

# Acoustic Performance of CLIMAVER® Light-Weight Ductwork Systems

Discover the impact of CLIMAVER® lightweight ductwork systems on acoustic comfort in HVAC applications. With superior sound insulation and linear attenuation, these innovative solutions address common noise challenges in buildings, enhancing indoor air quality, fire safety and energy efficiency while ensuring a more peaceful environment for occupants. Explore the benefits today!

**Keywords:** Acoustic Performance, Break-in Noise, Break-out Noise, CLIMAVER® Ductwork, Energy Efficiency, HVAC Systems, Indoor Air Quality, Linear Attenuation, Noise Control, Sound Insulation.

## Introduction to Acoustic Performance in HVAC Systems

Acoustic comfort of HVAC systems is one of the key topics in buildings, as well as indoor air quality, energy efficiency and fire safety. What few of us have in mind is that equipment noises due to HVAC are a major source of annoyance and non-conformity in buildings, as pointed out by a recent study led by the French QUALITEL association [1].

## Noise Emissions and Their Classification

The general problem to be solved is the control of noise emitted by the ductwork when it is submitted to an airflow due to the sound sources (e.g. fan noise). It is convenient to classify these noise emissions as follows:

- The sound radiated by the duct outlets, often called “break-in noise” or linear attenuation property (**in decibels per meter**). In this scenario, the ductwork behaves as a waveguide with the sound propagating internally. The performance is evaluated using the EN ISO 11691 standard.
- The sound radiated by the duct walls itself, often called “break-out noise” or sound insulation property (**in decibels**). To the authors knowledge, this property has received little attention from HVAC designers and engineers while it can be relevant, especially in places without false ceilings. The ISO 15665 standard, adapted to rectangular ductworks, can be used to address this property.

## Benefits of CLIMAVER® Ductworks

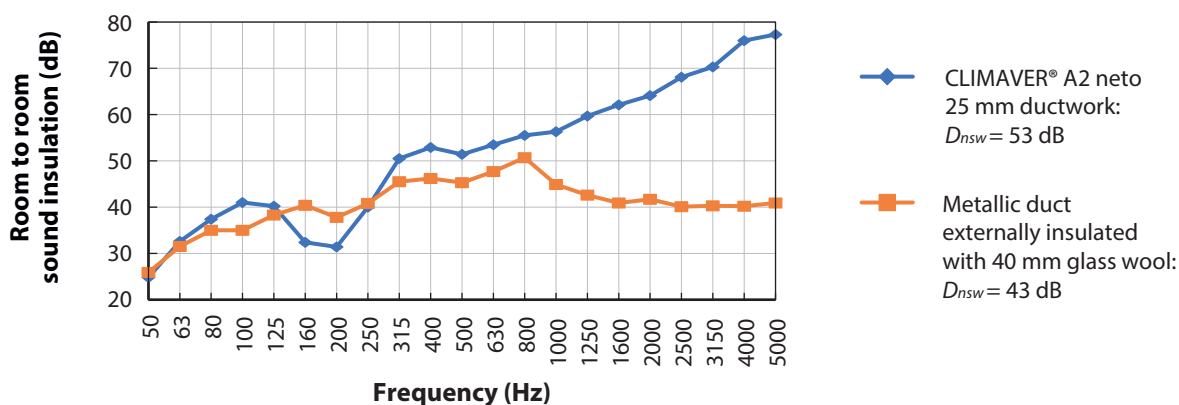
In practice, the experimental assessment of the acoustic performances can be done by neglecting the airflow

effect due to low speeds (typical values are between 2 m/s and 5 m/s in buildings) and focusing first on straight sections. This has led us to benchmark the acoustic potential of CLIMAVER® ductworks [2] compared to a bare metallic duct and an externally insulated metallic duct. The acoustic results obtained in external accredited laboratory clearly emphasize the advantages of CLIMAVER® systems compared to conventional ones. On the one hand, CLIMAVER® ductworks have a better sound insulation compared to a steel duct alone or even externally insulated. On the other hand, the linear attenuation values reached with CLIMAVER® are also very significant (up to 28 dBA with only 2.4 m long ductwork) while bare metallic ducts or externally insulated ones do not address this key issue.

## Example of experimental sound reduction of insulated ductworks compared to a bare 300 mm × 300 mm steel duct (EN ISO 11691 & ISO 15665):

Ductwork System	Sound Insulation	Linear Attenuation
CLIMAVER® APTA 40mm	-13dBA vs baseline	-28dBA vs baseline
CLIMAVER® A2 NETO 25mm	-10dBA vs baseline	-24dBA vs baseline
Galvanized rectangular duct externally insulated with 25mm glass wool	-6dBA vs baseline	~0dBA vs baseline

Baseline is a 0.8 mm galvanized rectangular duct. The linear attenuation values given above are measured on a 2,400 mm long ducts. In all cases, the source is a loudspeaker generating a wideband signal at one end of the ductwork. The values given in the table may vary depending on the duct section.



“Room to room” insulation measured (according to EN ISO 10848 standards) on a CLIMAVER® ductwork and an externally insulated metallic duct (200 mm × 200 mm section).



CLIMAVER® A2 NETO 25 mm ductwork with 2 openings ( $\phi = 125$  mm) at 1 m and 3 m from the separating wall in both rooms, left: source room, right: receiving room.

### “Room to room” sound insulation of CLIMAVER® ductworks

The “room to room” insulation is another scenario where the ductwork transports the sound from one room to another through openings in the separating walls. The sound insulation of a 200 mm × 200 mm CLIMAVER® ductwork has been measured in external laboratory and compared to a traditional metallic duct with the same section and externally insulated with 40 mm glass wool. Once again, the CLIMAVER® ductwork outperforms the reference solution, with a 10 dB gap in terms of global sound insulation ( $D_{nsw} = 53$  dB vs 43 dB for the externally insulated metallic duct).

### Conclusion

Acoustic studies done by Saint-Gobain Isover with third party laboratories highlight that CLIMAVER® ductwork has significant benefits compared to

traditional ductworks. Finally, it also improves the energy efficiency thanks to very low-pressure losses of the airflow compared to metallic silencers currently used for acoustic purposes. Therefore, it is anticipated that CLIMAVER® ductworks could be more effective and sustainable solution, especially in cases where the air handling units and other sound sources are located outside the nearfield of first occupants.

### References

- [1] <https://www.qualitel.org/professionnels/uploads/Guide-acoustique-renovation.pdf>
- [2] [www.isover-technical-insulation.com](http://www.isover-technical-insulation.com) ■