



Technical Comparison of Materials for Cold and Damp Walls

This table compares the hygrometric and thermal behavior of five materials commonly used for insulation or for correcting internal thermal bridges: **Nobilium® Thermalpanel, calcium silicate, calcium hydrate, clay, and plasterboard**. The focus is on their performance under conditions of high humidity and/or cold walls, with relative humidity (RH) above 60% and inadequate air exchange management.

Table 1 – Summary of Performance Comparison

Characteristic	Nobilium® Thermalpanel	Calcium silicate	Calcium hydrate	Clay	Plasterboard	Lime-cement plaster
Moisture absorption	Very low	High (300–400 g/m ²)	High, similar to silicate	Medium: balanced	High: easily absorbs moisture	Low, but can retain
Moisture release	Does not retain → No issue	Slow, depends on ventilation	Slow, risk of saturation	More dynamic and regular	Slow, retains moisture	Slow, depends on the mixture
Breathability (μ)	≈ 1-3	≈ 5-10	≈ 5-10	≈ 10	≈ 10–15	≈ 15–25
Hygroscopicity	None	Present	Present	Present	Absent	Absent
Risk of mold	Very low	Medium-high if saturated	Medium-high	Low	High if damp	Medium-high if cold/damp
Thermal insulation	Excellent ($\lambda \approx 0,029-0,032$ W/m·K)	Good when dry	Similar to silicate	Poor	Poor	Poor
Stability at high relative humidity	Excellent	Good	Medium	Fair	Poor	Good, but prone to cracking
Ideal for	Mold, thermal bridges, cold wall	Dry internal microclimate	Alkaline environments, dehumidification	Indoor comfort, RH regulation	Dry walls not exposed to condensation	Economical base support, but not insulating



Table 2 – Sd Values (Equivalent Air Thickness)

Material	μ	Considered thickness	Sd (m)	Average Sd values (m)
Nobilium® Thermalpanel	1-3	4 mm (0,004 m)	0,004 - 0,012 m	0,008 m
Nobilium® Thermalpanel	1-3	9 mm (0,009 m)	0,009 – 0,027 m	0,018 m
Calcium silicate	5-10	25 mm (0,025 m)	0,125 – 0,250 m	0,187 m
Calcium hydrate	5-10	25 mm (0,025 m)	0,125 - 0,250 m	0,187 m
Clay	10	22 mm (0,022 m)	0,220 m	0,220 m
Plasterboard	10–15	12,5 mm (0,0125 m)	0,125–0,187 m	0,156 m
Lime-cement plaster	15-25	15mm (0,015 m)	0,225 – 0,375 m	0,300 m

The **Nobilium® Thermalpanel**, even at reduced thickness (4–9 mm), ensures an Sd value that is on average ten times lower, **making it highly breathable and suitable for cold walls at risk of condensation**. In contrast, materials such as plasterboard, calcium hydrate, and calcium silicate can absorb and retain moisture, resulting in greater fragility and reduced suitability unless controlled ventilation is provided. Clay, although breathable and hygroscopic, offers poor thermal insulation and should be used judiciously.

In contexts such as **a north-facing wall with high relative humidity**, the **Nobilium® Thermalpanel** represents the most reliable choice in terms of both performance and hygiene. Hygroscopic materials, on the other hand, should be used with caution, and only if effective ventilation and the absence of chronic moisture are ensured.



Advantages of Nobilium® Thermalpanel

1. **Exceptional breathability** → Ensures **rapid evaporation of internal moisture** without the risk of interstitial condensation. No other material in the table is as permeable.
2. **Extremely low Sd values** → Even at 9 mm thickness, it **maintains an extremely low Sd value**, ideal for cold walls at risk of mold.
3. **Non-hygroscopic and does not retain moisture** → Unlike mineral materials (silicate, hydrate, clay), Nobilium **does not become saturated** and does not act as a water reservoir.
4. **High dimensional stability even at RH > 90%** → Resistant to deformation, shrinkage, absorption, or swelling typical of plasterboard, clay, and lime-based materials.
5. **Excellent thermal insulation even at low thickness** → Helps reduce issues at cold spots, drastically lowering the possibility of surface mold and maintaining consistent insulating performance over time.
6. **Naturally mold-resistant** → Does not provide nutrients for fungal spores and **does not create microclimates favorable to their proliferation.**
7. **Compatible with breathable finishes** → Can be finished with silicate or lime-based paints, maintaining full breathability of the system.



Table – Cost-benefit analysis of insulating materials for cold and damp walls

Material	Thermal insulation	Mold resistance	Breathability	Durability	Notes
Nobilium®	✓ Consistently excellent	✓ Excellent	✓ Maximum	✓ High (even at elevated RH)	No maintenance required
Calcium silicate	✓ Good (when dry)	⚠ Medium	✓ High	⚠ Medium	Requires constant ventilation
Calcium hydrate	✓ Good	⚠ Medium	✓ High	⚠ Medium	Sensitive to humidity and stagnation
Clay	✗ Poor	✓ Good	✓ Medium-high	⚠ Medium	Not insulating, requires suitable finish
Plasterboard	✗ Poor	✗ Scarso	⚠ Low ($\mu \approx 10-15$)	⚠ Low	Unsuitable for humid environments or those with condensation

Nobilium® Thermalpanel, the effective solution and not just a simple palliative.

The **Nobilium® Thermalpanel** can be considered the solution with the best cost-benefit ratio for use on cold walls prone to mold, especially when compared to materials such as calcium silicate, calcium hydrate, clay, and plasterboard. **Additionally, the installation time for Nobilium® Thermalpanel is at least halved compared to other solutions**, thanks to its high ease of handling, installation, and reduced bulk.