thermocal™

Eco-friendly thermal and acoustic insulation system

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WHAT IS THERMOCAL™?

Thermocal™ is the brand under which the first waterproof, mineral and ecological mortar for coating walls and ceilings has been developed. It simultaneously acts as a thermal and acoustic insulating/corrective material and provides fire protection.

Thermocal™ is a market leader in terms of performance, offering an unprecedented ecological solution thanks to the properties of its components: lime, expanded perlite, exfoliated vermiculite and hollow glass microspheres.

Thermocal™ is the true skin of walls. It is a very lightweight, breathable mortar with a porous and cavernous structure that protects buildings by hindering any thermal exchange. In addition, its water-repellent properties prevent water from passing from the outside to the inside of the building.

Thermocal™ provides a level of climatic comfort inside habitable spaces that is significantly higher than that offered by all known mortars and materials, achieving, in a single operation, better results than a multi-layer insulation system, as it provides a water-repellent and breathable coating, thermal and acoustic insulation, and a high level of fire protection.

THE COMPOSITION OF THERMOCAL™

LIME

Lime is the noble material par excellence in construction. It has accompanied mankind for thousands of years and has withstood all technological developments. Thanks to its exceptional physical properties, lime remains an irreplaceable building material. Due to its unique adhesion characteristics and resistance to diagonal stresses, developed countries require the use of lime in mortars used in seismic areas. Today, there is no other material as versatile as lime in mortars, as it provides greater long-term strength, workability, improved adhesion, greater thermal insulation and waterproofing, all at a lower cost. Furthermore, only pure natural lime allows gaseous exchanges between the inside and outside of a dwelling.

PERLITE

Perlite is a mineral of volcanic origin composed of silicon dioxide and aluminium oxide, also containing small amounts of water, soda, potash and lime. To be used in construction, it must undergo a physical expansion process consisting of heating the perlite to approximately 1000–1200 °C. This process gives it very low thermal conductivity as well as excellent lightness. Perlite is chemically classified as an inert material; it is non-combustible, non-rotting and non-toxic.

VERMICULITE

Vermiculite is a mineral. More specifically, it is a clay belonging to the mica family, composed of aluminium, iron and magnesium silicates. It occurs in the form of shiny flakes that turn its surface into a large reflector of thermal radiation, dispersing heat and increasing its thermal insulation capacity. Vermiculite is insensitive to atmospheric agents and the passage of time. Furthermore, due to its low thermal conductivity and extremely high fire resistance, it is capable of maintaining its insulating capacity between 200 and 1200 °C.

GLASS MICROSPHERES

The raw material used to produce glass microspheres is recycled glass, produced annually in millions of tonnes. The **Ibercal Group** therefore makes a decisive contribution to improving glass recycling processes and preserving natural resources. Following a technological process of mixing and expansion, a spherical aggregate is obtained which is completely hollow, very lightweight and extremely resistant to compression. It is chemically stable, highly resistant to weathering and alkalis, non-flammable, solvent-free and odourless, and does not provide a source of nutrients for parasites or fungi.

2 PROPERTIES

NOBLE, NATURAL & ECOLOGICAL

Thermocal™ is a 100% mineral, noble, natural and ecological mortar, free from undesirable chemical or biological substances and therefore bacteriologically sterile. It is non-toxic, odourless and does not produce bacteria, spores, fungi or mites. It also has no phytotoxic effects.

Thermocal™ contains no formaldehyde, as it incorporates neither wood derivatives nor forestry waste.

It is compatible with both traditional and modern construction methods and materials from a chemical, structural and mechanical standpoint. It behaves harmoniously with other materials, such as stone, ceramics and concrete, among others, and possesses excellent bioclimatic properties.

Thermocal™ does not produce harmful salts or efflorescence, since the lime it contains is manufactured from high-quality, highly pure raw materials. The amount of soluble salts is much lower than that found in cement, preventing significant damage to the combined stone-mortar system caused by crystallisation or hydration cycles.

It has high elasticity, which allows it to adapt to substrate deformations without causing cracks, accommodating the movements of both old and new buildings.

This deformability provides excellent watertightness against physical stresses — vibrations, wind and freeze-thaw cycles — and chemical stresses — rain, acid salts, etc. — as well as maintaining volume stability under varying humidity conditions.

Thermocal™ respects the environment and its waste is fully recyclable and reusable as aggregate.

THE SKIN OF WALLS HUMIDITY REGULATION

Thermocal™ is the true skin of walls. Its water-repellent properties prevent water from passing from the outside to the inside of the building.

The purity of the lime with which it is manufactured and its microporous structure make it highly permeable to water vapour, allowing it to act as a true dehumidifying mortar. In addition to evaporating moisture originating from the substrates, it allows gaseous exchanges between the inside and outside of the building, enabling the walls of the dwelling to breathe and preventing condensation.

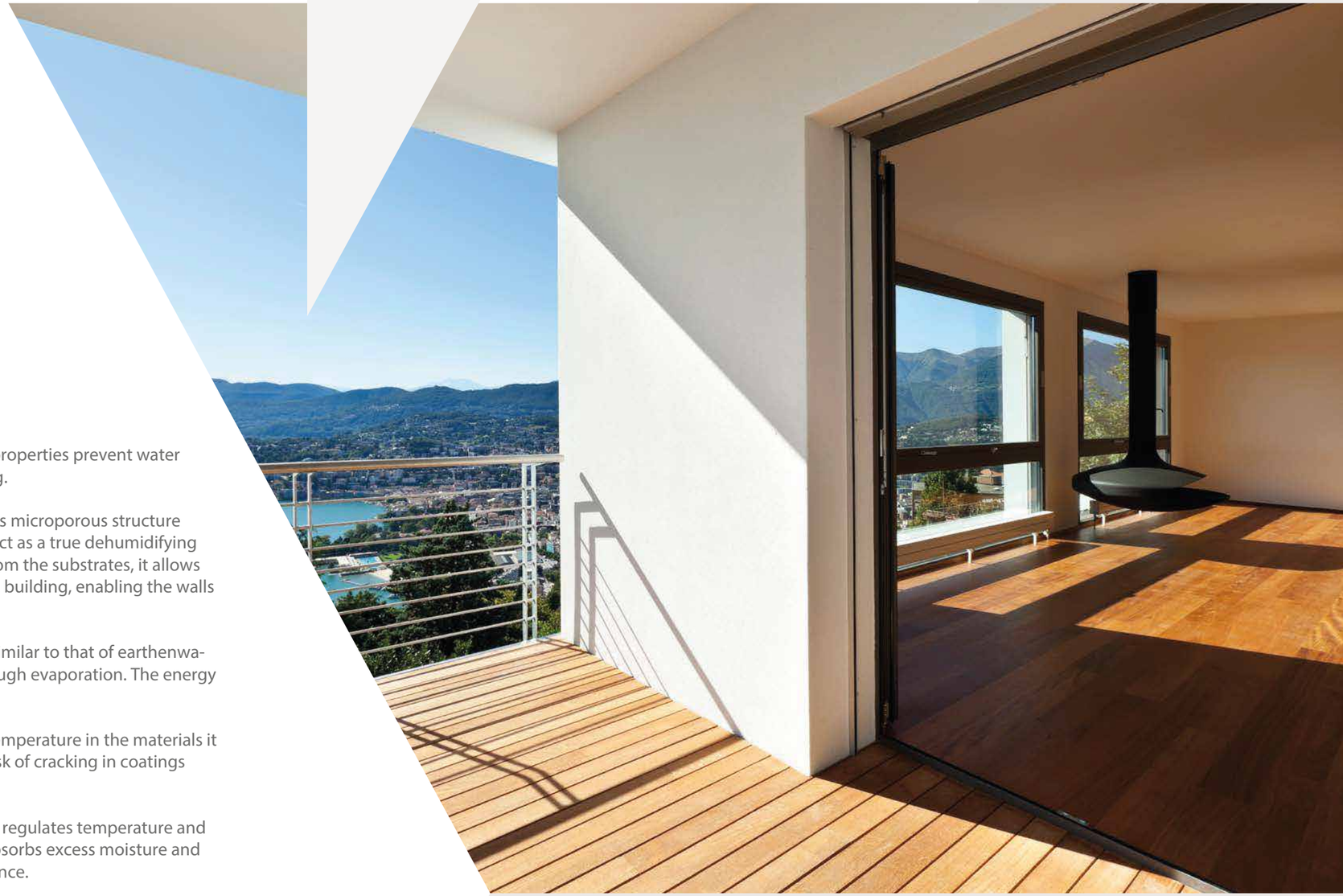
This permeability has a beneficial effect on the dwelling, similar to that of earthenware, recreating the so-called “botijo effect”, i.e. cooling through evaporation. The energy required for evaporation is taken from the internal heat.

It acts as a thermal regulator, maintaining a more stable temperature in the materials it coats, eliminating thermal differences and reducing the risk of cracking in coatings caused by hygrothermal stresses.

Due to its excellent hygrometric properties, **Thermocal™** regulates temperature and promotes environmental ventilation inside buildings. It absorbs excess moisture and releases it when the air is drier, ensuring hygrometric balance.

Greater structural stability through self-healing of cracks: in lime mortars, recrystallisation of calcium carbonate occurs. This property is known as self-healing and occurs when water penetrates through cracks, dissolving the lime which, when it hydrates again, recarbonates and seals the cracks.

This phenomenon, being directly related to the dissolution and reprecipitation cycles of calcite and depending on the purity of the lime, does not necessarily occur in all mortars containing lime.



NATURAL THERMAL INSULATION

Thermocal™ is a very lightweight mortar composed of a highly porous mass and mineral elements with very low thermal conductivity, hindering any heat exchange by conduction. Its small globular structure, together with the closed, empty microcells of the glass microspheres, immobilises the air, hindering and cancelling any thermal exchange inside the material by convection.

In construction, so-called selective cold surfaces are common, such as lime, white paint, etc. They are so called because they have low absorptance and high emittance, meaning that they do not heat up through solar radiation and are good emitters of radiation.

Thermocal™ has a whiteness index of approximately 80% and chromaticity coordinates very similar to those of fresh snow, providing reflectance values of 90% — as an average value measured across the entire visible spectrum — and consequently an integrated absorptance of 10%.

These values naturally give it thermoreflective insulating properties, largely produced by the visible aluminium content present in the shiny surfaces of the mica flakes it contains, forming a multitude of surfaces that reflect and disperse thermal energy transmitted by radiation.

This makes it an ideal insulator for high temperatures.

In winter, this reflection prevents heat from escaping to the outside and increases the surface temperature of internal walls, thereby increasing the feeling of comfort. These reflective properties also redirect a large proportion of solar radiation towards the outside, preventing overheating of the dwelling in summer.

Due to the excellent relationship between density, specific heat and thermal conductivity coefficient, Thermocal™ has the lowest thermal diffusivity among the most commonly used building materials, making it an ideal material for the design of bioclimatic buildings.

Thermocal™ can be used to design passive climate-control systems, using thermal inertia as a passive strategy. Because it forms part of the building's structure and adapts to the characteristics of the environment, it can naturally capture, block, transfer, store or release energy in a natural and self-regulating manner, using it as efficiently as possible and contributing to significant savings.

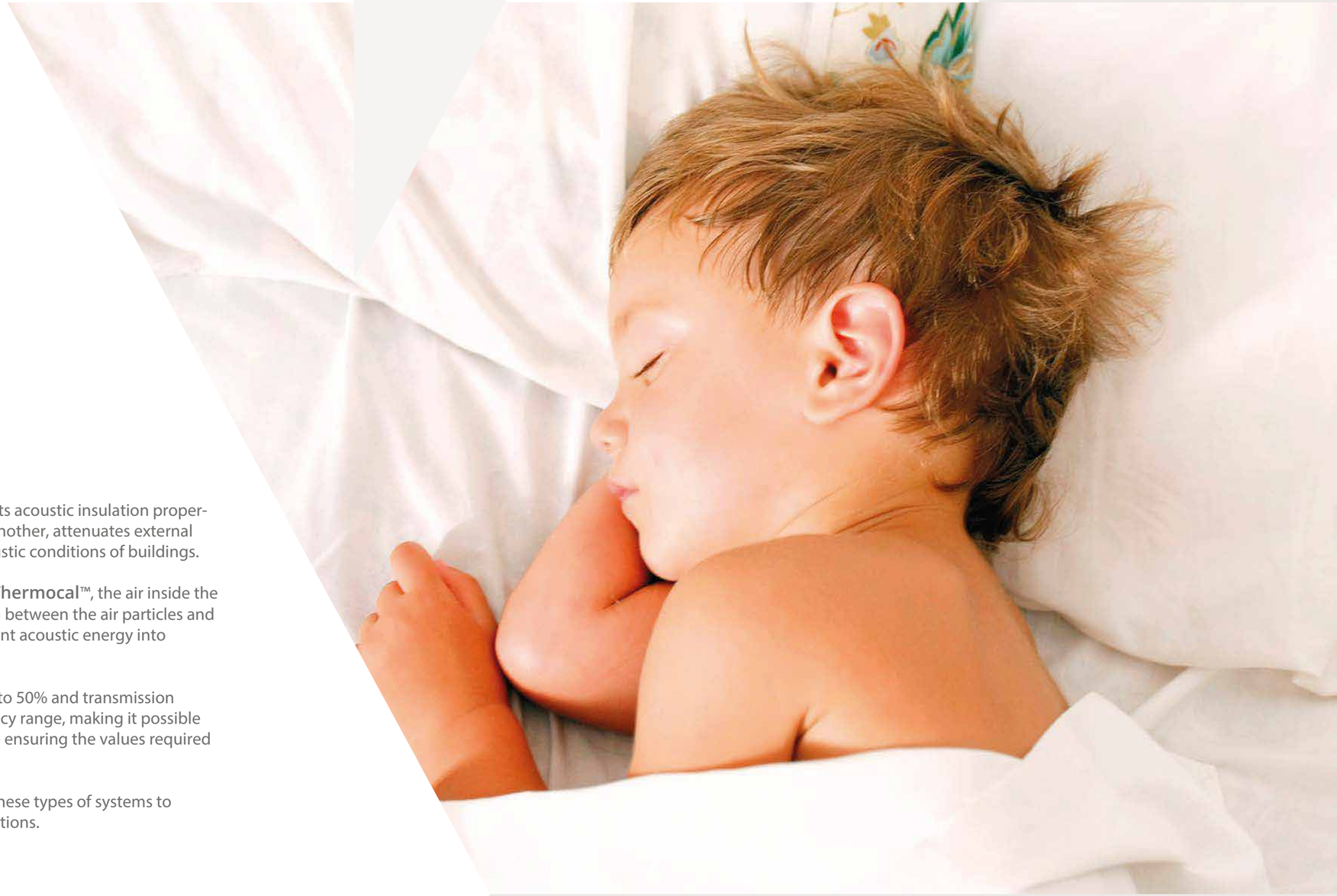
ACOUSTIC INSULATION & ABSORPTION

Thermocal™ is an elastic material that stands out for its acoustic insulation properties: it reduces sound transmission from one room to another, attenuates external sounds and reduces reverberation, improving the acoustic conditions of buildings.

When the acoustic wave strikes the porous surface of **Thermocal**™, the air inside the pores is forced to move. This movement causes friction between the air particles and the material's structure, transforming part of the incident acoustic energy into thermal energy.

Thermocal™ has sound absorption coefficients of up to 50% and transmission losses of between 18 and 23 dB in the relevant frequency range, making it possible to correct and improve any acoustic brick system while ensuring the values required on site.

It also provides the thermal performance required by these types of systems to comply with the requirements imposed by local regulations.



COMFORT, HEALTH & QUALITY OF LIFE

Thermocal™ has unique properties: it provides thermal and acoustic comfort inside buildings that is significantly higher than that offered by other construction materials and mortars.

It has very low thermal conductivity, high acoustic absorption, high specific heat, low thermal diffusivity, high thermal inertia, complete water resistance, excellent fire resistance and high vapour permeability, as well as fungicidal and bactericidal properties, and it is easy and simple to apply.

Its fungicidal and bactericidal properties, inherent to pure lime, make it a product capable of combating fungi and bacteria that affect old and damp buildings.

Due to its high content of calcium hydroxide, i.e. air lime, **Thermocal**™ absorbs carbon dioxide from the environment, contributing to atmospheric purification and creating an oxygen-rich microclimate and an ideal comfort environment for the people living there, particularly those suffering from any type of allergy.

Thermocal™ is radiologically harmless and can be widely used as a construction element, in accordance with the criteria proposed by the European Union Directorate-General for Environment, Nuclear Safety and Civil Protection.

Thermocal™ is a natural and ecological material committed to environmental balance, creating comfortable and healthy environments.

DURABILITY

Hydraulic lime and hydrated lime react with silicates, creating hydrated dicalcium silicate complexes that act as binders and provide high dimensional stability to walls, absorbing construction deficiencies and becoming stronger over time.

The carbonation of hydrates in contact with atmospheric carbon dioxide increases strength and durability. This phenomenon also causes its mechanical strength to progressively increase throughout its service life.

Thermocal™ requires no maintenance and its thermal values remain constant throughout the building's life cycle.

FIRE PROTECTION

Fire safety is one of the essential requirements in the design of a building and its effectiveness cannot be compromised. Insulation plays an important role in terms of fire safety. In fact, some insurance companies vary building insurance premiums depending on the insulation materials used.

A fire can only occur when the three essential factors that make up the fire triangle are present: combustible material, oxygen and ignition energy.

Oxygen is always present; ignition energy can be supplied intentionally or accidentally, for example through a flame, spark, cigarette or short circuit. Combustible material, however, can be avoided.

Solid materials do not burn directly but release combustible gases when heated, and these gases are what actually ignite. During the first stage of a fire, combustible gases develop and cause the fire to grow while the temperature is still relatively low.

During a fire, gases such as carbon monoxide, monostyrene, hydrogen bromide and other aromatic compounds are generated. The effects of these substances on the human body can cause acute or chronic damage and, in many cases, may even result in death.

If inhaled, even in moderate quantities, carbon monoxide can cause death by poisoning within a few minutes, as it replaces oxygen in the blood's haemoglobin.

Smoke obscuration

Smoke obscuration or density is another effect associated with a fire. Smoke production is particularly important when selecting materials for construction, since obscured air or dense smoke makes it difficult to escape from a burning building.

Today, it is entirely possible to design a building with high energy efficiency while simultaneously meeting all fire safety requirements.

Thermocal™ has been designed in accordance with legal requirements for thermal and fire protection. It offers technically safe and definitive solutions for façades and walls that guarantee structural protection throughout their service life.

The result is safe planning and sustainable cost-effectiveness for construction and maintenance. **Thermocal**™ is classified as Euroclass A1 reaction to fire, since it is mineral and therefore completely non-combustible; it does not decompose and is fire-resistant.

When exposed to heat, it gradually releases crystallisation water in the form of vapour, slowing the rise in temperature and absorbing heat without emitting toxic gases, which are the main cause of fatal accidents in most fires.

Thermocal™ can be used as a mortar for the passive protection of structural and compartmentation elements.

3 CONSTRUCTION SOLUTIONS

Thermocal™ mortar and its various developments are suitable for meeting the vast majority of construction needs, both in new construction and renovation.

In addition, Thermocal™ is also used to treat building pathologies of a thermal and acoustic nature and those resulting from excess moisture in buildings.

Thermocal™ is the complementary and definitive solution for single-leaf masonry walls to meet the thermal and acoustic requirements of current regulations.

STRUCTURAL CONSOLIDATION

Thermocal™ creates a protective shell around the building, stable over time and unaffected by environmental variations.

By acting as a thermal regulator, it maintains a more stable temperature in the materials it coats, eliminating thermal differences and reducing or eliminating the risk of cracking in coatings caused by hygrothermal stresses.

Lime reacts with silica, forming hydrated dicalcium silicate complexes that act as binders and provide high dimensional stability to walls, strengthening them over time.

TOTAL INSULATION

Thermocal™ reduces the energy demand required to achieve thermal comfort depending on the climate zone, building use and summer/winter operating conditions.

Thermocal™ creates an envelope system that insulates buildings from climatic conditions, becoming a true skin for buildings.

When applied as a coating mortar, **Thermocal™** makes it possible to completely and totally insulate any element of a construction project, such as columns, cornices, beams, slab edges, chimneys, walls, floors, ceilings, etc.

In External Thermal Insulation Composite Systems (ETICS), combined with other insulating materials such as cork, mineral wool or polystyrene, Thermocal™ provides dimensional stability, fire protection and moisture protection, keeping the insulation dry.

ANTI-MOISTURE SYSTEM

Thermocal™ is a dehumidifying mortar, ideal for restoring walls affected by rising damp caused by capillary action.

The pure natural lime used to manufacture **Thermocal**™ causes liquid-gas phase changes, ensuring water-vapour permeability and promoting the evaporation of moisture originating from substrates.

In addition, **Thermocal**™'s water-repellent properties allow moisture exchange in only one direction: from inside to outside.

Thermocal™ also solves problems caused by moisture resulting from condensation inside homes or spaces, as it increases the thermal insulation of the substrates on which it is applied, particularly in:

- Cold ceilings and walls, whether or not they show masonry marks (joists, blocks, bricks, etc.).
- Slab edges, for the elimination of thermal bridges, such as roof/façade junctions, lintels, joints between prefabricated elements, etc.

ACOUSTIC SYSTEMS

Thermocal™ is an excellent acoustic absorber that corrects echoes and reverberation in spaces, providing acoustic quality to rooms.

Thermocal™ makes it possible to correct and improve any acoustic brick system, ensuring the values required on site. It also provides the thermal performance required by these types of systems to comply with regulatory requirements.

VENTILATED FAÇADES

Thermocal™ transforms ventilated façade systems into a definitive construction solution that provides significant energy savings and offers a high level of comfort to building occupants.

Benefits of applying Thermocal™ mortar to ventilated façades:

- Uniform and continuous coating that eliminates thermal bridges in the various façade elements.
- Highly efficient thermal and acoustic insulation system.
- Impermeability to rainwater entering through open joints in the external cladding.
- Excellent fire protection system.
- Elimination of condensation caused by moisture thanks to its high breathability.
- Low thermal diffusivity, thus preventing heat loss in winter.
- Excellent whiteness and high reflectance, providing a high level of protection that significantly changes the solar factor, light transmission, surface temperature and thermal transmittance coefficient of the cladding.
- Free and smooth space between the cladding and the wall, achieving maximum efficiency of the ventilation system.
- Speed and safety: **Thermocal**™ provides a firm, stable, resistant and joint-free support surface for fixing the framework, ensuring wall waterproofing, breathability and elimination of any thermal bridge.
- During framework installation, **Thermocal**™ allows additional anchors to be fixed without the risk of insulation failure or loss of façade watertightness.
- Cost-effectiveness: **Thermocal**™'s resistance to rainwater facilitates clean and fast installation regardless of weather conditions.

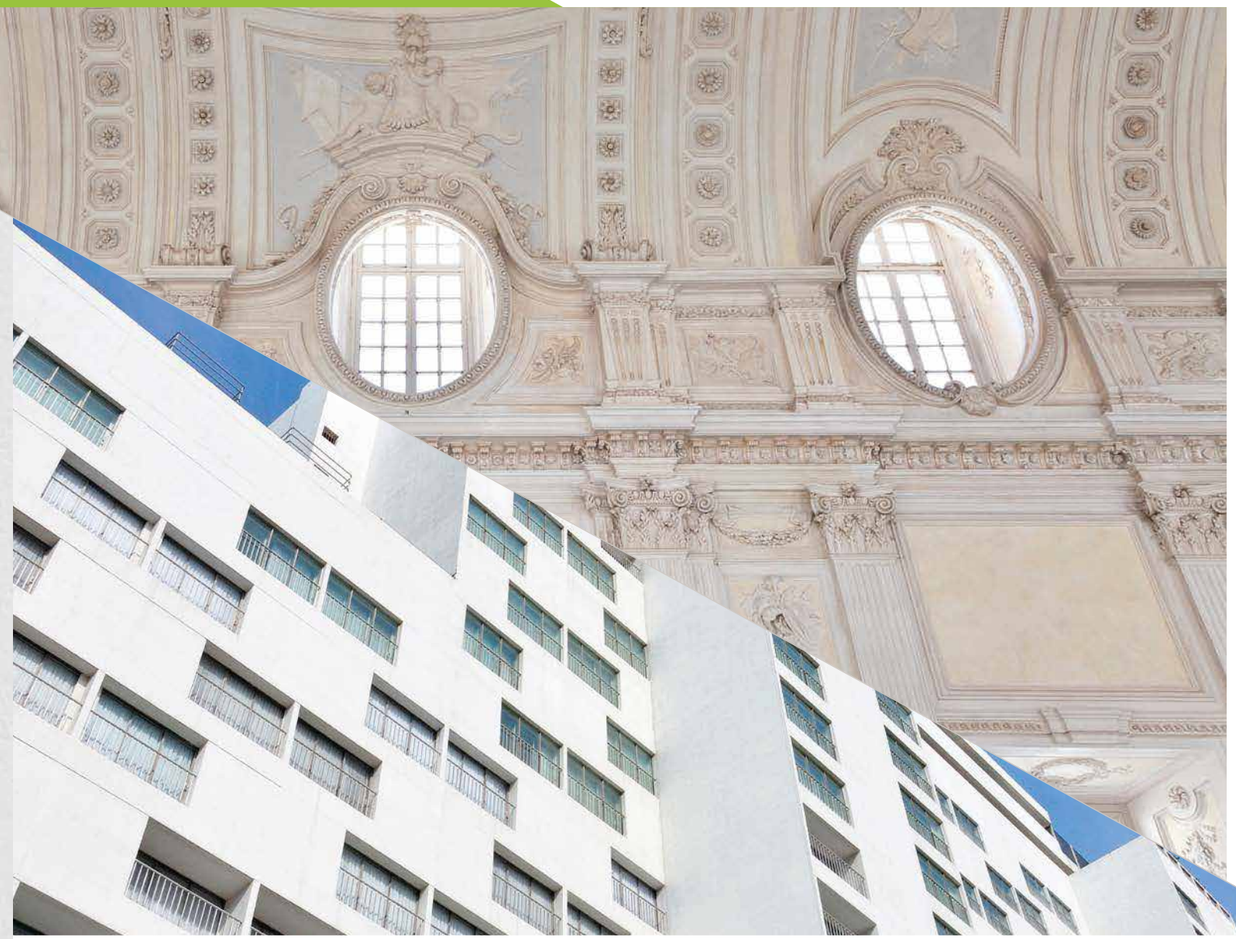
4 APPLICATION

SINGLE LAYER

Thermocal™ is applied manually or by mechanical spraying, on internal and external peripheral areas of homes and buildings in general. When applied to the substrate, it makes it possible, advantageously, in a single operation and with a single layer, to render the external face of the outer leaf of the wall and provide thermal and acoustic insulation, eliminating all thermal bridges. It can also be applied to ceilings and floors. Once hardened, **Thermocal™** can be painted with mineral paints, coated with lime mortar, faced with stone, ceramic tiles, etc. Its high adhesion allows application to any material.

INTERNAL APPLICATION

Thermocal™ allows compact and uniform interior application by spraying. Its excellent adhesion and consistency allow horizontal beads to be applied while continuously controlling thickness. Its creamy consistency fills all voids and corners, ensuring that not a single pore remains uncovered. The surface can be levelled using a straightedge and guide rails.



EXTERNAL APPLICATION

By applying **Thermocal™** directly to the external side of the wall, at the appropriate thicknesses, excellent insulation and complete elimination of all thermal bridges are achieved, giving walls high thermal inertia and making full use of their heat-storage capacity. **Thermocal™** adheres to any surface and absorbs irregularities in the masonry substrate, providing a continuous coating of constant thickness. **Thermocal™** is applied with great ease and high productivity, using minimal labour, minimising scaffolding costs and meeting construction schedules.

5 QUALITY

QUALITY CERTIFICATIONS

Thermocal™ follows the **Ibercal Group's** philosophy of investing in continuous quality improvement processes. For this reason, the company has implemented and certified an ISO 14001 Environmental Management System, as well as an ISO 9001 Quality Management System.

Thermocal™ is an exceptionally conceived and developed material protected by patent, with unique qualities, making it an innovative, non-replicable, distinctive and superior material.

Its levels of quality, reliability and durability are unquestionable, while at the same time it is simple and easy for professional applicators to use.

It is the result of a corporate policy focused on research, creativity and entrepreneurship.

AENOR GESTIÓN DE LA CALIDAD ISO 9001

AENOR GESTIÓN AMBIENTAL ISO 14001

IQNet UNE-EN-ISO 9001:2008 UNE-EN-ISO 14001:2004

SPAIN GREEN BUILDING COUNCIL

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