

## VENTILATED CEILINGS WITH CEWOOD PANELS

Maintaining a healthy indoor climate while ensuring comfort, energy efficiency, and acoustic performance is a key challenge in modern building design. Especially in environments like schools, offices, and healthcare spaces, traditional mechanical ventilation systems often rely on high-velocity ducted diffusers, which can result in draughts, uneven air distribution, and increased energy consumption.

Diffuse ventilation offers an alternative approach – by supplying fresh air gently and uniformly through the entire ceiling surface at low pressure. Instead of targeting specific outlets, air flows through a permeable ceiling and mixes naturally with room air, helping to maintain stable temperature, humidity, and air quality levels.

When combined with CEWOOD Panels, this system allows for quiet and energy-efficient air delivery with minimal visible infrastructure. At the same time, the panels contribute to effective sound absorption and thermal inertia, making them an elegant and practical solution for integrated ceiling systems.

### ADVANTAGES:

**Enhanced Air Quality:** Diffuse ventilation facilitates the circulation of fresh air throughout the space, reducing the concentration of pollutants, odours, and contaminants. It helps remove airborne particles, such as dust, allergens, and volatile organic compounds, resulting in improved air quality and a healthier environment for inhabitants.

**Comfortable Thermal Environment:** By evenly distributing the supply air, diffuse ventilation helps maintain a more uniform temperature throughout the space. This prevents hot or cold spots and eliminates draughts, creating a comfortable and pleasant thermal environment.

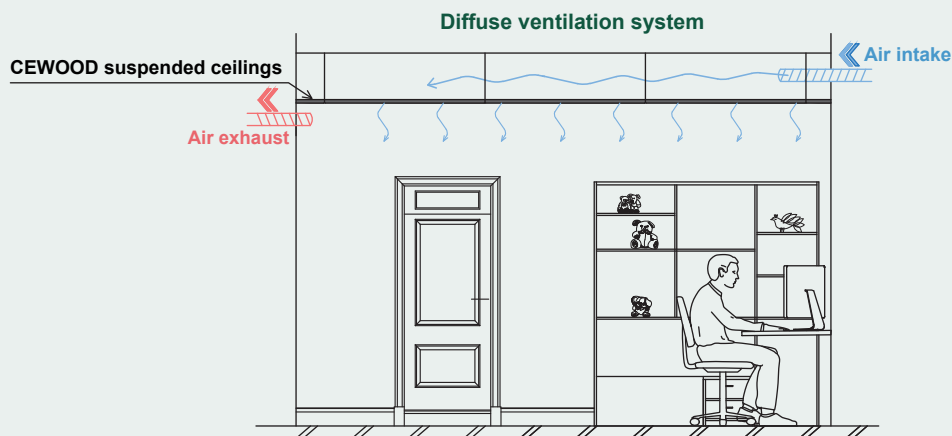
**Energy Efficiency:** Diffuse ventilation systems typically operate at lower air pressure and velocity compared to conventional ventilation methods. This means less fan power is needed to move air through the system, leading to lower energy use and reduced operating costs.

**Noise Reduction:** The use of CEWOOD Panels in diffuse ventilation systems can help reduce noise levels by acting as sound absorbers. This can improve the acoustic comfort of premises, especially in areas where noise control is important, such as offices, classrooms, or healthcare facilities.

**Flexibility in Airflow Distribution:** Diffuse ventilation systems offer flexible airflow design that can be adapted to different room layouts and usage needs. The placement of air supply zones can be adjusted to control how air moves through the space – for example, to guide fresh air where it's most needed or to manage specific airflow patterns.

**Design Integration:** Diffuse ventilation systems can be seamlessly integrated into the architectural design of a building. CEWOOD Panel ceilings provide a visually appealing and inconspicuous ventilation solution.

**Simplified Maintenance:** Diffuse ventilation systems often involve fewer components compared to more complex ventilation systems. CEWOOD Panels also provide simple access to the ceiling cavity, which can help reduce long-term maintenance time and costs.

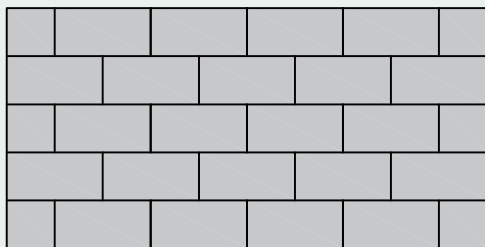


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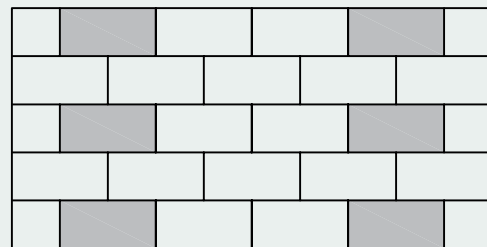
### AIR PERMEABILITY OF CEWOOD PANELS

CEWOOD panels allow low-pressure air to pass through the panel surface, enabling gentle and even air distribution across the space. This ensures effective mixing of supply and room air, helps prevent draughts, and reduces the risk of uncomfortable temperature differences – leading to lower cooling energy demands.

In ventilated ceiling systems, the air inlet area can be easily adapted: either the entire ceiling can function as a supply surface, or only selected zones. This is achieved by combining active panels, which are naturally air-permeable, with passive panels, where the back surface is sealed with an air-blocking layer, such as a vapour-permeable film.



Whole ceiling as air inlet area



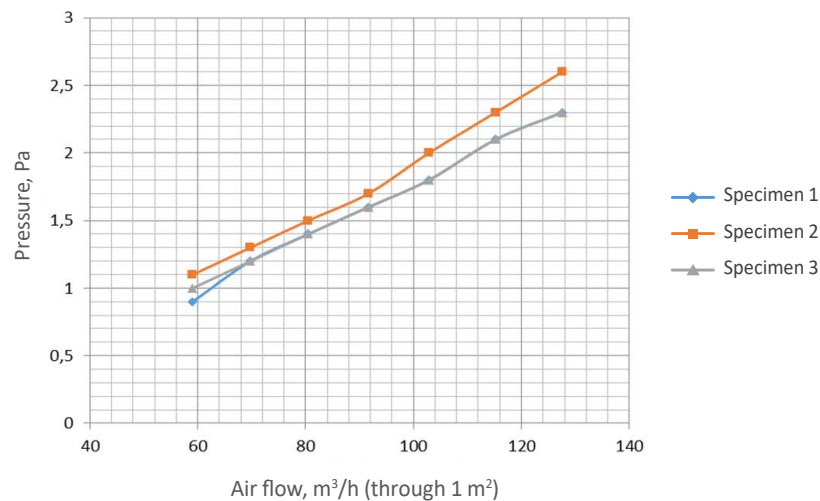
Local points of ceiling as air inlet area

### Air permeability of CEWOOD panels

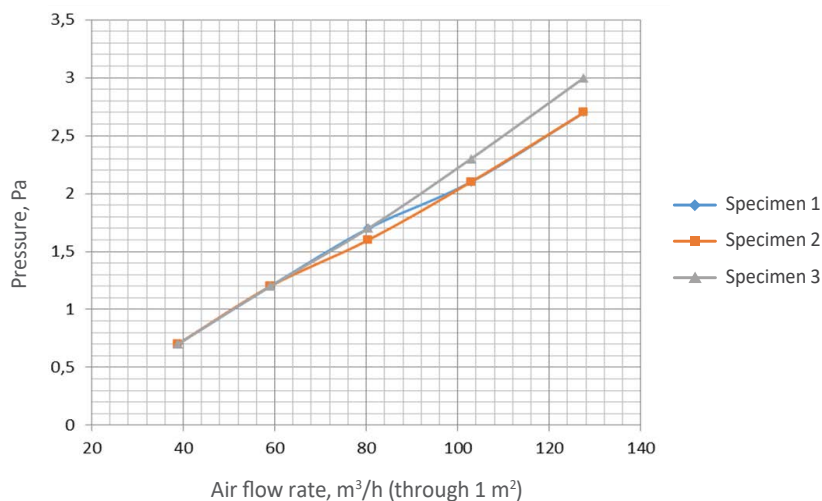
Thickness, mm	Test method	Air permeability $\text{m}^3/(\text{m}^2 \cdot \text{s} \cdot \text{Pa})$
25	EN ISO 9053-1:2019	$16,6 \cdot 10^{-3}$
35	EN ISO 9053-1:2019	$13,7 \cdot 10^{-3}$

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### Air flow capabilities of CEWOOD panels



25 mm CEWOOD panel air flow capacity as a function of pressure



35 mm CEWOOD panel air flow capacity as a function of pressure

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### DESIGN GUIDELINES FOR VENTILATED CEILINGS USING CEWOOD PANELS

The design of ventilated ceilings using CEWOOD panels should be carried out by experienced HVAC professionals or engineers who understand air distribution through permeable ceiling systems. Each project must consider specific room requirements, local building regulations, and manufacturer recommendations to ensure an effective and efficient solution.

Several key factors influence performance and comfort:

#### 1. Analysis of the premises and ventilation type:

- Define the purpose and expected occupancy of the space, and determine the required ventilation rates per person or per square meter.
  - Assess the thermal loads in the space, such as heat generated by occupants, equipment, and lighting.
  - Consider any specific requirements such as noise reduction, air quality, or humidity control.
  - Choose the appropriate ventilation method (natural or mechanical).
- Ventilated ceilings are not recommended in rooms with a ceiling height below 3 meters.

#### 2. Ceiling Panel Selection:

- Select the desired CEWOOD panels to ensure visual comfort.
- Evaluate the acoustic performance of the panel to ensure it fits the desired noise reduction goals.
- Determine the necessary height of the cavity behind CEWOOD ceilings. At least 20 cm is recommended.

#### 3. Airflow Distribution:

- Calculate the required supply air volume based on the ventilation rates and room size.
- Determine the number and size of air supply and exhaust vents, considering the desired air distribution pattern. If the area of the premises is more than 150 m<sup>2</sup>/or the depth exceeds 8 m it is recommended to have CEWOOD panels with higher air pressure resistance or adjust the air supply intake locations to even out the air distribution.
- Optimize vent locations to reduce stratification and achieve consistent conditions throughout the space.

#### 4. Ductwork Design:

- Design the ductwork layout to provide the necessary count and locations of air supply and exhaust vents in the premises.
- Consider the pressure drop, velocity, and friction losses in the HVAC system to ensure efficient airflow to behind ceiling cavity.

#### 5. Controls and Integration:

- Depending on the chosen ventilation type, the control strategy is determined for the diffuse ceiling ventilation system, considering factors such as occupancy sensors, thermostats, and air quality sensors.

#### 6. Compliance and Standards:

- Ensure that the design meets local building codes, regulations, and standards for ventilation, air quality, and fire safety.