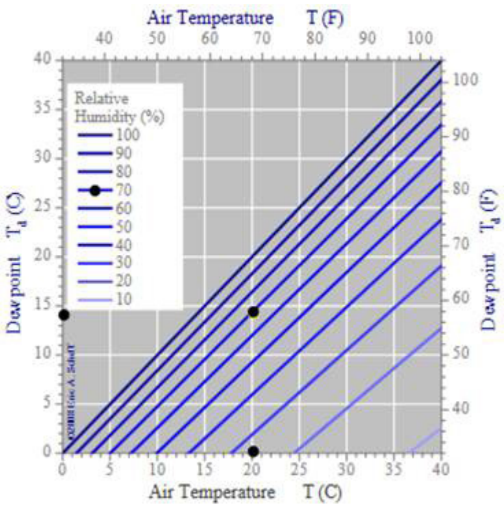
Airlock on appliances

Ventilation and condensate

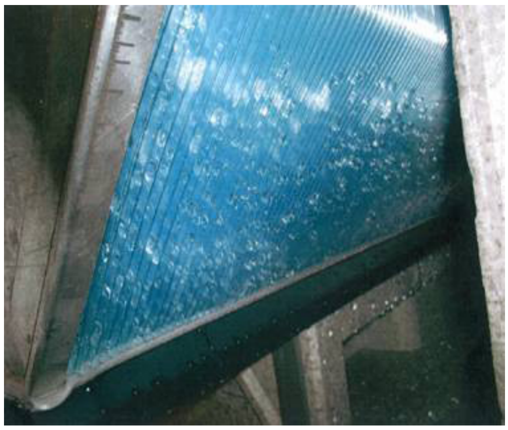
Heat recovery ventilation systems usually produce condensate. The laws of nature dictate this process and the user of ventilation appliances cannot stop it. Hot air can contain more moisture than cold air. The relative humidity (RH) increases as the air temperature drops. The temperature level where RH = 100% is referred to as the dewpoint. Since of course the RH cannot be higher than 100%, the moisture in the air will condensate when the temperature drops below the dewpoint.

Condensate Process

In the heat exchanger of the HRV appliance the exhaust air, that contains moisture from the dwelling, is cooled by the outdoor air. The example below makes it clear that in a moderate climate this process occurs in HRV appliances during most of the year. For instance, at an indoor temperature of 20 °C and an RH of 70%, the dewpoint is 14 °C. In other words, if the outdoor temperature is <14 °C, condensate will form in the heat exchanger. Such conditions prevail during extended periods.



Air Temperature



Condensation

The picture on the next page, explains the process in the appliance on the basis of the above example.

BRINK
Climate Systems

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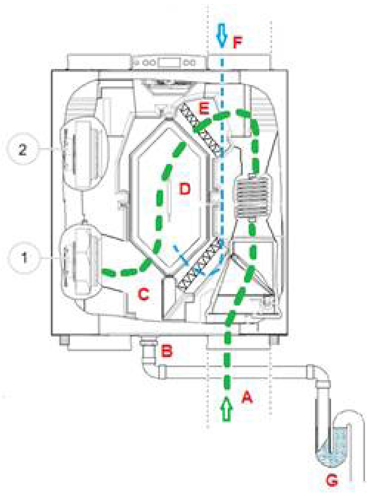


Openworked Renovent Excellent

- Fan '1' sucks the air 'A' from the dwelling, through heat exchanger 'D'.
- This airflow is cooled in the heat exchanger by the cold outdoor air that also flows through heat exchanger 'D' (from 'F' to '2').
- As from the point where airflow 'A' has cooled down to < 14 °C, condensate will form in heat exchanger 'D'
- This condensate flows to compartment 'C' under the influence of gravity, assisted by airflow 'A'
- Compartment 'C' is designed to collect the condensate and to let it flow from the appliance through condensate drain 'B'.
- This is an open connection that can be coupled to the dwelling's sewer system through what is known as an 'airlock', 'G'.

Airlock

Why is a properly performing airlock so important? Installers often underestimate the necessity of a properly performing airlock and in many cases this results in water damage inside or outside the appliance. For that reason we emphasise in this article the necessity of a properly performing airlock and we identify the consequences of an incorrectly performing airlock. The fan that forces the exhaust air 'A' through the heat exchanger creates such an underpressure that air flows from the dwelling to the appliance. That means the underpressure at point 'C' must be sufficient to overcome the total resistance that the air is subjected to while it travels to and through the appliance.
This total resistance is the grand total of:

- Diffusers
- Ducting
- Manifold
- Filter 'E'
- Heat exchanger 'D'

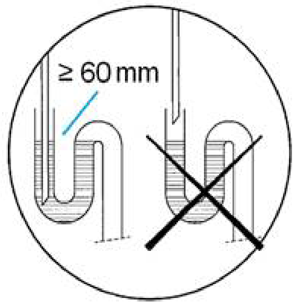
This total resistance may easily be as high as 200-300 Pa, and in less carefully built installations even as high as 400-500 Pa. So an airflow is only possible when the underpressure at 'C' at least equals this total resistance.

If the condensate drain is not equipped with an airlock, the very low underpressure in compartment 'C' will also cause an airflow into the appliance through opening 'B'. This airflow - easily 25-40 m³/h - has two negative effects.

1. The air flowrates from the supply and exhaust fans are no longer balanced.
2. The condensate in compartment 'C' will no longer flow out freely through opening 'B' but accumulate in the appliance.

The 1st negative effect means that the exhaust rate from the 'wet rooms' decreases, which will not necessarily cause problems. The 2nd negative effect causes water damage in or near the appliance. The condensate that cannot flow out freely will spread throughout the appliance through capillary action (foam parts etc.), or is even sucked in by fan '1'.

This makes it highly important that a flawlessly performing airlock is installed between connection 'B' and the sewer system. Such an airlock may be a simple air trap, but its water column (head) must be sufficient to overcome the aforementioned 500 Pa underpressure. For that reason every manual refers to a water column of at least 60 mm (=600 Pa).



Condensate Drain

Note:
A number of matters deserve attention with regard to an air trap.
• During periods with little condensate (summer), an air trap may dry up and subsequently cause water damage during winter. (hint: a few spoonfuls of oil on the water in the air trap prevents drying up)
• The appliance must be switched off when filling an air trap, otherwise the water is directly sucked into the appliance. (Make sure there is a sufficiently high water column before switching the appliance back on.)
An alternative that permanently ensures a properly performing airlock is the installation of what is known as a ball siphon, also available from Brink Climate Systems.

BRINK
Climate Systems

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