


Guide to refrigerants for wholesalers



 This information letter to our wholesale partners is for your information only. Your own legal obligations during handling, storage and transport remain unaffected by this; Vaillant provides no guarantee for the completeness of the information provided.



Vaillant introduces its new aroTHERM plus air-to-water heat pump. While Vaillant used the R410a refrigerant for the aroTHERM monoblock and split heat pumps, the new sixth-generation heat pump is filled with the natural refrigerant R290.

R290 is a category A3 refrigerant (according to DIN EN 378). R290 is similar in nature to the A3 refrigerant R600A (isobutane), which is also widely used, and which is commonly used by manufacturers of white goods and the responsible logistics companies. The refrigerants R290 and R600A have been used for years to fill commercially available fridges, dehumidifiers, mobile air conditioners and tumble dryers.

The handling of A3 refrigerants is thus neither new nor unusual. However, some basic precautions must be taken during storage and transport, which we would like to explain to you on the following pages.

General information

The properties of R290

R290 is a hydrocarbon. Due to its low flash point, R290 is classified as a highly flammable category 1 gas and must be labelled accordingly. Here is an example of the labelling used for the aroTHERM plus:



R290

Warning about flammable materials



Avoid fires, open flames and smoking



Read the operating and installation instructions

Chemically, R290 is propane in highly pure form without additives such as odorants. It is characterised by a wide range of use (down to $-40\text{ }^{\circ}\text{C}$) and very good efficiency. R290 also has an extremely low global warming potential (GWP) of three. This corresponds to three times the same amount of CO_2 . For comparison, R410a has a global warming potential of 2,088.

R290 is thus increasingly being used as a substitute for fluorinated hydrocarbons as a result of stricter environmental regulations. Also - and above all - in the European Union.

At the same temperature and pressure, R290 is heavier than air and usually reaches higher concentrations near the ground. The gas is odourless, but can be easily detected with commercially available gas detectors and leak detection devices.

Please contact your Vaillant sales or service representative if you have any questions about gas detectors or service tools recommended by Vaillant.

What is intended to protect the climate must not harm humankind. This is why special safety regulations apply to R290. Detailed information on the R290 refrigerant can be found in its relevant safety data sheets, which you can easily find online, for example.

Data on the Vaillant heat pump

The new aroTHERM plus heat pump is made in a monoblock design. This means that the refrigeration circuit is completely inside the external unit of the heating system. The units' refrigeration circuits are hermetically sealed and are supplied from the factory completely filled with R290.

Our new heat pumps contain different amounts of the natural refrigerant R290, depending on their output:

Name of the product	Amount of R290 refrigerant
aroTHERM plus VWL 35/6 and 55/6 S2	600 grams
aroTHERM plus VWL 75/6 S2	900 grams
aroTHERM plus VWL 105/6 S2 and 125/6 S2	1,300 grams

What has to be taken into account during storage?

1 Hazardous substances legislation: REACH, CLP, and COSHH

REACH is Regulation 1907/2006/EC, concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals. REACH doesn't consider R290 as a substance of very high concern (SVCH). Because the R290 is contained within a sealed unit and not supplied separately, there's no obligation to submit information on the use of this substance under article 33 of REACH. However, it's always wise to ensure compliance with local policies or laws when transporting flammable materials.

2 Fire safety

When storing and transporting multiple heat pumps, the volume of R290 increases, and with it, the risk of fire. Depending on the volume of the refrigerant in any one location, fire safety procedures should be reviewed and modified in line with local requirements. The local Fire Brigade should be informed when necessary.

3 Explosion protection

The refrigerant is in a hermetically sealed circuit and every delivered unit is subjected to a leak test. However, it cannot be ruled out that, in exceptional cases, transport damage may occur and refrigerant may be released. It is therefore important to avoid sources of ignition, e.g. sparks or smoking, and to label storage areas accordingly.

Before storing larger quantities of heat pumps, it is also advisable to check the risk of explosion for your warehouses. This is based on the number of heat pumps with the corresponding amount of refrigerant and the volume of storage space as well as on the technical equipment.

Specific measures should be agreed on a case-by-case basis to ensure adequate protection against the formation of explosive gas mixtures. A risk assessment should be completed by the warehouse management and action taken when and if required. Examples of some preventive actions below.

For example:

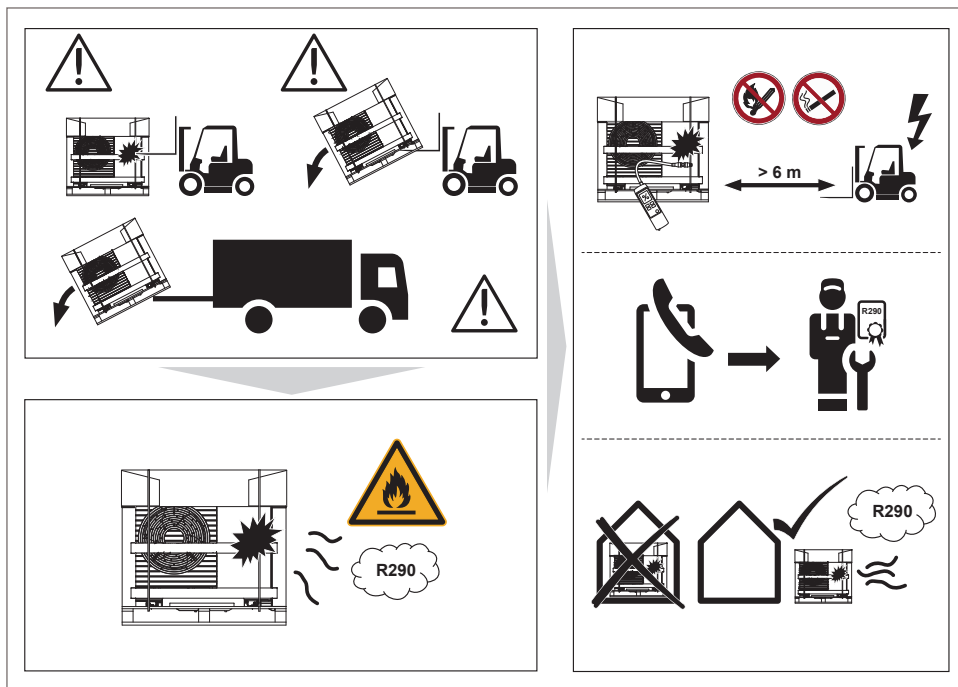
- a) Eliminate all sources of ignition in the storage area
- b) Forced ventilation, e.g. floor extraction, with at least two air changes per hour
- c) Install a gas warning system for R290
- d) Define measures after alarm has been triggered, e.g. warn personnel, open doors for cross ventilation
- e) Label areas at risk of fire and explosion with warning signs
- f) Provide fire extinguishers of a type and quantity to be determined as required
- g) Train the employees in areas at risk of fire and explosion
- h) Appoint and train a fire safety officer or fire safety assistant
- i) Issue an explosion protection document with classification into zones
- j) Crash protection for warehousing to avoid possible damage by transport vehicles

What must be considered during transport?

Type of transport

As R290 has already been put into the heat pump and is hermetically sealed, no special rules need to be observed when transporting the new aroTHERM plus. Nevertheless, you should comply with the following general instructions:

- Only transport in upright position, as horizontal transport can lead to damage to the equipment
- Transport only permitted in the original packaging
- Ensure sufficient air supply during transport
- Avoid sources of ignition such as sparks, smoking, etc.*
- If possible, store heat pumps above ground level with a natural ventilation opening to the outside*



European dangerous goods law - ADR

The carriage of dangerous goods is regulated throughout Europe by the ADR (European Agreement concerning the International Carriage of Dangerous Goods by Road). It contains regulations for the classification, packaging, labelling and documentation of dangerous goods. According to the current status of the ADR, you **do not** have to observe any special regulations for the new aroTHERM plus heat pumps with R290.

Last mile

It's important that the above conditions are adhered to by all transport providers involved in getting the heat pump to its final destination.

Returns

Article 1.4 of ADR dictates that the recipient of the heat pump can't delay or refuse to accept items in transport that contain R290 without very good reason. Should this situation occur, the heat pumps must be unloaded promptly, in a safe environment.

Transport damage

If damage occurs during transportation, the dangerous goods must be taken immediately to a safe outdoor location. There must be no ignition sources within a distance of six metres. The refrigerant can then escape safely or be professionally emptied and disposed of by a service technician.

When consistently transporting large volumes of heat pumps containing flammable refrigerants, it's recommend that a mobile gas detector be included in each transport unit. This enables the transport personnel to check, for example in the event of an accident, that no refrigerant has escaped.

In the following cases, the refrigerant must be removed correctly before transporting the heat pump:

- If equipment is transported without its original packaging
- When transporting leaking or otherwise damaged equipment (e.g. transport damage)

This also applies to the return transport to the manufacturer. The refrigerant may only be removed by suitably trained specialists and in accordance with the instructions in the installation and maintenance manual enclosed with the unit. All requirements for the transport of dangerous goods must also be met during return transport.

* Additional to the requirements for transporting other heat pumps

New version with transition period until 31 December 2022

The ADR was recently revised and from December 2022, the aroTHERM plus heat pump will be classified as an 'object containing flammable gas'. This means that, in future, the transport of our heat pump will also be subject to ADR regulations. "In future" means after a transitional period expiring on 31 December 2022. Only then will our new heat pumps be affected by the revised ADR.

Labelling requirement

From this date, packages containing heat pumps with R290 must be specially labelled. This includes:

- Specification of new transport category UN 3537
- Attaching a hazard label 2.1 to the package, size 100 × 100 mm
- Directional arrows (black or red) to indicate the orientation of the packaging on two opposing sides



As our heat pumps fall under transport category UN 3537 4, there are no restrictions on the quantity of equipment transported per transport unit.

Must be documented as of 1 January 2023 pursuant to the ADR

Compliance with legal regulations also includes the complete documentation. To do this, you usually only have to correct the structure of the delivery note and add some missing information:

1. UN 3537, "Articles containing flammable gases, n.o.s. (propane)", 2, (E)
2. Name and address of the sender
3. Name and address of the recipient
4. Number of packages sent
5. Carriage with an exception according to 1.1.3.6 of the ADR
6. Total quantity of R290 in kilograms in all packages with the abbreviation BK4

Responsibilities in dangerous goods transport according to ADR as of 1 January 2023

A chain is only as strong as its weakest link. This also applies to the supply chain for the transport of dangerous goods and is why everyone involved bears responsibility for safe transport.

The transport of dangerous goods includes all aspects and each portion of the journey, whether by land, sea or air. It also includes the packaging of individual goods, preparation of transport documents, loading of transport units, potential interruptions in the transport process and the unloading of the dangerous goods.

All employees who are involved in this process should first receive professional training in accordance with 1.3 of the ADR.

Important data

In summary this means:

- Until 31 December 2022, you may transport the aroTHERM plus from Vaillant without any special conditions
- As of 1 January 2023, it will fall under dangerous goods class 2 and classification code 6 F for flammable gases



Further obligations according to the revised ADR from 1 January 2023:

1. All persons involved in the transport of dangerous goods must be instructed in accordance with 1.3 of the ADR, and this must be repeated every two years
2. A two-kilogram powder fire extinguisher must be carried on board
3. An ATEX-compliant (explosion-protected) torch must be carried on board
4. Smoking must be strictly prohibited during transport in the transport unit
5. Packages must not be opened
6. Loaded transport units must be deposited in safe places



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