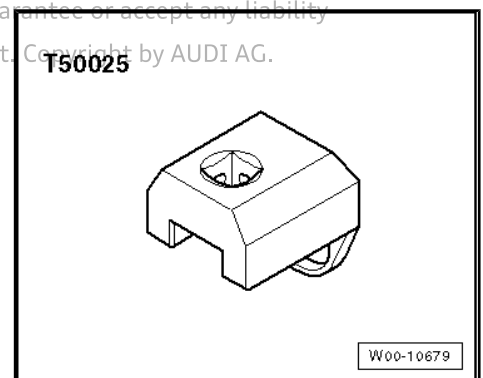
- Render natural gas fuel tanks inert ➔ [page 41](#) .

## 1.8 Rendering natural gas fuel tanks inert

### Special tools and workshop equipment required

- ◆ Key - T50025-

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- Residual pressure in natural gas fuel tank determined ➔ [page 38](#) .
- 
- Only render natural gas fuel tanks inert for disposal.



**⚠ DANGER**

**Risk of explosion due to gas escape in connection with ignition sources and electrostatic discharge - risk of death!**

**Danger of severe or fatal injuries due to explosion.**

- Residual pressure in natural gas fuel tank must not exceed 1.0 bar.
- Never render natural gas fuel tanks inert in enclosed areas.
- Never render natural gas fuel tanks inert if a thunderstorm is approaching.
- Set up a protected area of 10x10 m.
- The protected area must be kept under permanent supervision.
- Never bring ignition sources into the protected area.
- Equalise potential between mechanic and natural gas fuel tank.

- Apply key - T50025- at mechanical tank shut-off valve -1-, as shown.
- Ensure that guide of key -T50025- is seated correctly on mechanical tank shut-off valve.
- Using key - T50025- , loosen mechanical tank shut-off valve -1- carefully.

**Note:**

Depending on the residual pressure, you may hear some noise when releasing the seal from the sealing area.

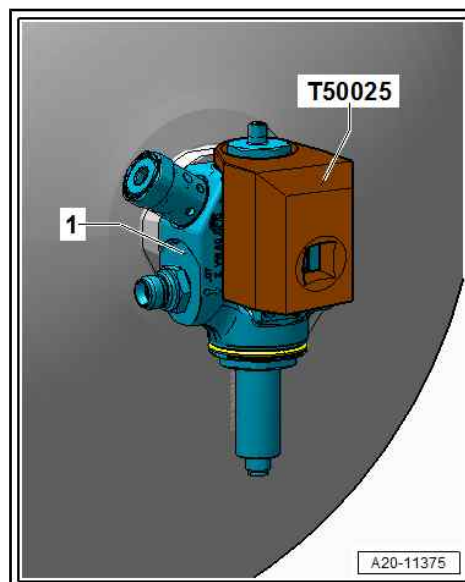
- Unscrew tank shut-off valve slowly in stages of 360° by no more than six turns.
- Because natural gas escapes during the inertisation process, the same precautions must be taken as when natural gas is discharged ⇒ [page 1](#) .

**Rendering tanks inert with nitrogen**

- Place fuel tank in vertical position and insert a hose or an injection lance in the fuel tank opening so that it reaches the bottom.
- Fill fuel tank with nitrogen.
- The gas will be displaced upwards out of the fuel tank opening.
- Allow the natural gas fuel tank to stand for 12 hours.

**Rendering tanks inert with water**

- Place fuel tank in vertical position and fill it with water (it must be completely full).
- The gas will be displaced upwards out of the fuel tank opening.
- Ensure that no pockets of gas form in the fuel tank.
- Allow the natural gas fuel tank to stand for 12 hours.





## 1.9 Disposing of natural gas fuel tanks



### DANGER

**Risk of explosion due to gas escape in connection with ignition sources and electrostatic discharge - risk of death!**

**Danger of severe or fatal injuries due to explosion.**

- Never dispose of a natural gas fuel tank which has not been fully discharged.
- Render discharged natural gas fuel tanks inert before disposal.

- Any natural gas fuel tanks which are to be disposed of must be discharged fully.
- Full discharge must be performed by rendering the tank inert (filling with nitrogen or water) [⇒ page 41](#).
- The fuel tank can then be discharged and disposed of.
- A 10 mm hole must be made in fuel tanks made of composite fibre materials after discharge.