



Technical Service Bulletin

87 Air conditioning refrigerant circuit diagnostic method using calibration gas
87 22 24 2064077/1 April 15, 2022.



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Model(s)	Year	VIN Range	Vehicle-Specific Equipment
A4 allroad, A4, S4, A5, A5 Cabriolet, A5 Sportback, S5, S5 Cabriolet, S5 Sportback, A6, S6 A7, S7, Q3, A5, SQ5, Q7, TT, TTS, and TT Roadster	2018 – 2023	All	Not Applicable
A3 Cabriolet	2018 - 2019		
A3, and S3	2018 – 2020 2022 – 2023		
RS 3	2018 – 2020 2023		
RS 5	2018 – 2019 2021 - 2023		
RS 7	2018 2021 - 2023		
A8	2018 – 2021 2023		
S8	2018 2020 – 2021 2023		
R8, and R8 Spyder	2018 2020 – 2023		
TT RS	2018 – 2022		
RS 5 Sportback	2019 2021 – 2023		
e-tron quattro	2019 2021 – 2023		
Q8	2019 – 2023		
A6 allroad, e-tron Sportback quattro, SQ7, SQ8, and RS Q8	2020 – 2023		



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A8 e quattro	2020 – 2021		
Q5 e quattro	2020 – 2021 2023		
RS 6 Avant, Q5 Sportback, and SQ5 Sportback	2021 – 2023		
A7 e quattro	2021 – 2022		
e-tron GT, and RS e-tron GT	2022 – 2023		

Condition

The cabin air conditioning cooling capacity is insufficient or without function on an R134a or R1234yf refrigerant system equipped vehicle.

Technical Background

When a refrigerant circuit leak is determined as the root cause of a cabin cooling insufficiency it has traditionally been diagnosed using either the addition of a contrast dye into the circuit and inspection using ultraviolet light, the use of an electronic halogen leak detector, or filling the circuit with pressurized nitrogen and searching for the leak by applying a liquid soap and water solution and inspecting the circuit for the presence of bubble formation. These methods can be unreliable, particularly when diagnosing a possible refrigerant leak in the evaporator core.

When diagnosing a possible leak from an evaporator core, false-positive readings from a halogen leak detector are common and visual access to the evaporator core in an attempt to inspect for the presence of contrast dye or bubble formation is problematic at the very least.

An additional diagnostic method is now available to analyze a refrigerant leak in the circuit of an R134a or R1234yf refrigerant system using calibration gas (95% nitrogen / 5% hydrogen) and an electronic hydrogen detector (VAS523003A). Leak detection using calibration gas has been found to be more effective when diagnosing a leak source in the areas of the refrigerant circuit that are extremely difficult to access (e.g. the evaporator core concealed inside the evaporator housing).



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Production Solution

Beginning with the R744 refrigerant system in the new Q4 e-tron the leak detection method for this refrigerant system requires a process that prohibits the use of additives of any kind when diagnosing a leak, creating the need for a leak detection method using calibration gas. This requires a new tool set. The *AT-448 Tool Set Audi R744 CO₂ A/C Service Introduction* (See *Service Information circular – Special Tools and Equipment number ATE-21-21*) is now released to all dealers. The tools in this set can be adapted to diagnose R134a and R1234yf refrigerant circuit leaks as well.

Service



Note:

The procedure in this TSB describes a method for leak detection for R134A and R1234yf refrigerant platforms only. While the diagnostic method for the R744 system in the Q4 e-tron is similar there are important differences in the procedure and, as such, should be carried out using the procedure in ElsaPro.



Warning:

Extreme caution must be exercised when handling and using calibration gas. The hydrogen component of the gas mixture is flammable. Failure to employ proper handling and use protocol invites the risk of serious personal injury or death.

1. Should the vehicle arrive with insufficient cabin cooling from the air conditioning system recover the refrigerant remaining in the circuit and compare this amount to the specified volume. A significantly lesser amount recovered (>50% of total volume lost) indicates an active refrigerant circuit leak.



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2. Obtain a tank of calibration gas (95% nitrogen / 5% hydrogen) (Figure 1). This will need to be sourced locally (e.g. Airgas®).



Figure 1. Calibration gas (95% Nitrogen / 5% Hydrogen).




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- The pressure regulator included in the NITROKITG will not be used as it is only suitable for connection to a gas tank containing non-flammable gasses such as nitrogen (right-hand thread). The AT-448 Tool Set includes the VAS 584005 pressure regulator suitable for connection to a gas tank containing any flammable component as is the case with the hydrogen component in calibration gas (left-hand thread). Connect the VAS 584005 pressure regulator to the tank (Figure 2). Make sure the tank valve remains closed.



Figure 2. VAS 584005 pressure regulator attached to the calibration gas tank.

- Set the HVAC settings to full defrost. Close all of the instrument panel vents and make sure that the fresh air intake is also closed (recirculation mode). Close off the cabin completely (windows, sunroof, doors, rear lid, etc.). Then turn off the vehicle completely (key off, no blower activation).
- When servicing a high voltage vehicle de-energize the vehicle.

 DANGER
High voltage increases the risk of fatal injury.
Severe bodily injury or death by electrocution or electric arcs is possible.
– Have an Audi high-voltage technician or an Audi high-voltage expert de-energize the high-voltage system.

- The NITROKITG includes a service hose and high side service port snap coupler for both an R134a and R1234yf refrigerant system. This will allow the single connection to the refrigerant circuit of both an R134a as well as an R1234yf equipped vehicle. Use the snap coupler appropriate for the refrigerant platform being serviced from the NITROKITG to complete the connection.



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7. Evacuate the vehicle refrigerant circuit for 15 minutes. After the refrigerant circuit is free of any refrigerant connect the service manifold from the NITROKITG Automotive A/C Nitrogen Leak Test Kit to the high side service port. Use the appropriate snap coupler for the platform of the circuit being serviced. (Figure 3).

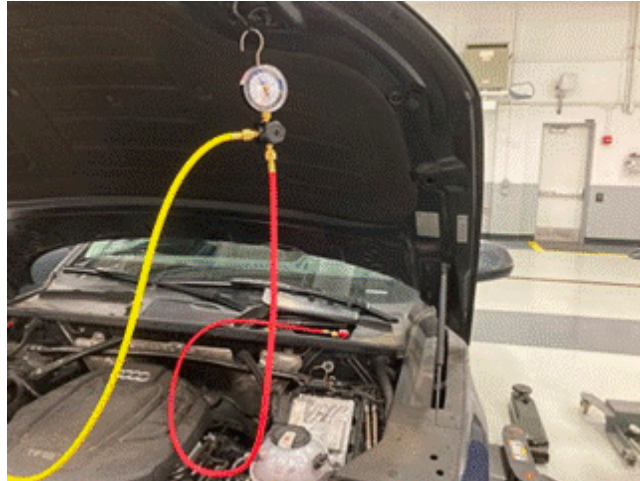


Figure 3. NITROKITG manifold connected to the high side service port.

8. Only one of the ports needs to be connected for this diagnosis. The connection to the high side port is shown in Figure 4.



Figure 4. NITROKITG high side snap coupler connected to the high side service port.



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9. Connect the VAS 584005 Pressure Reducer to the NITROKITG manifold. Fill the circuit with calibration gas to an absolute pressure of no greater than 14 bar (Figure 5).

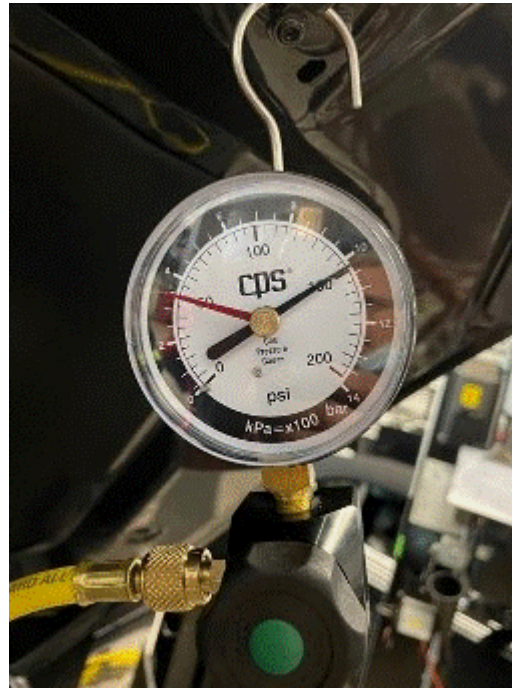


Figure 5. Calibration gas pressure in the circuit.



Note:

The air conditioning system must not be activated while the circuit is charged with calibration gas. Running the air conditioning system while it is charged with calibration gas will damage the compressor.

If necessary apply a warning sign to the vehicle stating “Do Not Run” or a similar warning to prevent accidental operation while the circuit is filled with calibration gas for the purposes of diagnosis.

10. After the circuit is charged allow the circuit pressure to equalize for 20 minutes. Leak detection can then begin.



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11. Close off the defroster outlets with masking tape leaving a small opening for the VAS 523003A gas leak detector probe (Figure 6).



Figure 6. VAS 523003A gas leak detector in place in the defroster outlet.



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12. The gas leak detector VAS 523003A reacts to the hydrogen component in the calibration gas. Since hydrogen is lighter than air, it will rise to the position of the detector probe. The hydrogen content in the calibration gas, however, evaporates after a short period of time (Figure 7).

Perform the leak diagnosis immediately after charging the refrigerant circuit with calibration gas and the 20-minute equalization period. Depending on the conditions, it may be necessary to recharge the refrigerant circuit with calibration gas in an attempt to clearly identify a circuit leak at the evaporator core.

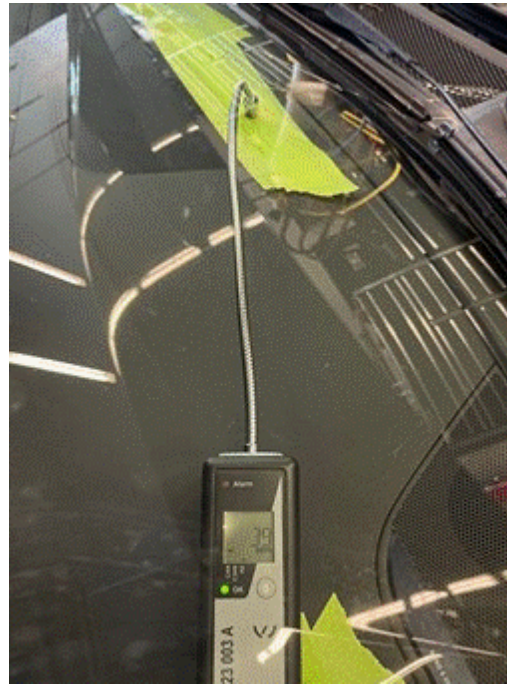


Figure 7. VAS 523003A in place in the defroster outlet and hydrogen presence is detected.

13. If no leak is detected through the defroster outlet using this method the evaporator core is not the source of the refrigerant leak and the evaporator core is not to be replaced. Continue diagnosis using the VAS 523003A along all remaining components of the refrigerant circuit to determine the source of the leak.
14. When any and all leak sources have been identified close the valve on the top of the calibration gas tank. Any calibration gas that remains in the refrigerant circuit can be slowly ventilated until the circuit pressure has equalized with atmospheric pressure. Proceed with the necessary repairs, evacuate the refrigerant circuit, and recharge the system as necessary.
15. When re-energizing a high voltage vehicle observe the following:





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⚠ WARNING
High voltage increases the risk of fatal injury.
Severe bodily injury or death by electrocution or electric arcs is possible.
- have an Audi high-voltage technician or and Audi high-voltage expert bring the high-voltage system back into service.

Warranty

This TSB is informational only and not applicable to any Audi Warranty.

Required Parts and Tools

Tool Number	Tool Description
VAS581009	 R744 CO ₂ A/C Service Unit
VAS584005	 Pressure Reducer and Hose



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NITROKITG	 <p>Automotive A/C Nitrogen Leak Test Kit</p>
VAS523003A	 <p>Gas Leak Detector</p>

Additional Information

All part and service references provided in this TSB (**2064077**) are subject to change and/or removal. Always check with your Parts Department and/or ETKA for the latest information and parts bulletins. Please check the Repair Manual for fasteners, bolts, nuts, and screws that require replacement during the repair.

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