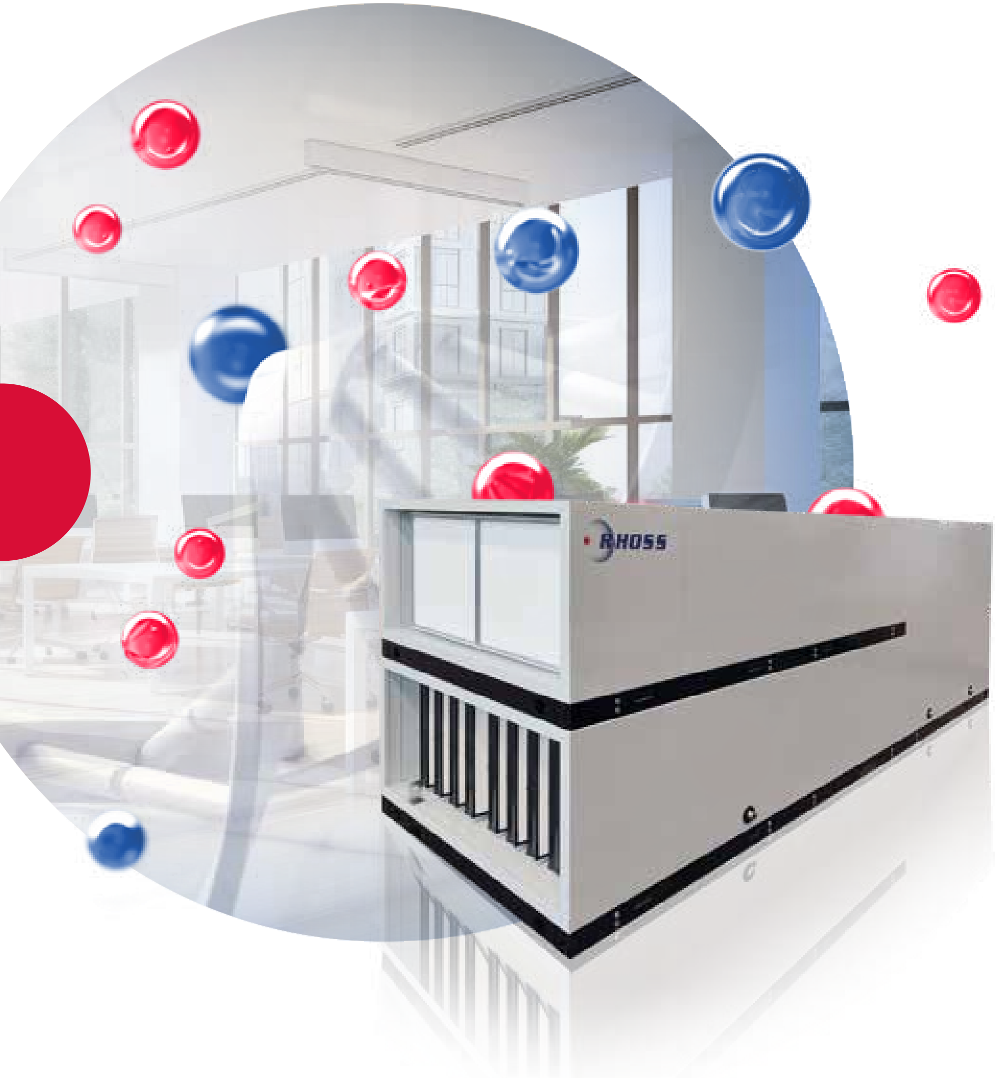
New, highly airtight AHU: ADV DNAIR



Case study: Product - System

RHOSS

PART OF NIBE GROUP

Table of Contents

Working group

Rhoss S.p.A
Polytechnic University of Turin - TEBE Group @ IEEM

1. Objective of the analysis

To study the effect on energy performance of the new, highly airtight AHU (ADV DNAIR) by comparing it with a “standard” AHU

CASE I: PRODUCT

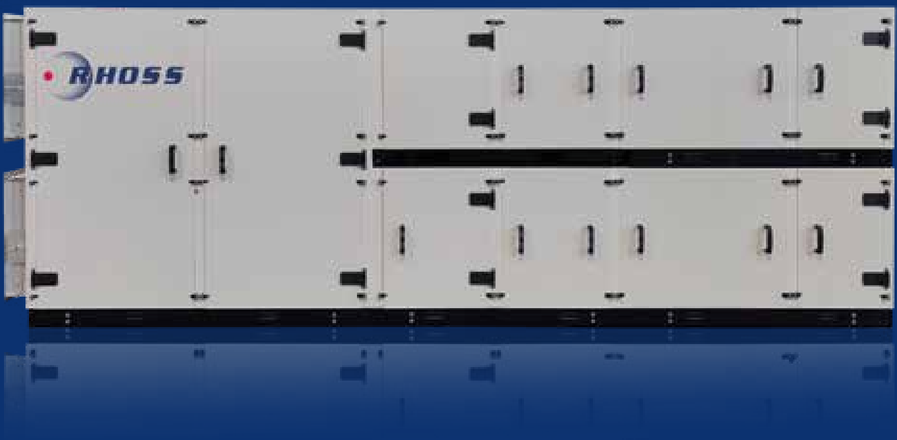
Objective: to characterise the potential energy savings from the installation of the new AHU intended as a “box” with high air tightness

CASE II: SYSTEM

Objective: analysis of the energy performance increase of the new AHU within a standard building.

In this second phase, which aims to evaluate the payback time of the investment due to the increase in energy performance achieved, the AHU was placed inside a standard office building.

2.
Features of the compared technologies: ADV DNAIR vs “standard” AHU



The new highly airtight AHU is characterised by its high capacity of not losing energy through exfiltration or air infiltration thanks to its airtight casing and innovative sealing elements (Patent Pending solution).

- **112 machine sizes**
- **Air flow rate: 800 up to 110,000 m³/h**
- **Eurovent Certificate**
- **Thermal transmittance: T2**
- **Thermal bridge factor: TB1**
- **Air leakage: L1 (0.1 l/s/m²)**
- **Filter bypass: F9**
- **Mechanical resistance: D1**

For the analysis, the air leakage value was used as the main comparison parameter. In particular, while the new AHU is characterised by an L1 air leakage (equal to about 0.1 l/s/m²), the standard AHU used for the comparative analysis has an L3 air leakage (equal to about 1 l/s/m²).
Even when comparing these “plate” features of the machine, it is clear that the new AHU has the potential to reduce heat loss through infiltration/exfiltration by **10 times** compared to the standard AHU.

i

The “standard” AHU

used for the comparison analysis is characterised by an air leakage L3 (equal to about 1 l/s/m²)

3.

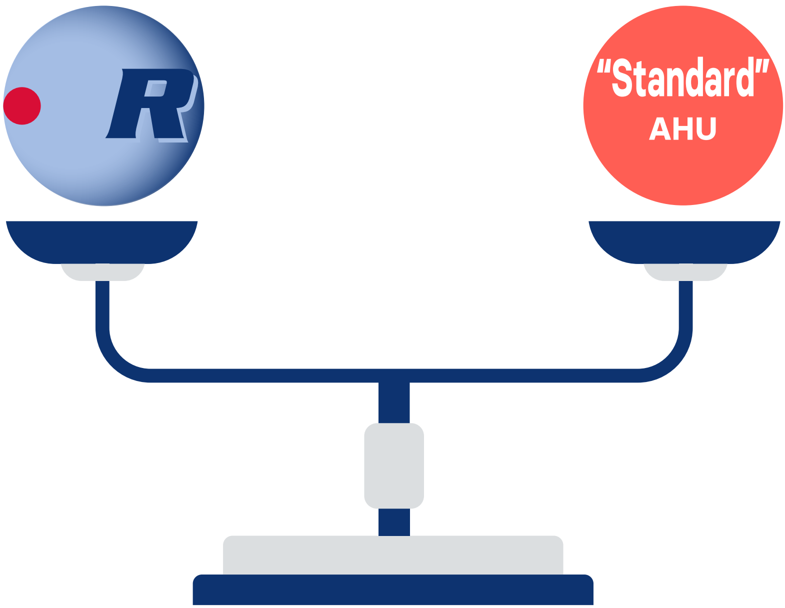
Case study I: PRODUCT

The first phase of the analysis aims to characterise the energy performance of the new AHU, understood as a “box”.

In detail, the new “box”, considered as an open thermodynamic system characterised by conduction and ventilation energy flows, has the ability to minimise these latter flows thanks to its high air-tightness.

For this first study, the energy balance on the thermodynamic system characterised by a high air tightness (L1) was compared with “standard” air tightness (L3) that characterise standard AHUs.

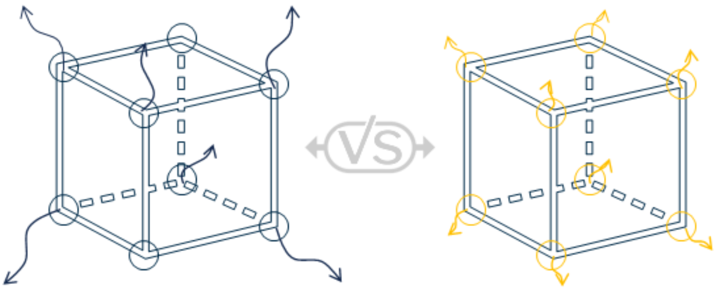
As described in the previous section, the difference lies in the air flow rate of approximately 0.1 l/s/m^2 and 1 l/s/m^2, respectively.



Verification of the energy performance of the new AHU, through comparison with the "standard" airtightness that characterise the "standard" AHU

"Standard" conditions:

- "Standard" AHU air flow rate: 10,000 m^3/h
- Standard climatic conditions: Turin (climate zone E)



Verification models for air leaks

- **Model 1 -->** influencing variable: **air flow rate**
- **Model 2 -->** influencing variable: **pressure difference**

The results obtained from the overall energy balance between the new AHU condition and the standard condition show potential energy savings of between 11% and 14%, depending on the adopted model.

CO2
A
B
C
D
E
F
G
ENERGY EFFICIENCY

4.
Case study II: SYSTEM

The second phase of the analysis concerns the installation of the new AHU in a standard building with the aim of evaluating the payback time of the investment due to the overall energy performance increase of the system.

The standard building was taken for office use, equipped with a mixed water and primary air conditioning system.

In this case, the assessment was carried out by checking the potential energy savings obtained in a standard building characterised by the installation of machines with an air flow rate of 10,000 m^3/h.

Demonstrate that the increase in energy performance achieved by the installation of the new AHU allows reduced payback time

- Standard building: Office building
- Average occupation: 4-8 m²/person
- Air exchange rate: 40 m³/h person

"Standard" climatic conditions:

- Turin, Rome, Palermo
  (energy requirement ranging from 113 kWh/m² to 115 kWh/m²)

"Standard" system:

- All-electric (heat pump)

The results show that the installation of the new AHU can achieve an overall energy saving improvement on the building system of 2.2 to 2.6%. Considering an increase in investment cost between the standard AHU and the new ADV DNAIR of approximately 3%, the increase in energy performance achieved allows for a payback time of less/just over 1 year.

5.
Conclusions

PRODUCT

The energy saving potential of the new AHU compared to the “standard” one varies from 11% to 13%.

SYSTEM

The new AHU resulted in an improvement in overall system energy savings of 2.2% to 2.6%. Considering an increase in the cost of the new AHU of 3%, the increase in energy performance achieved resulted in a payback time of 1/2 years.

The new AHU with high air tightness represents a strong technological product innovation that is absolutely ready to be introduced to the market because it pays for itself through energy savings.

New air
for the future.

K15586EN - 08.24

RHOSS S.P.A.
Via Oltre Ferrovia, 32
33033 Codroipo (UD) - Italy
tel. +39 0432 911611
rhoss@rhoss.com

RHOSS Deutschland GmbH
Hölzlestraße 23, D
72336 Balingen, OT Engstlatt - Germany
tel. +49 (0)7433 260270
rhossde@rhoss.com

RHOSS S.P.A. - France
39 Chemin Des Peupliers
9570 Dardilly - France
tel. +33 (0)4 81 65 14 06
rhossfr@rhoss.com

RHOSS Iberica Climatizacion, S.L.
Frederic Mompou, 3 - Pta. 6a Dpcho. B 1
08960 Sant Just Desvern - Barcelona - Spain
tel. +34 691 498 827
rhossiberica@rhossiberica.com

RHOSS Nederland B.V.
Nijverheidsweg 9 - 3401 MC IJsselstein - NL
Nikola Teslastraat 1-14 - 7442 PC Nijverdal - NL
tel. +31 (0)85 8223 001
info@rhossnederland.nl

rhoss.com