



# THERMOKAPA

External thermal  
insulation system guide



Comercialización

**BAUER**



## Professional quality & credibility in BAUER products



Our products are always designed focused on the real needs of people and the environment

**Our goal is simple.**  
Instead of a series of redundant features, we offer real solutions.

We believe that people cannot be forced to adapt to the complex requirements of technology; on the contrary technology should match people's requirements. Our experience and expertise are supported by world-class industrial facilities for the production and control of our products.

BAUER products are designed and developed meticulously, paying great attention to detail, in modern, fully automated facilities: in all production stages such as design, production and handling, a certified quality assurance system is implemented by the German organization Deutsche Gesellschaft für Qualität.

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We are meeting the increasing demand expressed by consumers, governmental agencies and public authorities for improved environmental protection and sustainable development in all our products.

With high-performance products based on natural raw materials and the development of future-viable innovations, BAUER offers improved performance and environmental compatibility.

The energy consumption of the building sector accounts for 40% of total energy consumption and accounts for 45% of national emissions of carbon dioxide.

Energy saving to protect the environment and improve energy and environmental performance of buildings is the basis of the philosophy of Green Building. By using natural insulating coatings and insulating mortars capable of transpiration ensure optimum insulation, while maintaining the breathability of the wall to the well-being inside buildings, which are less costly in terms of heating and cooling them, and healthier and environmentally friendly.

## Save from your building

Depending on the building usage the economic benefits of an external thermal insulation system are quickly realized. The energy savings from heat and aircondition expenses of the building are reduced drastically in comparison to the cost of the system installation. The depreciation period of the investment varies between 4-5 years depending on the condition and usage of the building. BAUER on the other hand guarantees the efficient functionality of BAU-system external thermal insulation system for decades.



Deutsche Gesellschaft für Qualität, Frankfurt, Reg. No. 312110 DM  
Total quality management system according to DIN EN ISO 9001

## Excellent durability and protection from the elements

THERMOKAPA external thermal insulation system

All THERMOKAPA system materials are product of uninterrupted research, combining the highest quality raw materials, expertise and BAUER manufacturing capabilities, to ensure top quality and durability.

**1 Kapa 11 / Ecoflex**

Adhesives for fixing the plates to the substrate, with a particularly high adhesion bonding for maximum safety.

**2 Bautherm W / Bautherm G**

Expanded polystyrene thermal plates with ( $\lambda=0,036 \text{ W/m}^*\text{K}$ ) and ( $\lambda=0,032 \text{ W/m}^*\text{K}$ ) respectively. Certified for external thermal insulation systems.

**3 Kapa 11 / Ecoflex / Ecoflex Organic**

Organic and inorganic reinforcing plaster for fiberglass impregnation.

**4 Bau Mesh 160**

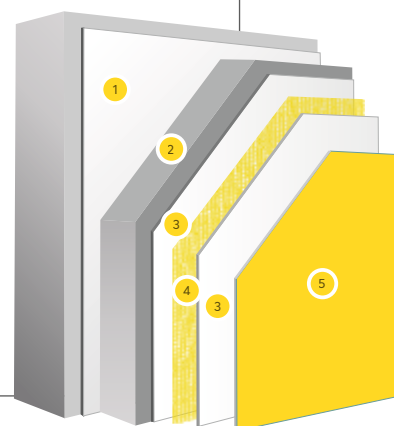
Fiberglass mesh with high strength reinforcement designed for THERMOKAPA system resistant to alkalis and moisture.

**5 Monokapa / Kapasil / Granulato**

Ready to use decorative organic render highly elastic with top resistance to cracking, moisture, dirt and fungus.

BAUER system is based on thermal insulation plates of expanded polystyrene or expanded polystyrene with graphite providing excellent thermal insulation, very good breathability of the building, excellent resistance to stresses and stability for many decades. All products are designed to withstand any stresses which daily accept the external walls of buildings offering maximum resistance to cracks.

With the use of self-extinguished polystyrene, totally incombustible inorganic adhesives and limited flammability acrylic renders, THERMOKAPA is the ideal system for new construction and renovation projects.



### BAUER warranty

- BAUER expertise
- 50 years of experience
- The highest quality and workmanship of the materials
- CE Marking in the system and products
- Certification ETA (European Technical Approval)
- Top resistance, unique elasticity, unsurpassed resistance to shocks and cracks
- Large selection of colours and textures for the final surface
- Continuous development of materials and construction methods for durability and economy



### System Advantages

**• Superior strength and durability.**  
Designed by BAUER to protect your building from any outside influence for decades.

**• Energy saving.**  
The most reliable investment with a guaranteed profit for the entire life of the building.

**• Superior protection against moisture and mold.**  
High water resistance and excellent breathability of the building ensuring walls without condensation and molds.

**• Maximum protection from cracking.**  
The most effective method of renovation on old facades that have cracks and other problems by providing maximum flexibility, strength and protection for several decades by reducing the contractions of components and cracks.

## Thermal insulation types

### Interior wall insulation

This type of thermal insulation system does not alter the external structure of a building as thermal plates are installed on the walls internally. This is a recommended choice for buildings which are not frequently used ( i.e. country houses etc.). Buildings with internal wall insulation heat quickly because only the air heats inside the rooms and not the walls. However when the heating is switched off the building cools off equally fast as a result of low thermal capacity since the walls always remain cold. The main disadvantage of this system is that thermal bridges are not eliminated from the external environment. It is also necessary to conduct detailed hygrometric analysis in order to avoid the deterioration of condensation effect on walls which are exposed externally.

There is no need for scaffolding but rooms must empty completely. Furthermore living space is reduced and electrical as well as plumbing installations need refitting. A similar thermal insulation system is cavity wall insulation where thermal plates are installed between double wall cavities. This application offers increased thermal capacity in comparison to the previous solution but the problems of thermal bridges and walls condensation remain.

### External thermal insulation

With external thermal insulation all thermal bridges are eliminated and the building achieves its maximum thermal capacity. The walls store heat during winter and cold during the summer radiating it back to the rooms. Consequently heating and air conditioning systems need to work for fewer hours resulting in higher energy efficiency and lower carbon emissions. This type of thermal insulation does not disrupt the building usage as all works are done externally. It is considered the optimal solution for renovation projects because the creation of structural thermal balance protects the building from environmental stresses, renews its appearance and prevents new cracks.



## Accurate planning is the foundation of a perfect result

Each insulation system needs to be carefully planned in order to achieve the optimal result. New structures should be constructed according to the latest building regulations and local geographical conditions need to be taken into account. Thermal upgrade of old buildings must be conducted under the guidance and supervision of a professional consultant who will specify the recommended type of insulation after taking into consideration all necessary parameters.

Professional guidance from experts makes it possible to obtain energy saving certification for the building. During planning the energy consumption of the heating and cooling system needs to be accurately calculated in order to classify the buildings energy performance and obtain the appropriate energy certification. European Union instructed the European Organisation for Technical Approvals (EOTA) to issue specific guidelines for the verification of the technical aspects

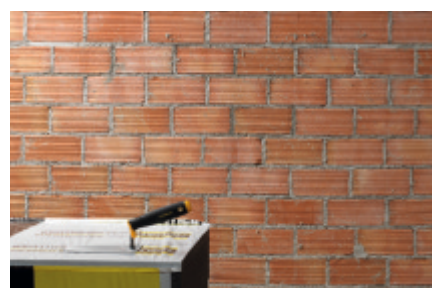
of insulation systems based on the European Technical Approval Guideline ETAG 004. This guideline specifies the reference standards for the control of all products of the system. It is important to mention that system design and technical know how of the applicator plays crucial role in the final performance of the system since small details during installation may affect final performance and life span of the system.



## Recommended application

### 1 Substrate

The substrate must be clean, smooth and able to bare loads. Concrete and plaster surfaces need to have sufficiently cured. In case of unstable substrate or multi-storey buildings it may be recommended to apply locally or in the entire surface mechanical fixing. With the use of string lines the surface flatness is checked and levelled in the initial stage of the application to ensure accurate product consumption, correct installation and optimal aesthetic result.



### 2 Thermal insulation boards installation

Thermal insulation boards are always placed from bottom up, in horizontal, consecutive layers overlapping each other so as to form a layout of crossed joints that will prevent cracking of the overlaid render. They are fixed on the substrate with the use of special cement based adhesives mixed with water. On smooth substrates the adhesive is spread on the thermo-insulation board and combed using a notched trowel in order to be uniformly applied on the whole of the surface. On uneven substrates the adhesive is applied with a trowel around the perimeter of the thermo-insulation board and in selected spots in the center in order to absorb the unevenness of the substrate. The adhesive must guarantee safe fixing of the system for many decades. Proper adhesion is achieved if the adhesive requirements have been correctly specified, top quality raw material are used and the installer follows the proper method of statement and guidelines.



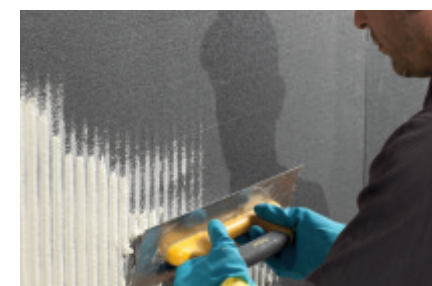
### 3 Thermal insulation boards mechanical fixing

The fixing of thermal insulation plates with mechanical fixtures is necessary for weak substrates that cannot bare loads, are worn and not sufficiently attached to the wall. The layout and number of fixtures vary between 4-8 pieces / m2 depending on the substrate condition, height of the building and type of wall. In systems with expanded polystyrene the adhesion force of the adhesive is adequate due to the boards low weight. In systems with rockwool, fixtures are obligatory due to the insulation material increased weight.



### 4 Reinforcement base coat and fiberglass mesh installation

Base coat or reinforcement plaster is an inorganic or organic render which uses cement or acrylic resins as binding agent respectively. Fiberglass mesh is used as reinforcement against cracks that are caused from shear stresses in facades due to heat transfer and high temperature differences between inner and outer walls. BAUER fiberglass mesh has a special anti-alkaline coating for protection against the alkaline high pH of the material that is embedded. The mesh also improves the systems durability against impact forces. The levelling-reinforcement base coat is applied when the insulation plates have achieved adequate adhesion to the substrate. Normally the time frame is 24h depending on weather conditions. Initially the material is applied with a notched trowel in a maximum thickness of 2-3 mm.



On the still fresh layer the fiberglass mesh is placed and pressed with a smooth trowel to get fully encased in the adhesive. The mesh layers must overlap each other approximately 10 cm on the sides and the edges to ensure even distribution of the forces and the continuance of the systems reinforcement. The fiberglass mesh quality and proper installation are vital for the durability and long life span of the system. The entire surface of the system needs reinforcement. After 24h a second coat is applied with maximum thickness of 2 mm to cover the fiberglass mesh entirely. In high stress points like openings, windows etc. additional pieces of reinforcement needs to be installed diagonally to the openings.

### 5 Final coating

After the base coat has fully dried, the surface is primed to regulate the substrate absorption (applicable only for cement base coats). The render is applied by using a smooth, stainless metal trowel. While still fresh (approx. after 20 minutes), the render is treated (pressed) with a plastic float, in horizontal, vertical, or circular movements depending on the desirable appearance of the surface.

It is advised to choose a render colour with light reflection indicator (20% approximately) because building facades that are exposed to solar radiation may reach temperatures above 50°C during the summer. Dark render colours should be avoided.



## The adhesive is the key ingredient of the system

The ability of the adhesive to resist shear stresses is the critical characteristic that provides security to the thermal insulation system for many decades.

The weight of the system and the wind loads create low tensions which are easy to calculate with a power balance analysis. On the other hand higher tensions are the result from deformations caused by temperature differences between the two sides of the insulation boards.

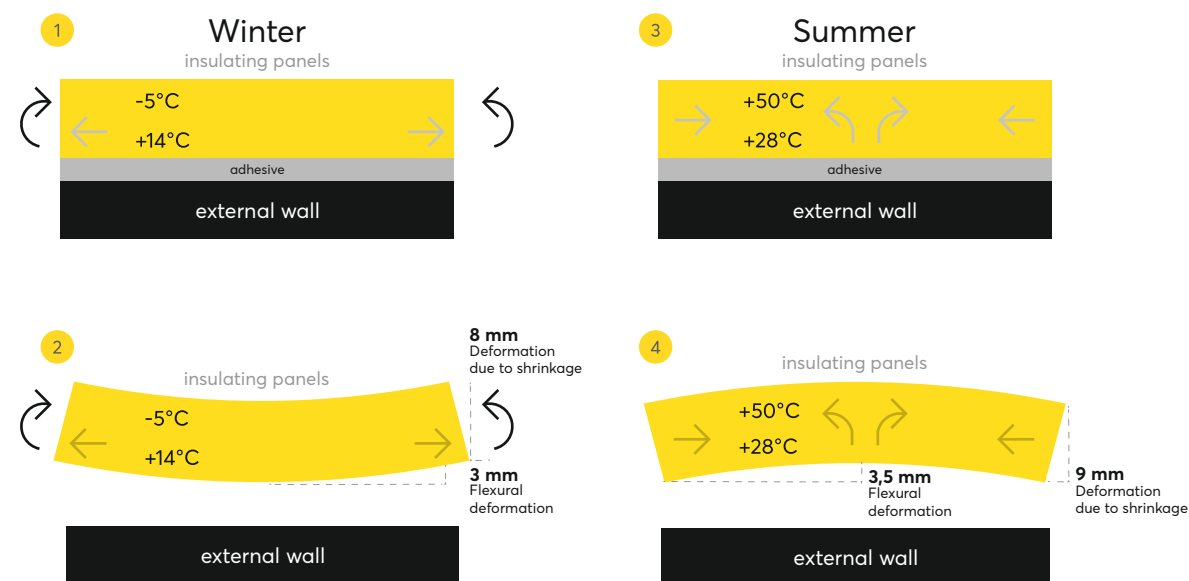
The drawings below illustrate the importance of the adhesive. During winter with outside temperature of -5 °C and room temperature of 20 °C insulation boards experience a temperature difference greater than 15 °C.

These conditions generate forces equivalent to 800 μ shrinkage deformation and more than 3 mm curvature deformation, which must be absorbed from the adhesive. Similar deformations also occur during the summer where we have higher temperature differences.

BAUER adhesives are designed to cope with these demanding conditions and guarantee high performance levels. After detailed examination of the substrate flatness the adhesive can be applied on the whole of the surface which will eliminate the common problem of stresses that appear by applying the adhesive on the perimeter and in spots on the insulation board.

It is important to use adhesives with premium performance characteristics for long term adhesion results. It is advised to pay special attention to the mortar workability time and application environmental conditions in order to ensure maximum adhesion of the insulation boards. Working under shade helps to avoid as much as possible the deformation

of the boards from surface temperature differences during the first hours of application where the adhesive has not yet reached adequate adhesion forces. Any gaps or voids need to be filled with pieces of board or polyurethane foam. After finishing the installation the boards are smoothed with special floats.



## Impact resistance, transpiration, durability in time

### 1 EPS insulation boards

The insulating material quality plays an important role for the stability of the boards dimensions and the accuracy of its thermal insulation coefficient.

It is necessary to use insulation boards which are classified as suitable by the manufacturer. The insulation boards must have the appropriate CE certification for use in external thermal insulation systems (ETICS) because according to European Technical Approval (ETA) certification these are the only insulating materials that can be safely used as part of a certified system.



### 2 Why choose expanded polystyrene?

Expanded polystyrene is worlds No.1 best selling thermal insulation material. Based on international data from markets with decades of experience and in depth technical knowledge of external thermal insulation systems, expanded polystyrene is the most popular insulation material. The global market share of expanded polystyrene in external thermal insulation systems is over 80% and in the European market in particular exceeds 85% which is followed by rockwool with 12% market share.

### 3 Greater impact resistance and durability of thermal insulation systems

Durability and endurance of external surfaces in buildings with external thermal insulation systems is a major concern for their users. Expanded polystyrene insulation boards cover fully the technical and mechanical specifications that are required from the insulation material for a safe and reliable application.

Its increased elasticity minimizes the risk of cracks in renders which are caused from building materials expansion and contraction forces. The combination of elasticity and excellent adhesion with the render guarantees that EPS will protect the insulation board-render system from cracks and detachments even under the toughest mechanical stresses ( i.e. hard impacts, thermal shock expansion & contraction etc.). This level of performance and product compatibility cannot be achieved with hard insulation materials i.e. expanded polystyrene insulation boards – XPS. Forces from impacts, expansion & contraction etc. cannot be adequately absorbed and are violently transferred to the render surface because of the material's hardness and rigidity.

### 4 Transpiration

Transpiration is the ability of a material to diffuse water vapours in the environment and is measured with coefficient "μ". The μ-value of a material is also known as its "water vapour resistance factor". It is a measure of the material's relative reluctance to let water vapour pass through, and is measured in comparison to the properties of air. The water vapour resistance factor of air is μ=1. The lower the value of "μ" the higher the transpiration of the material. With the implementation of European Directive 2010/31/EU on the energy performance of buildings the use of high transpiration building materials is deemed mandatory. Depending on its density expanded polystyrene has a water vapour resistance factor that varies between μ 20 and μ 70 which classifies it as the ideal insulation material for external thermal insulation systems.

Studies of the Joint Research Centre (JRC) of the European Commission on the air quality of indoor led it to conclude that the contamination of indoor air can be from 2 to 3 times worse than outdoor air. The microclimate of the interior, combined with chemical pollution has a significant impact on the quality of the spaces in which we live, and therefore in our prosperity. According to World Health Organization estimates, 20% of the western world's population is infected with the Sick Building syndrome (headaches, nausea, irritation, an increasing number of allergic reactions and asthma cases in children and young adults), for which implicated low quality of building materials of chemical origin and insufficient capacity of transpiration of buildings.



The use of environmentally friendly and natural materials which does not release polluting substances can contribute to a microclimate interior with natural breathability and high energy efficiency, addressing the need for a residential area close to nature and ensuring immediate comfort and welfare.

### 5 Preservation of technical and thermal characteristics

According to European directive EN 13164 for the aging and degradation of thermal resistance in insulation materials the thermal conductivity of EPS does not deteriorate over time in comparison to XPS and rockwool.



Energy saving      Introduction to THERMOKAPA system      Manufacturing design      Description of application process



**1 Kapa 11 / Ecoflex**  
Polymer-modified, fiber-reinforced, cement-based adhesive and reinforcement coating, for installation of insulation plates of expanded polystyrene, mineral wool etc. on building facades and floors.

Kapa 11 and Ecoflex offers unparallel adhesion, high resistance to shear stresses and guaranteed adequate levels of bonding for many decades. The same material is used to cover insulation plates with the application of special fiberglass mesh as crack prevention, reinforcement coating and substrate for topcoat renders thermal insulation systems. With zero-slipping properties and extended open time for safer application.

Form: cementitious powder.

**Consumption**

Adhesive  $\approx 2,0-4,0 \text{ kg/m}^2$   
Base coat  $\approx 1,3-1,5 \text{ kg/m}^2/\text{mm}$



**2 Ecoflex Organic**  
Fiber reinforced, 100% acrylic, highly flexible, crack prevention reinforcement coating for thermal insulation boards of expanded and extruded polystyrene, mineral wool, etc. in building facades.

Ecoflex Organic is applied in combination with the special fiberglass mesh with alkali-resistance BauMesh 160, and offers unparallel adhesion, high mechanical resistance to impulse forces and guaranteed adequate levels of resistance for many decades. Ideal substrate for topcoat renders in thermal insulation systems. Characterized by high elasticity and moisture resistance.

Form: organic based paste, ready to use.

$\approx 1,5 \text{ kg/m}^2/\text{mm}$



**3 Bautherm W**  
Expanded polystyrene.

Certified plates for specific use in external thermal insulation systems (ETICS) with CE mark in thicknesses of 3 to 10cm. Coefficient of thermal conductivity:  $\lambda = 0,036 \text{ W / m}^* \text{ K}$

**4 Bautherm G**  
Graphite expanded polystyrene.

Certified plates for specific use in external thermal insulation systems (ETICS) with CE mark in thicknesses of 3 to 10cm. Coefficient of thermal conductivity:  $\lambda = 0,032 \text{ W / m}^* \text{ K}$

$\approx 1 \text{ m}^2/\text{m}^2$

Critical points      System products      External thermal insulation certificates



**5 Bau mesh 160**  
High-strength fiberglass mesh with a protective coating of special polymers, highly resistant to alkaline environments.

Essential for external thermal insulation systems as well as for total or partial reinforcement of sealants (e.g. epoxy, polyurethane, acrylic resins and cement mortar and lime). Provides significant structural reinforcement and prevents cracking from temperature expansion and contraction.

Mesh width:  $4,5 \times 4,5 \text{ mm} \pm 0,2$   
Weight (g /m2): raw net  $160 \text{ g /m}^2 \pm 5\%$   
Coating (g /m2):  $26 \text{ g /m}^2 \pm 5\%$

$\approx 1,1 \text{ m}^2/\text{m}^2$



**6 Pro 101**  
Water-based acrylic primer for paints and colored renders with high penetrating ability.

Offers an ideal substrate for cement-based renders and organic binder coatings such as Kapalux, Monokapa, Kapasil, Granulato and Plaster fin. Suitable for porous substrates such as render's base layer, concrete, bricks, aerated concrete, cementitious adhesives, cement mortars etc.

Form: Acrylic emulsion

$\approx 0,1-0,2 \text{ kg/m}^2$



**7 Monokapa flex**  
The original 100% acrylic and highly flexible render. Features high colour stability following the drying process and limitless color options in various final textured surfaces.

Hassle-free application with trowel or rendering machine. Optimum adhesion to the substrate. A balanced formulation and high quality raw materials provide Monokapa flex with outstanding qualities in application individual design, extremely low water absorption and exceptional resistance to mechanical stresses.

Form: pasty acrylic render ready for use. Available grain sizes: F-0,8mm, F-1,0mm, F-1,5mm, F-2,0mm, R-2,0mm

**8 Kapasil**  
Ready to use silicon-based, hydrophobic and self-cleaning render for final coating of facades in limitless color options.

Provides extremely high resistance to water and moisture, excellent adhesion to all substrates, high elasticity and allows transpiration of structural elements. Ideal as a finish coat in exterior thermal insulation systems. Highly resistant to algae and bacteria.

Form: pasty silicone acrylic render. Available grain sizes: F-1,5 mm

$\approx 1,8-4 \text{ kg/m}^2/\text{mm}$  depending on the granulometry





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