Minimising Virus transmission by design

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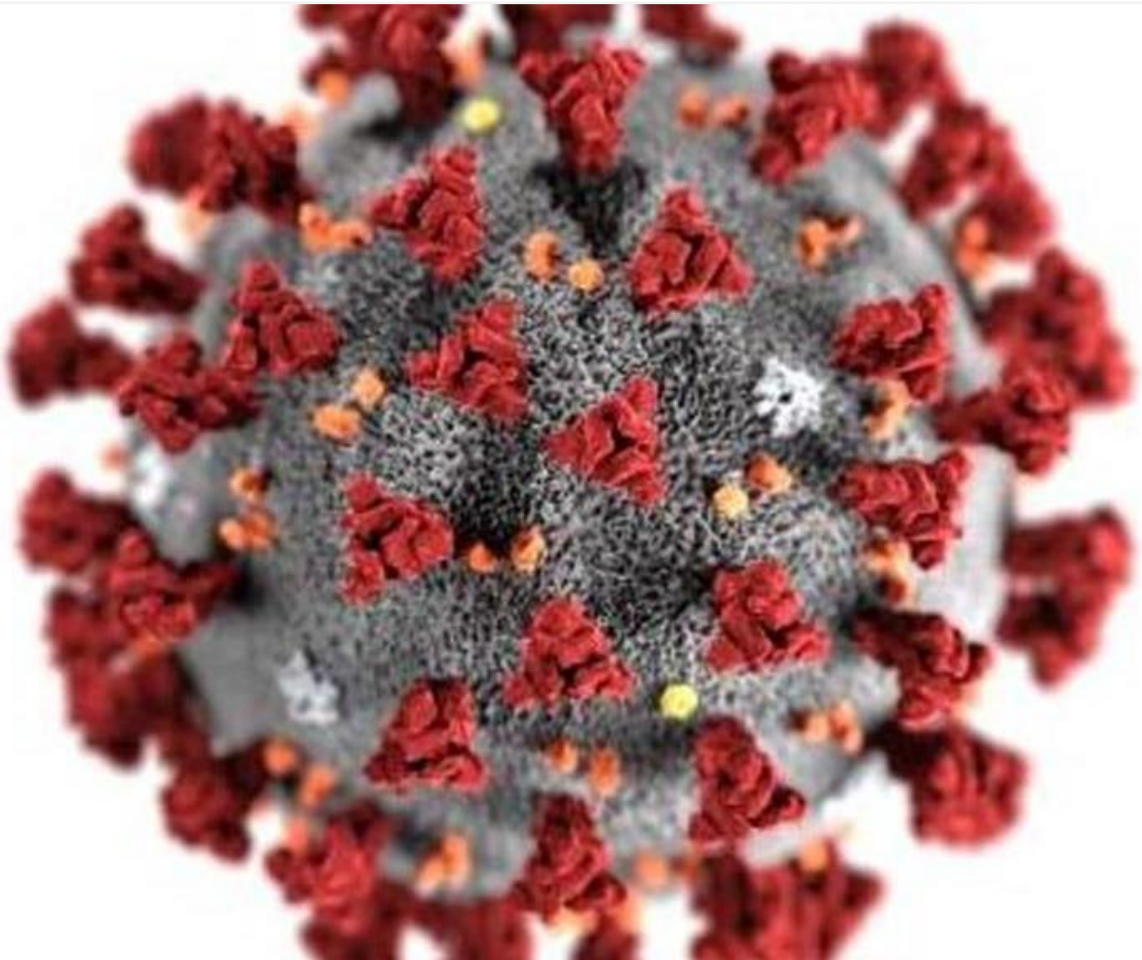


EXCELLENCE
IN SOLUTIONS

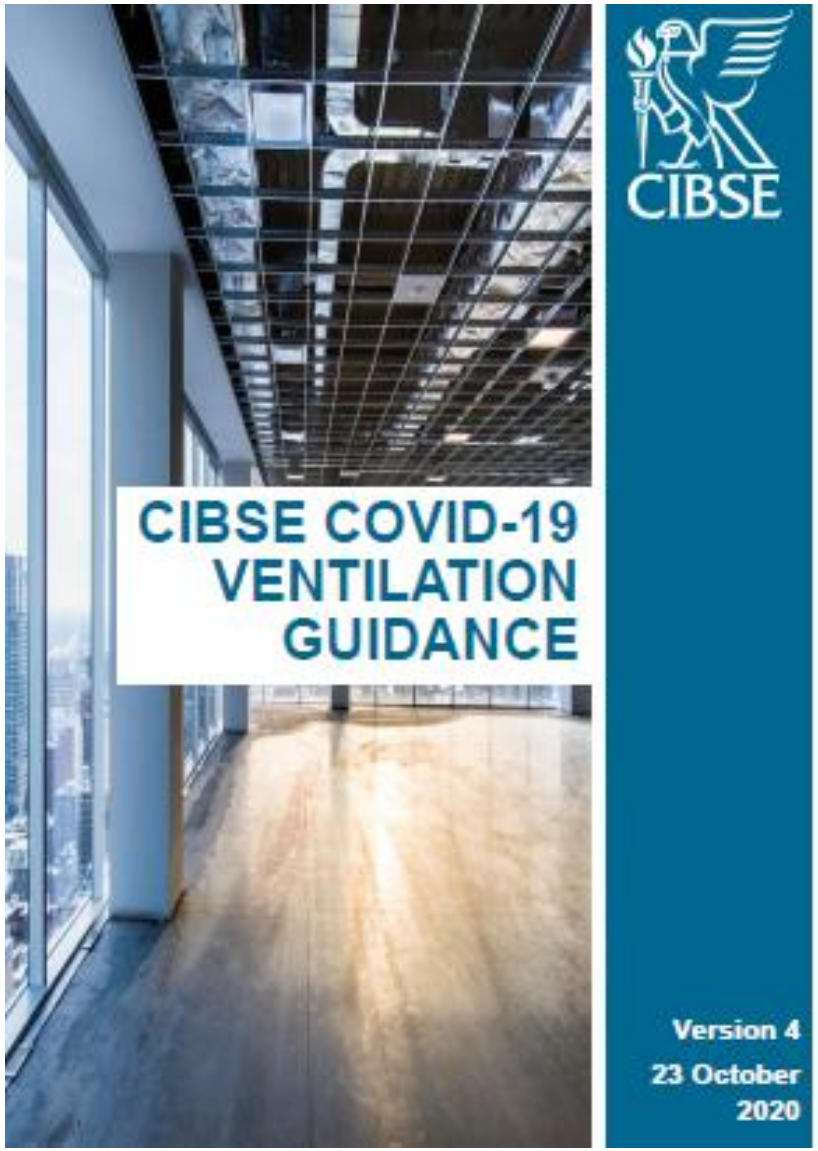
There is currently no evidence of human infection with SARS-CoV-2 caused by infectious aerosols distributed through the ventilation system air ducts. The risk is rated as very low.

Source: REHVA_COVID-19_guidance_version 4

However measures to reduce internal air leakage in ventilation systems can be taken.

Agenda

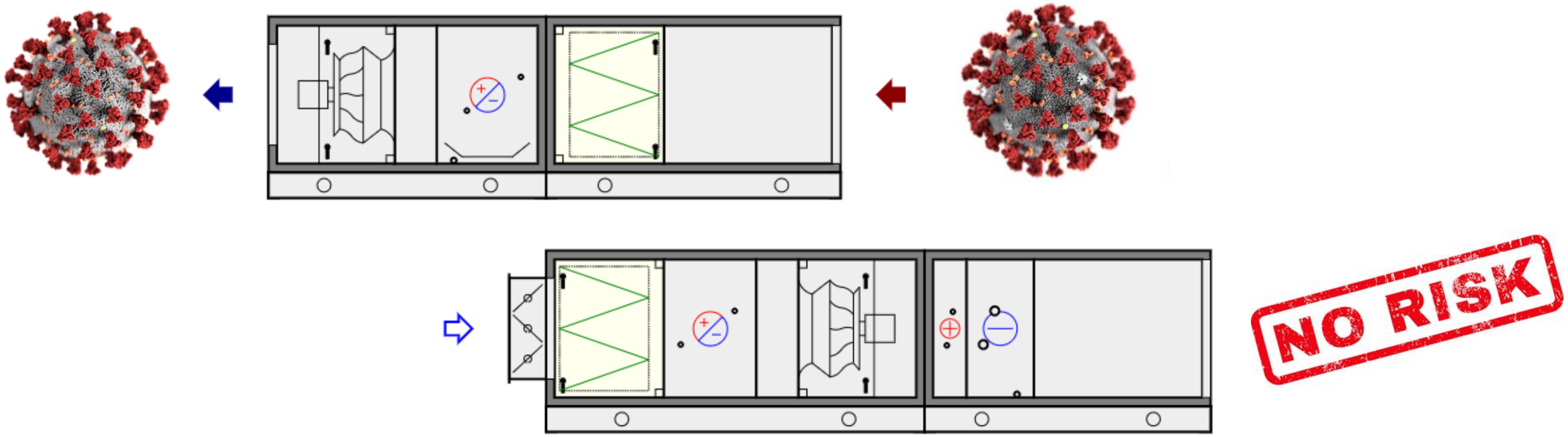
Which AHUs are the best for minimising transmission?
What can be done to these units to make them safer?
Summary
Questions.



4.2.2.1
Twin coil unit or plate heat exchange
4.2.2.2
Regenerative rotary air to air heat exchangers (also known as enthalpy or thermal wheels)

REHVA have also produced guidance which is available for free download.
https://www.rehva.eu/activities/covid-19-guidance/rehva-covid-19-guidance

RUN AROUND COIL

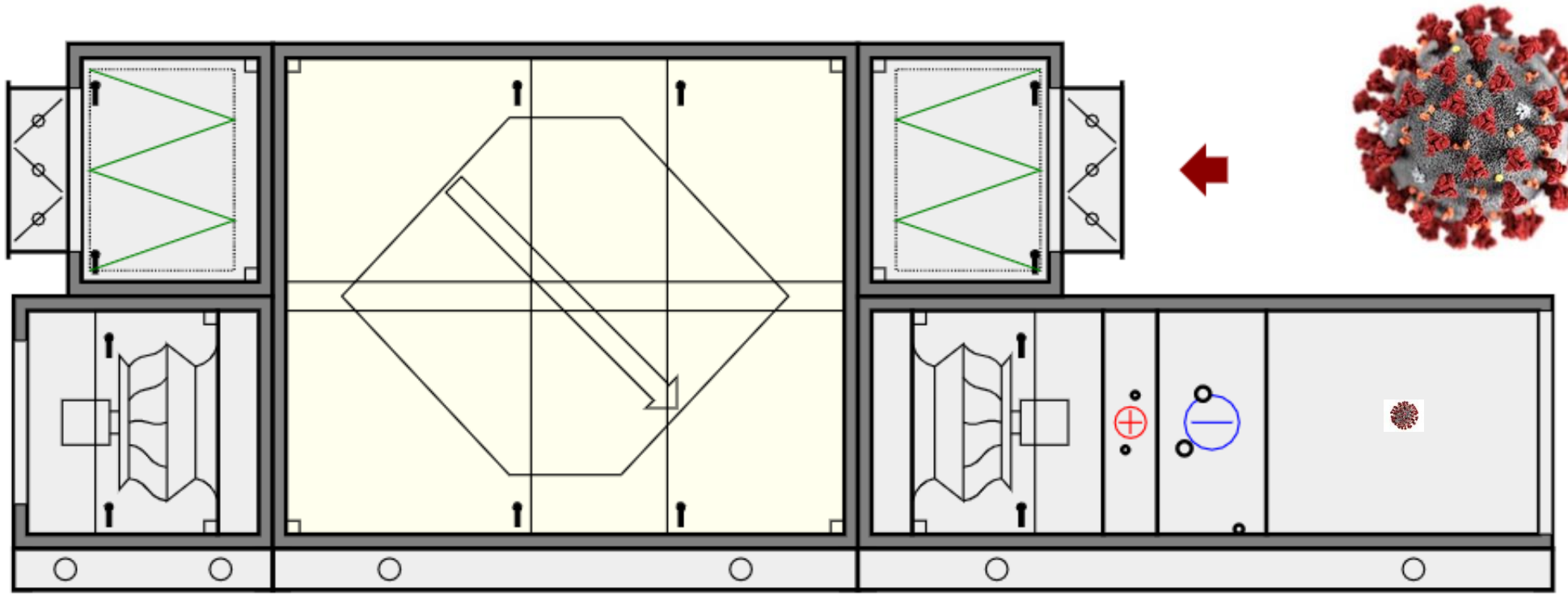


Exhaust Air Transfer Ratio (EATR) is 0% in this configuration

Low overall efficiency
Expensive to supply
Expensive to install

EATR is defined in EN 16798-3. 2017 as “level of carry over of extract air to the supply air”

PLATE WITHOUT RE-CIRCULATION



“It must be noted that plate heat exchangers are not 100 % leakproof”

Source: Hoval guide to plate heat exchangers.

Good for overall efficiency

Long footprint

High Cost

PLATE WITHOUT RE-CIRCULATION

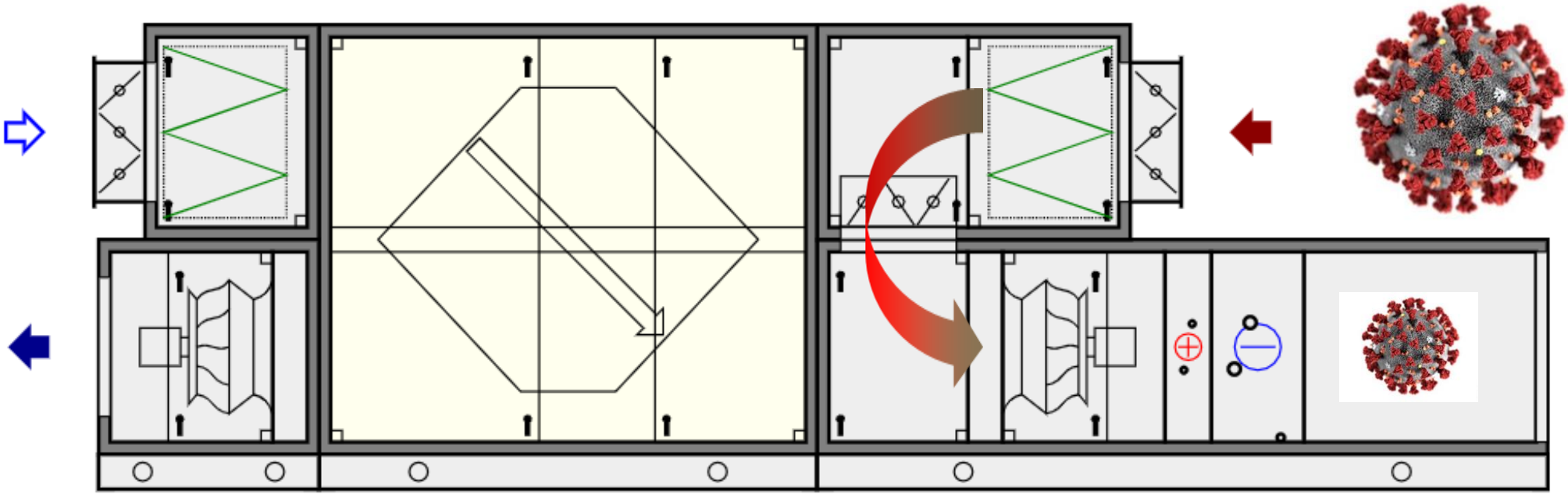
EN 308 allows an internal plate leakage of up to 3%
Source prEN 308:2020 5.5.2 Internal leakage test

Air leakage shall be checked according to EN 308:1997 The following acceptance criteria are acceptable:

- Air leakage + 0.5 % for models without humidity transfer
  + 1.0 % for models with humidity transfer

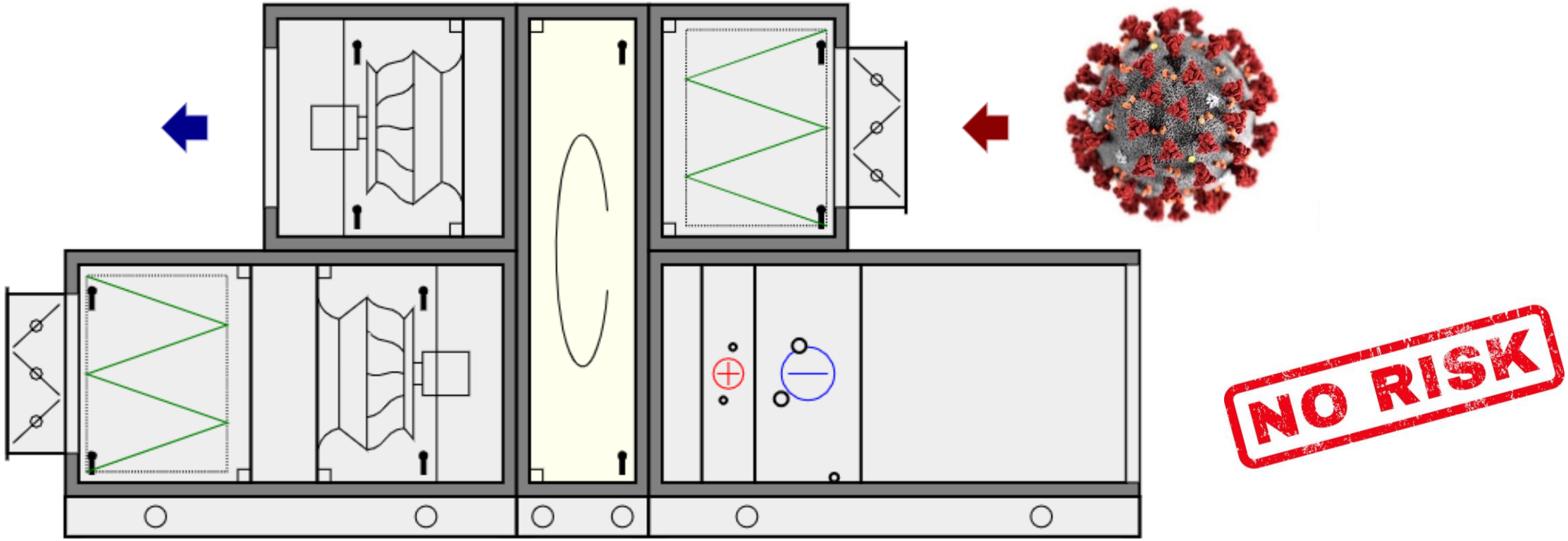
All units must be tested under a pressure difference of 250 Pa. If a unit is not compliant with the above maximum leakages, it is considered as a component failure.

PLATE WITH RE-CIRCULATION



Better for overall efficiency
Very Long footprint
Higher Cost

ROTOR WITHOUT RE-CIRCULATION

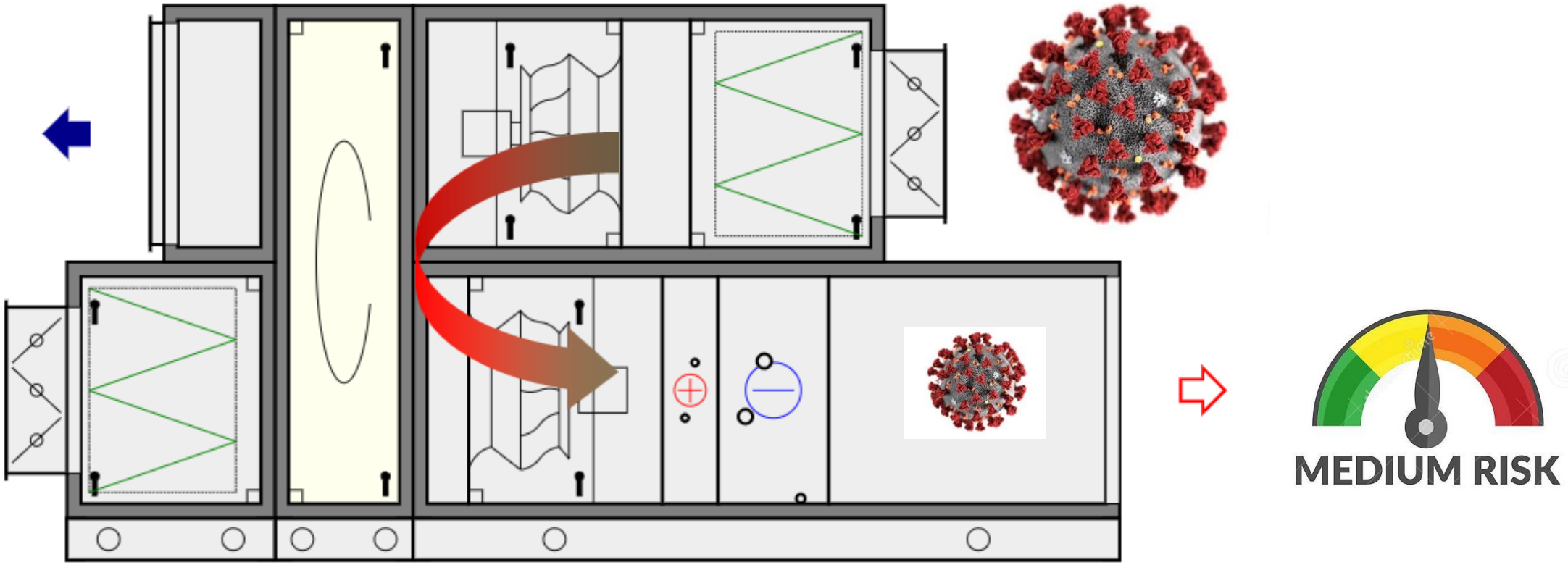


Exhaust Air Transfer Ratio (EATR) is 0% in this configuration

Source: Eurovent REC 6-15 - Air leakages in Air Handling Units - First Edition - 2020

But reduced efficiency

ROTOR WITHOUT RE-CIRCULATION



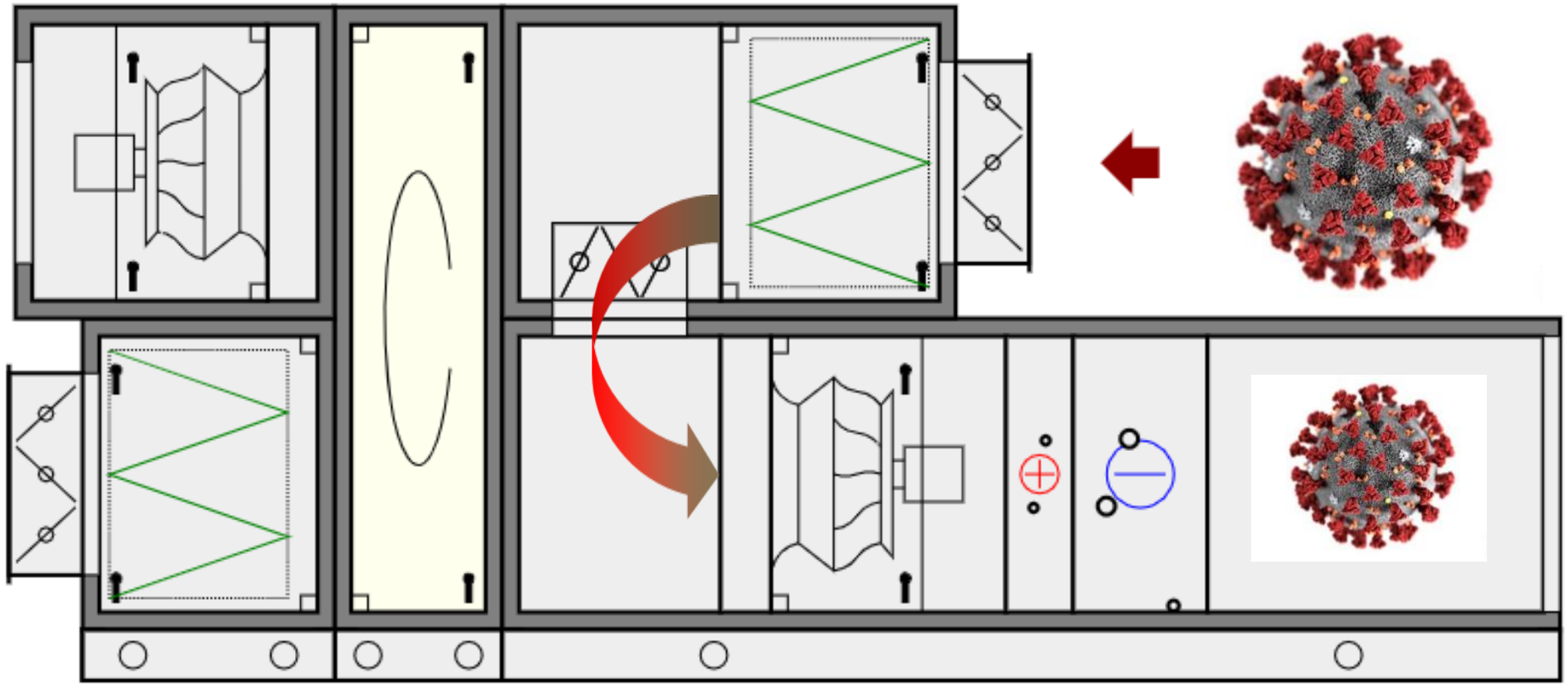
Purge Sector does not work in this configuration*

Very high EATR – up to 35%**

Source: * REHVA COVID-19 specific guidance document-Limiting internal air leakages across the rotary heat exchanger

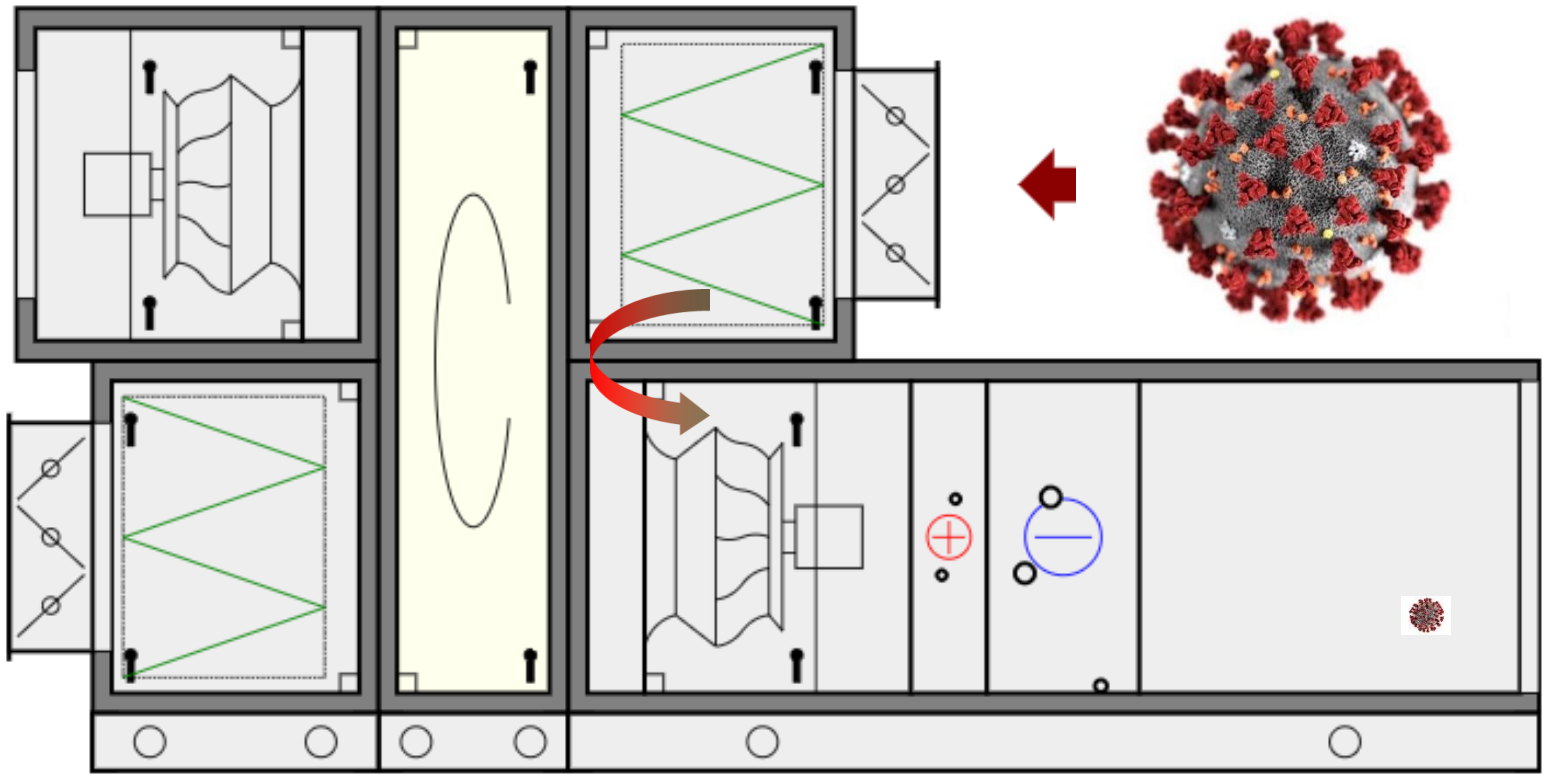
**Eurovent REC 6-15 - Air leakages in Air Handling Units - First Edition - 2020

ROTOR WITH RE-CIRCULATION



Better for overall efficiency
Longer footprint
Higher Cost

ROTOR WITHOUT RE-CIRCULATION



EATR: **0%** to <5 % with purge sector, <3% to 7% without purge sector

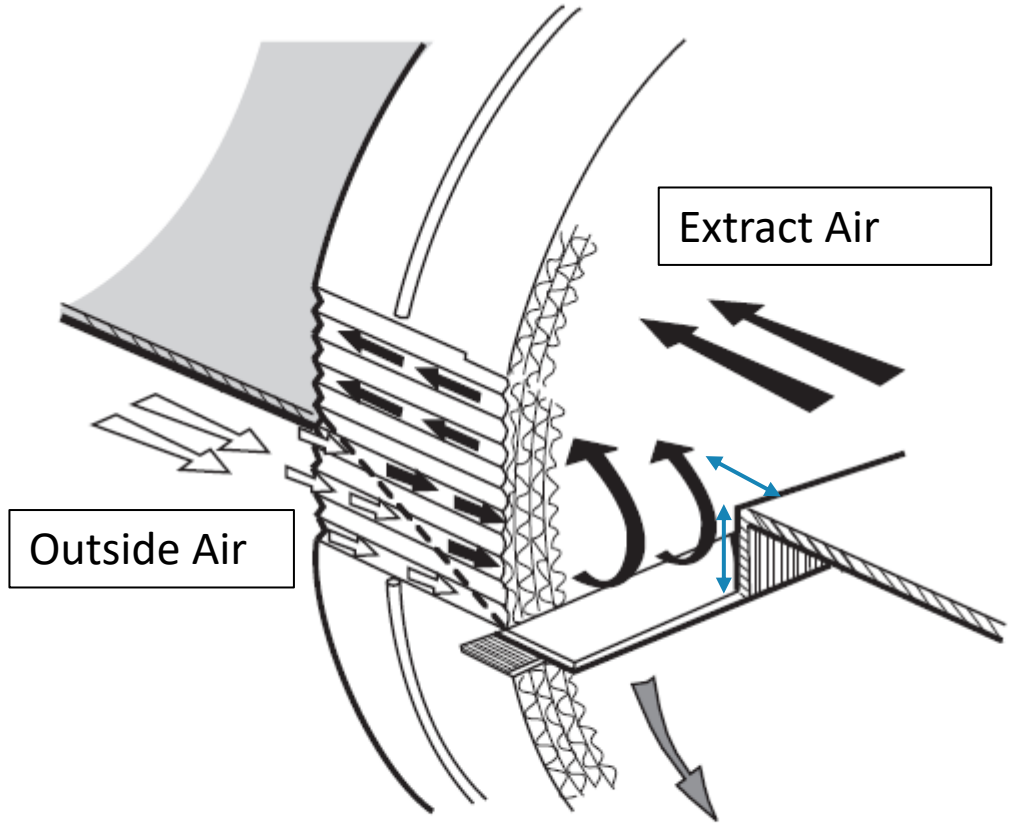
Source: Eurovent REC 6-15 - Air leakages in Air Handling Units - First Edition – 2020

Best for overall efficiency

Short footprint

Lowest Cost

Purge Sector



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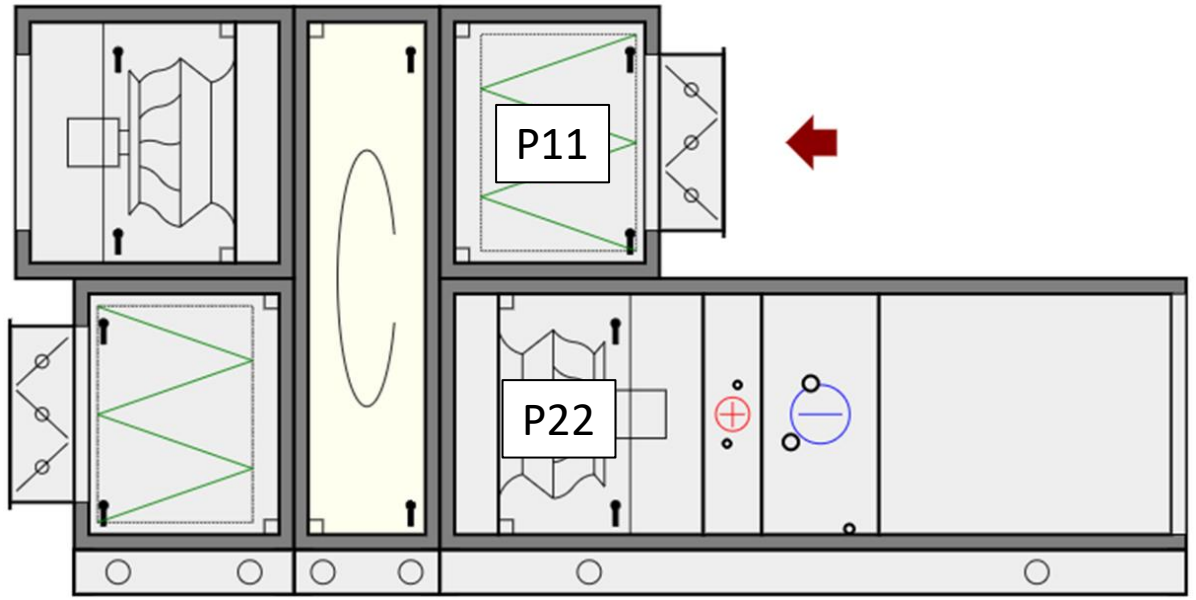
Limiting internal air leakages across the rotary heat exchanger

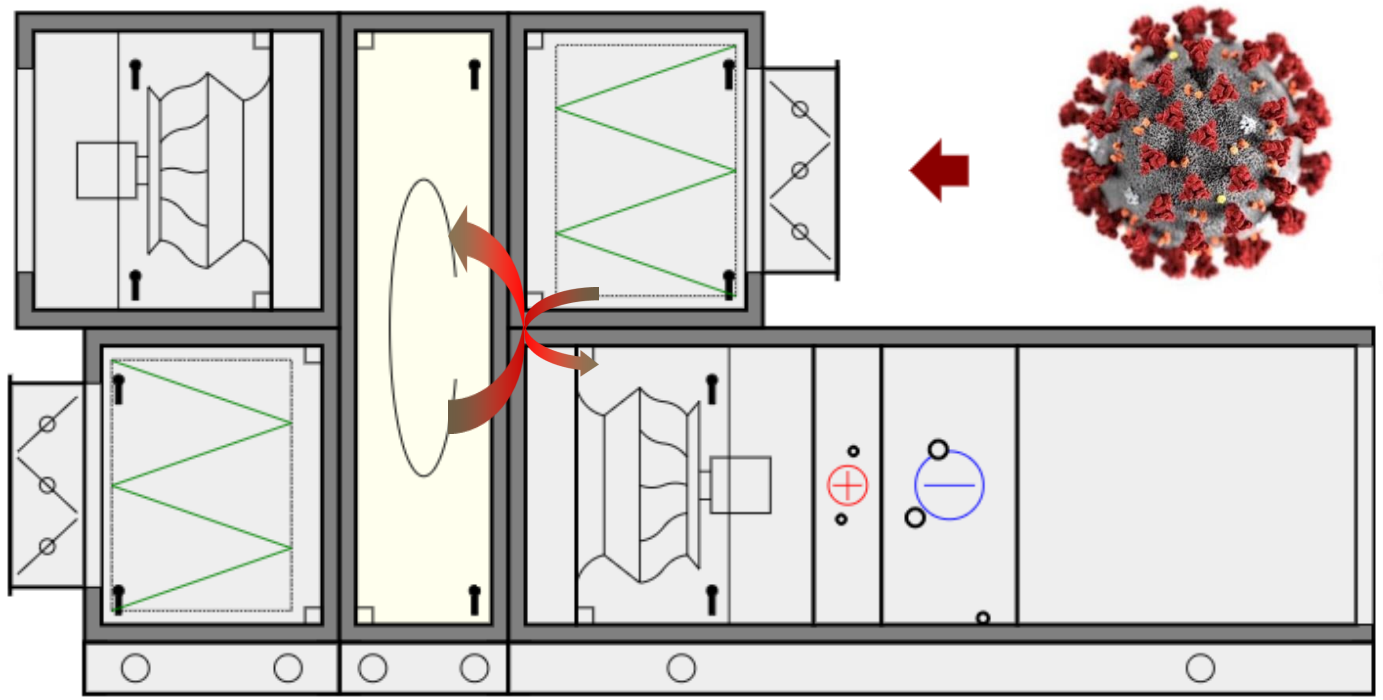
Balance pressure difference

- To eliminate a leakage set the correct relation between pressures p22 and p11.
- Pressure p11 shall be at least 20 Pa less than the pressure p22.
- For this configuration of fans, this can be done by regulating the exhaust damper



Source: REHVA COVID-19 specific guidance document limiting internal air leakages across the rotary heat exchanger

ROTOR WITHOUT RE-CIRCULATION



But with pressure control < 1% of the exhaust air is re-circulated

Source: REHVA COVID-19 specific guidance document-Limiting internal air leakages across the rotary heat exchanger

Best for overall efficiency

Smallest Footprint

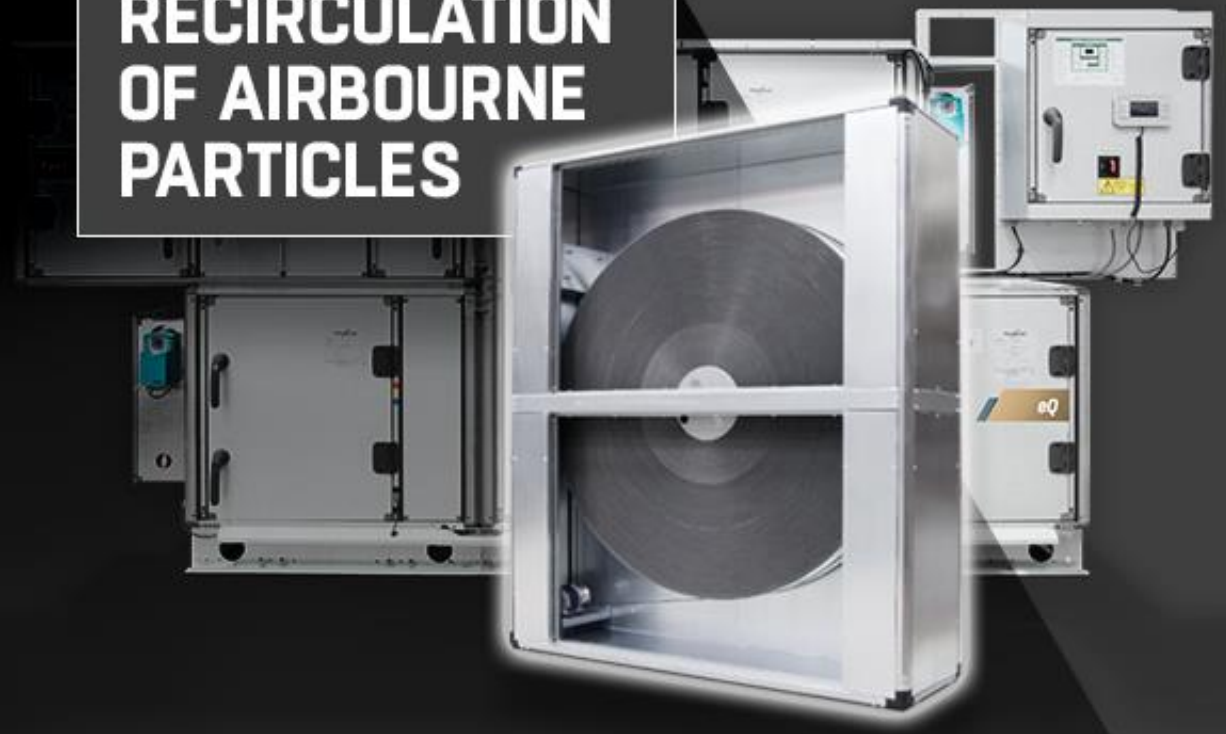
Lowest cost & as safe as a plate unit

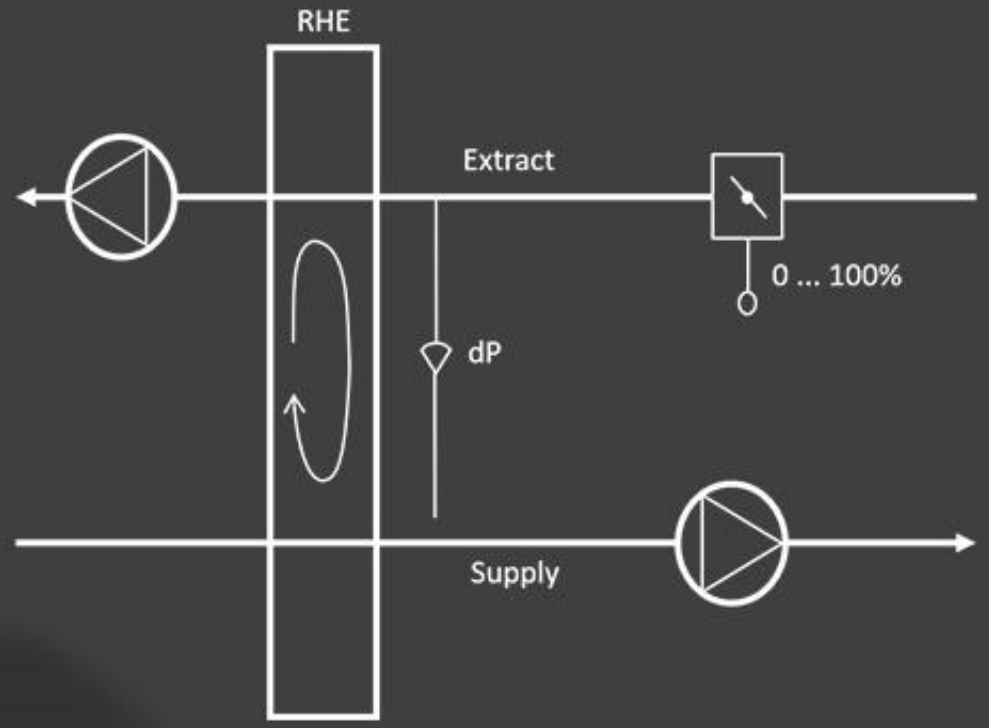
FläktGroup

SINCE 2015

FläktGroup AHU & Rotary Heat Exchanger with Automatic Pressure Balancing

ELIMINATE RECIRCULATION OF AIRBOURNE PARTICLES





FläktGroup

- Method to estimate leakage (EATR) for on-site tests
- The precise test of internal air leakage must be carried out at the laboratory. However, a draft of a new upcoming standard (prEN 308) provides a simple method for the estimation of EATR by temperature measurement that can be performed on-site. The test procedure includes measurements of temperatures t11, t21 and t22 in steady-state conditions with the rotor stopped.
- Next, EATR is calculated as:

$$EATR = \frac{t_{22} - t_{21}}{t_{11} - t_{21}}$$

Where,

- t11 is temperature exhaust air inlet;
- t21 is temperature supply air inlet;
- t22 is temperature supply air outlet.
- The part of leakage related to the rotation of wheel (carry-over) cannot be determined by this method.

Source: REHVA COVID-19 specific guidance document limiting internal air leakages across the rotary heat exchanger

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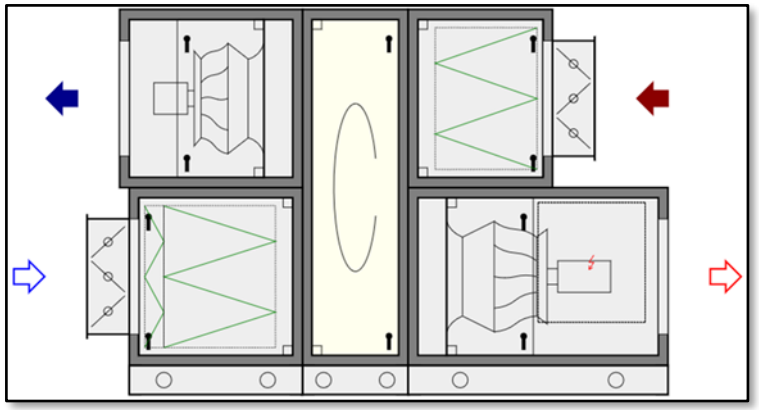

"The most recommended configuration"

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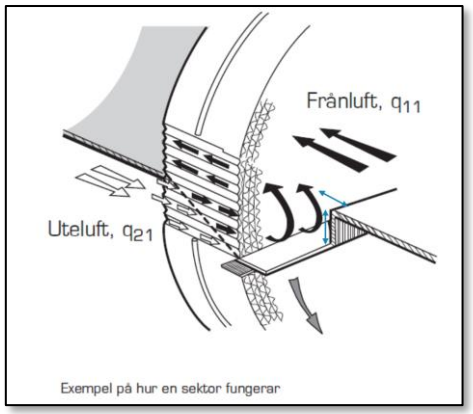

"For properly operating rotary heat exchangers, fitted with purging sectors and correctly set up, leakage rates are very low, being in the range of 1-2% that is in practice insignificant"

CIBSE
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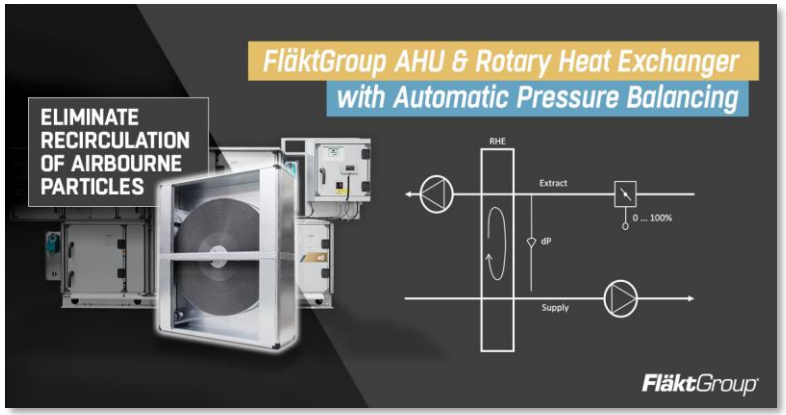
Federation of European Heating,
Ventilation and Air Conditioning Associations



"Where properly configured direct air leakage passes from the supply to the extract duct and is therefore not a concern."

"EATR <1%."

HIGH RISK

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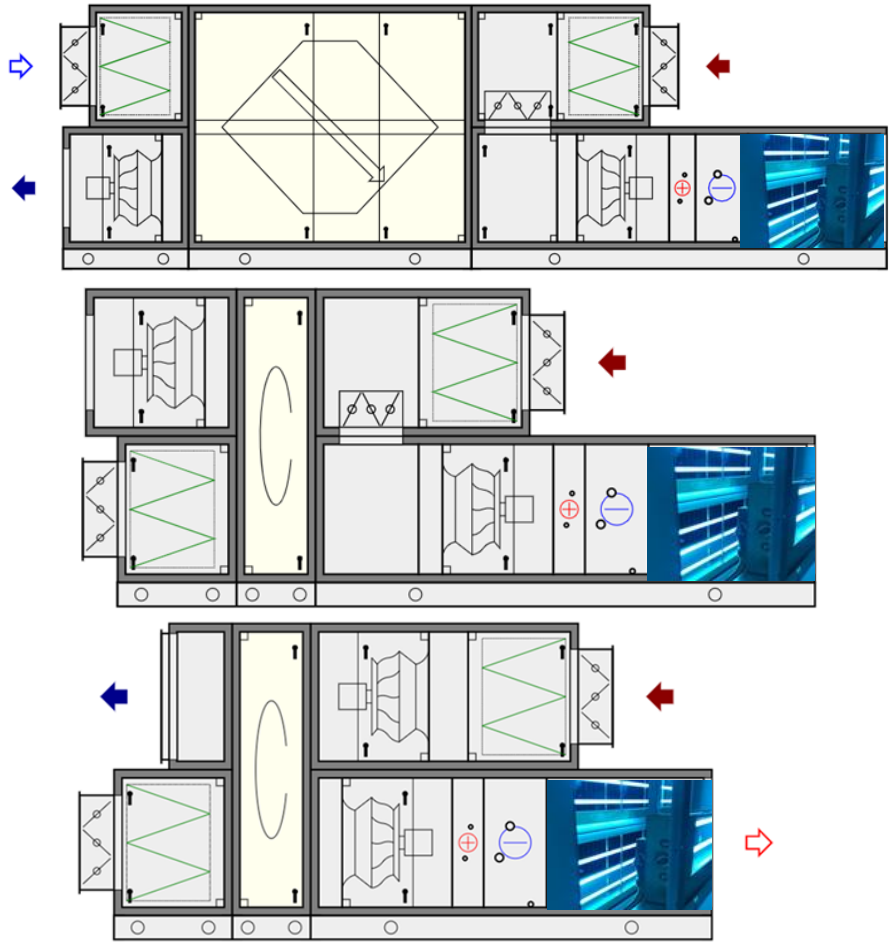
"UVC disinfection equipment maybe installed in air ducts in systems with recirculation"



EXCELLENCE IN SOLUTIONS

Source: REHVA advice- 4.10 Room air cleaners and UVGI can be useful in specific situations