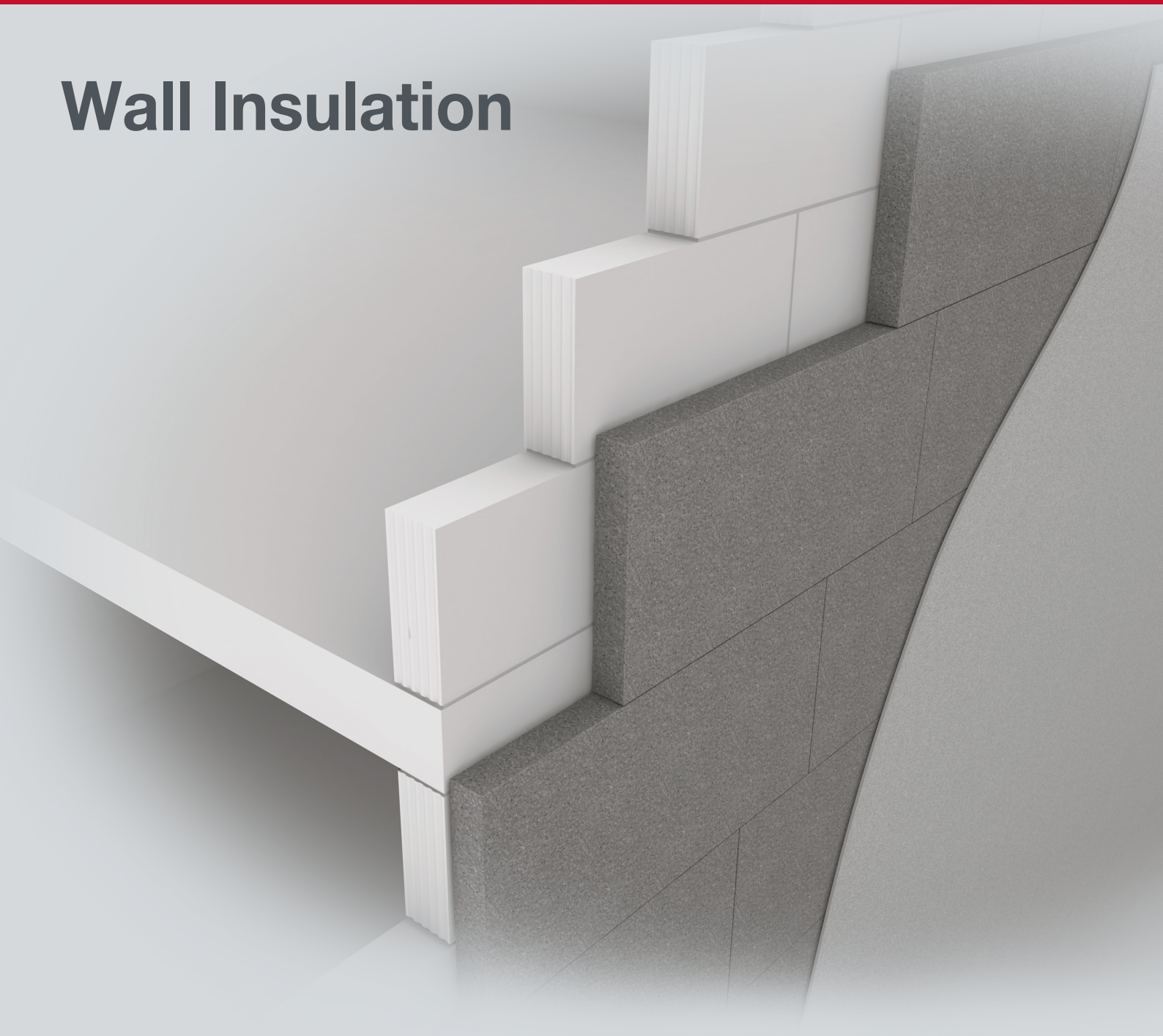
Neopor®
Innovation in Insulation

Wall Insulation



Neopor® in the web: www.neopor.de

BASF
The Chemical Company

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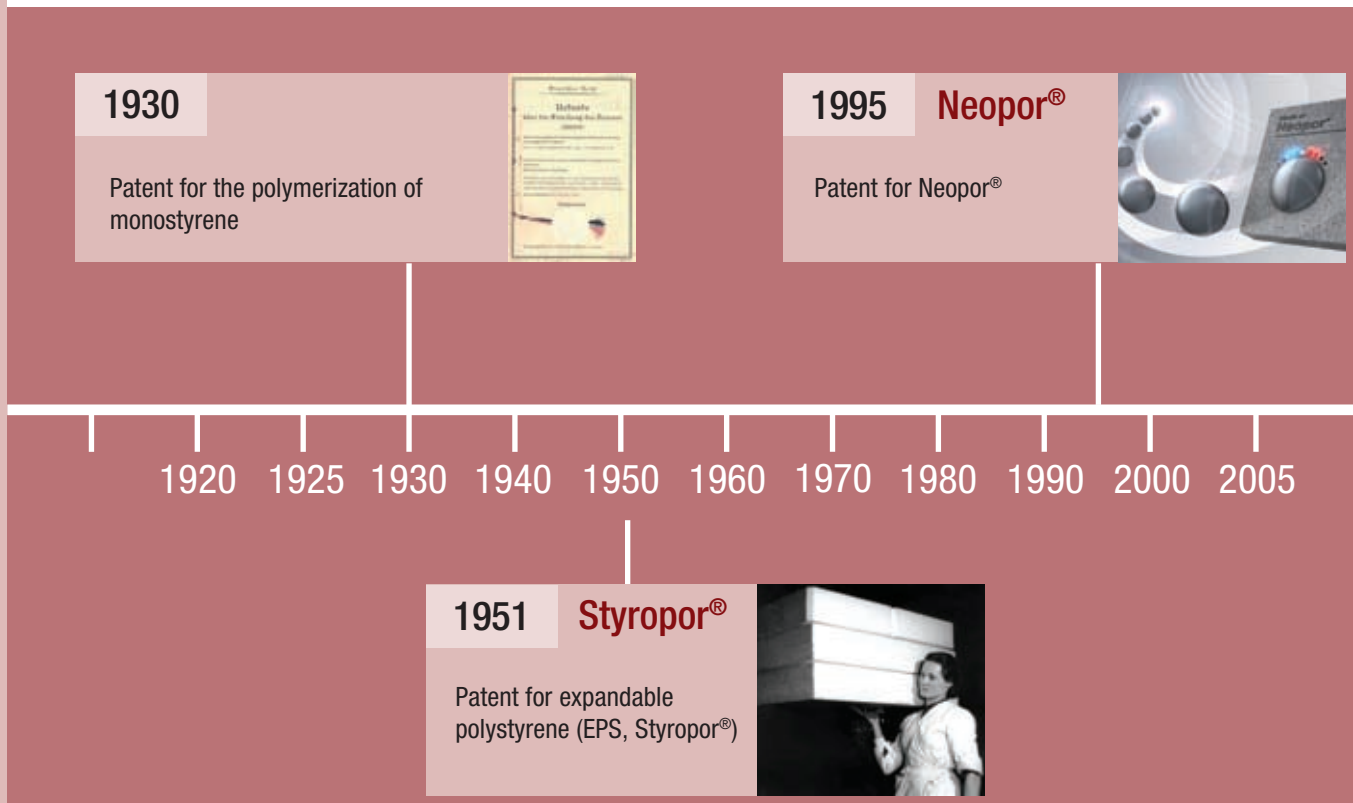


Quality Products from BASF—The Benchmark in Polystyrene For Over 50 years

Styropor®—Behind this name lies a success story that is everyone´s goal. BASF discovered a classic over 50 years ago in expandable polystyrene (EPS). Under the tradename Styropor, EPS is now the solution for efficient insulation and safe packaging worldwide.

With Neopor®, BASF has taken the classic Styropor a step further. This new material for modern insulating materials is foamed just like Styropor and processed to boards and molded parts.

The vital difference can be seen with the naked eye in the silver-gray color. In Neopor, graphite is added to the material, absorbing and reflecting heat radiation and improving the insulating performance of EPS by up to 20 percent.

Products made from BASF´s Neopor are an economic investment in the future and add to the value of a property.

Small, Round, Black—
One Material, Many Applications

Neopor®—Neopor is composed of small black beads of polystyrene (EPS) containing blowing agent, which makes it expandable. BASF produces this unique material, which is processed by foam manufacturers into insulating materials for a wide range of different applications.

Neopor® up to 20% insulates better

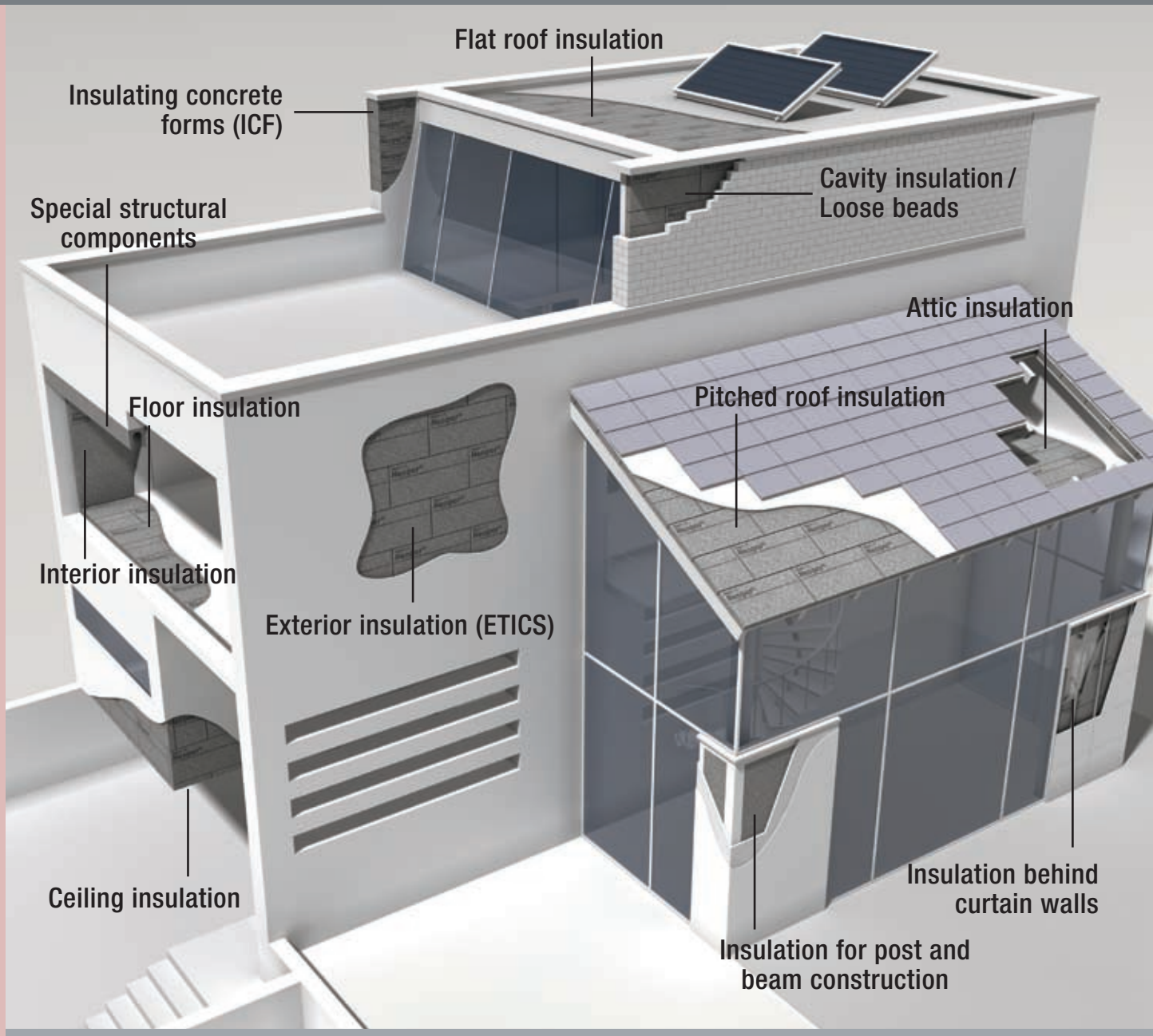
These black beads are foamed by converters on conventional EPS machines and processed to silver-gray foam blocks and molded parts with up to 20 percent better insulating performance than conventional EPS. The blocks are then cut to boards of different thicknesses.

Neopor insulating materials offer greater insulating performance and up to 50 percent lower use of materials than conventional EPS, helping environmental conservation and saving money. Environmentally-friendly Neopor insulating materials do not contain CFCs, HCFCs, HFCs, or other halogenated cell gases. They contain air as cell gas, which guarantees the preservation of the thermal conductivity throughout the life of the construction.

Neopor insulating materials therefore represent a modern, environmentally aware lifestyle. We call it: "Innovation in Insulation."

Neopor®—Innovation in Insulation

Overview of Applications for Neopor®



Insulation for the Future

Before the backdrop of climate and environmental protection aspects as well as exploding energy prices, thermal protection of buildings has become indispensable.

Excellent thermal insulation of roofs, exterior walls, floors, and basements is the cornerstone of low energy consumption.

When it comes to new construction and the renovation of existing buildings, Neopor® offers ideal insulation solutions for almost all components.

Neopor®

Innovation in Insulation

Exterior Walls with Insulating Materials Made of Neopor®

The large surface areas of exterior building walls are responsible for annual transmission heat losses of up to 75 percent. Sunlight striking exterior walls accounts for virtually negligible energy savings. A reduction in the energy losses through exterior walls can only be achieved by optimum thermal insulation. In addition to providing thermal insulation, exterior walls have to meet further requirements relating, for example, to structural engineering, acoustic and fire protection, weather protection, airtightness, and windtightness.

Promoting comfort and a good living climate

Well-insulated exterior walls can actually raise the surface temperature on the inside. This is how insulation makes a contribution to the comfort and well-being of the inhabitants. In the case of exterior wall constructions with U-values of up to 0.35 W/(m²·K), the surface temperature is only one degree lower than the room temperature. At a room temperature of 20°C [68°F], the temperature on the wall surface is 19°C [66.2°F] and about 14°C to 15°C [57°F to 59°F] in the outer corners. As a result, no condensation is formed, even if the humidity is high at times.

Avoiding thermal bridges

If the structural components are not properly insulated, in contrast to surrounding surfaces that are free of thermal bridges, a greater heat flow takes place from inside the building to the outside. This heat flow is intensified due to the geometry of the outer wall corners or components such as floors and balconies. Gaps and leaks in the building shell can also create thermal bridges.

Thermal bridges entail a higher consumption of heating energy and intensify the risk of condensation. This can lead to water damage or even health-hazardous mold growth.

For reasons relating to energy consumption, hygiene, and health, thermal bridges must be avoided by all means. When it comes to building components, the avoidance of thermal bridges is a prerequisite for properties to retain their value over the longterm and for the reliable functioning of buildings. As a rule, no thermal bridges can occur in well-insulated exterior components that are configured to remain airtight.

Exterior Wall Construction

The type of exterior wall construction employed can be a function of architectural, functional, financial, or cultural considerations. As a matter of principle, it is possible to insulate a building from the outside or from the inside. Two of the most widespread methods are thermal insulation composite systems in the case of single-leaf walls, and core insulation in the case of cavity masonry. Interior insulation is used in buildings with facades that have to be retained or in which exterior insulation is not possible. In back-ventilated curtain walls, the thermal insulation contributes to the functional reliability. Alternative construction systems, such as formwork elements and post and beam constructions, combine optimum thermal insulation properties with shorter construction times for the carcass of the building. For new constructions and for renovation work, Neopor® insulating materials can be used in virtually any wall structure.

Interior insulation

Insulating concrete forms (ICF)

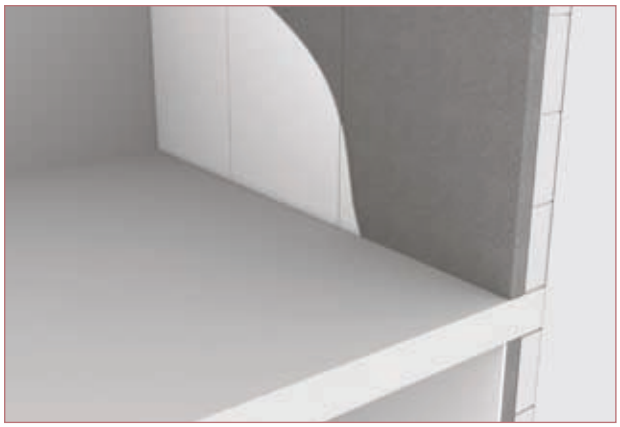
Exterior insulation (ETICS)

Cavity insulation / Loose beads

Insulation behind curtain walls

Applications for Neopor®

Interior insulation

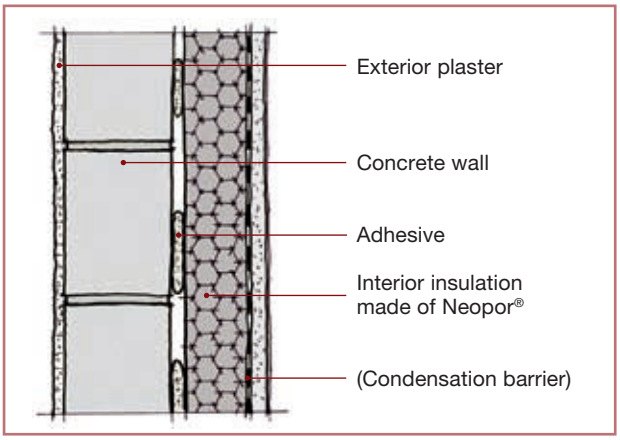


Internal thermal insulation achieves very good insulation results for new construction or renovation work wherever external thermal insulation is not an option. Spaces that have to be heated up quickly or only for brief periods of time definitely benefit from interior thermal insulation.

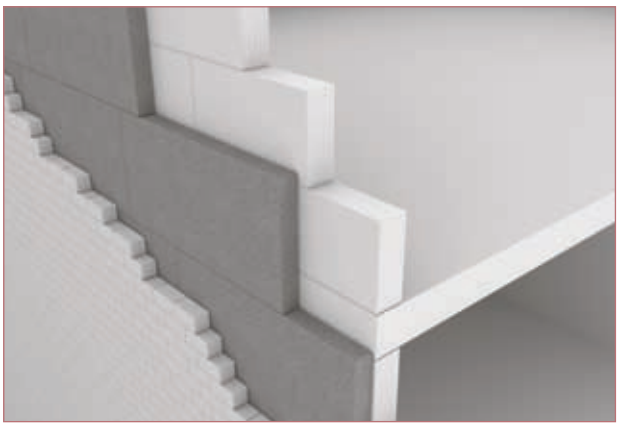
- Rooms heat up quickly
- Thinner insulating material
- Simple and cost-effective implementation
- Improved sound proofing

Because of the outstanding thermal insulation properties of Neopor® insulating boards, better insulation performance is achieved with smaller thicknesses than with conventional EPS. This means less valuable interior space is lost.

The additional elasticity brought about up by insulating materials made of Neopor can also improve sound insulation.



Cavity insulation / Loose beads

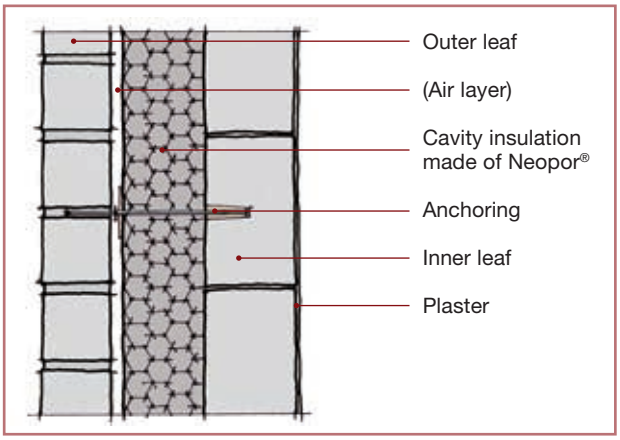


Two-leaf masonry structures represent a rainproof wall structure even when subjected to heavy loading from driving rain. Insulating materials made of Neopor can be employed for frost-resistant, back-ventilated masonry as well as purely for cavity insulation that is not back-ventilated.

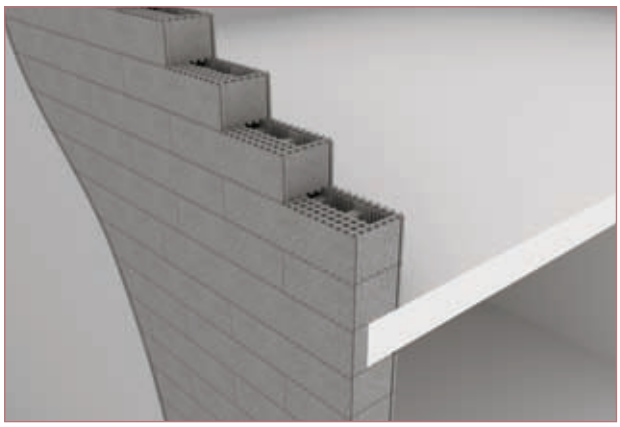
- Best thermal insulation effect
- Water-repellent without hydrophobing
- Low setting behaviour with Neopor beads
- Low weight

In double-wall masonry, the space between the outer frost-resistant masonry shell and the inner load-bearing structure is limited. Owing to the low thermal conductivity of insulating materials made of Neopor, a relatively higher insulating effect can be achieved.

A wall can be retrofitted with cavity insulation by blowing expanded beads made of Neopor into the existing cavities. The slight overpressure yields a thermal insulation that is free of gaps and very durable.



Insulating concrete forms (ICF)

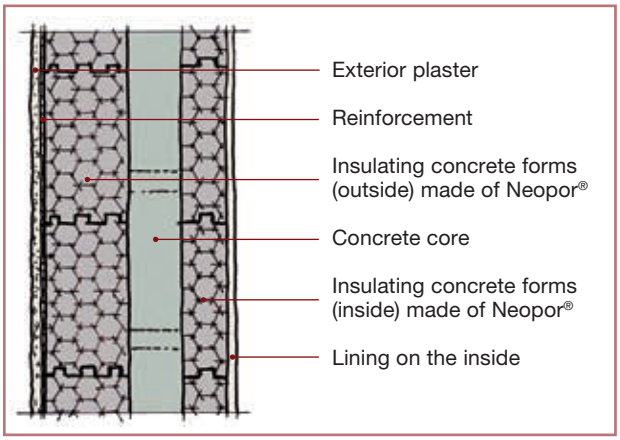


Formwork elements made of Neopor® are suitable for all kinds of components that require thermal insulation and ease of processing. They are employed as wall and floor elements for single-family houses as well as high-rise buildings. An enormous savings potential is available to do-it-yourselfers.

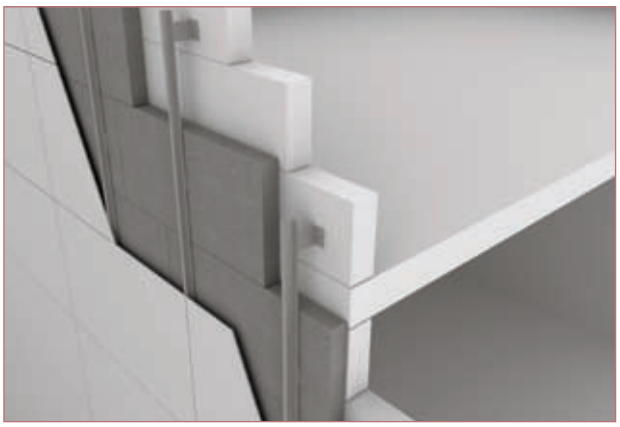
- No thermal bridges
- High degree of thermal insulation
- Simple and fast handling
- Low weight

Formwork elements made of Neopor make it possible to build and insulate exterior walls at the same time. The elements are available in various wall thicknesses and designs, for example, lintel elements that are free of thermal bridges, floor surrounds, roller shutter housings or cantilevers.

Thanks to their good thermalinsulating properties, formwork elements made of Neopor are well-suited for the construction of low-energy and passive houses.



Insulation behind curtain walls

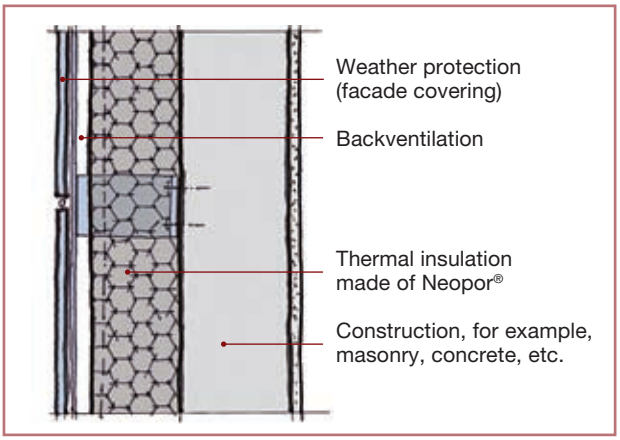


Back-ventilated curtain walls consist of a substructure, insulating material, an air layer, and facade covering. They are used for design reasons and also due to safety considerations of a technical nature. The exterior walls can be tailor-made to match the characteristics of a given building.

- Outstanding insulation performance
- Permanently dry thermal insulation
- Simple construction
- Licensed systems

The two-layer system of a back-ventilated curtain wall systematically separates the functions of weather protection and insulation. The insulation can be used in any desired insulating material thickness. U-values are thus achieved that are suited to low-energy and passive houses and comply with the current energy saving regulations.

Thanks to its outstanding insulating capacity, Neopor is the material of choice for use in this facade system.



Exterior insulation (ETICS)

Thermal insulation composite systems are a highly suitable and cost-effective type of thermal insulation for new construction and renovation projects. This type of insulation protects the load-bearing inner shell or the existing exterior wall against thermal loads and it also provides protection against the weather. Moreover, thinner exterior walls in new buildings can provide more living space.

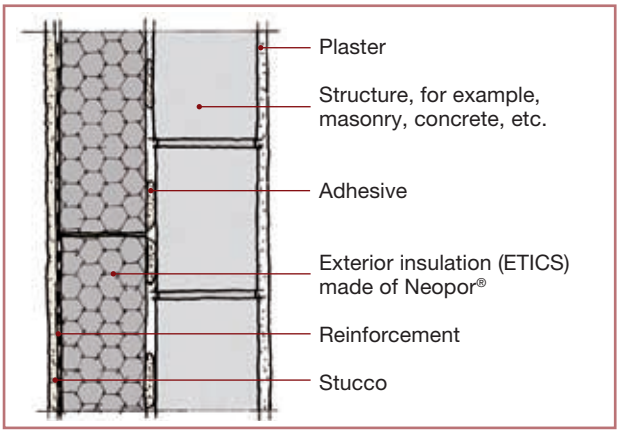
Thinner insulation material, higher insulation coefficient

Exterior components free of thermal bridges

Non-glare work in case of direct sunlight

Simple handling, ease of processing

Thanks to the outstanding heatinsulating properties provided by insulating materials made of Neopor®, better thermal insulation coefficients can be achieved.

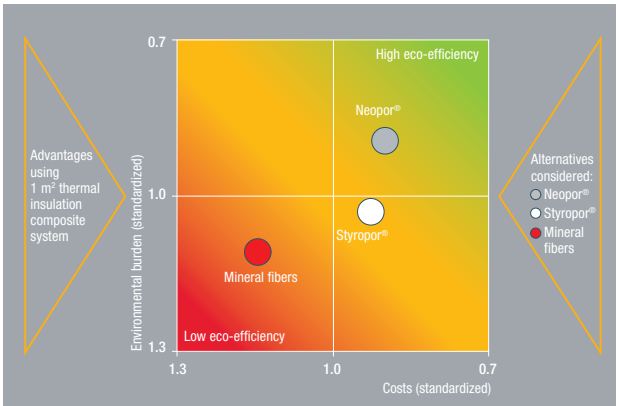


ETICS with Neopor®

- Uncomplicated and economic method for improving the thermal insulation of external walls.
- Extremely suitable for renovating facades.
- The thickness of the insulating boards can be adapted to the appropriate structural conditions and U-values required.
- Requirements for thermal insulation to save energy can be rapidly implemented.
- Thermal insulation demands can be fulfilled many times over right up to “zero heating cost house” standard.
- Neopor insulating boards meet the guidelines for fire protection in the window lintel even without protective strips. The material in the lintel area does not need to be changed.
- Neopor insulating boards are the most used grey facade insulating boards in Europe. More than ten million square meters per year are testimony to the success of this quality product from BASF.

Ecoefficiency with Neopor

The ecoefficiency analysis looks at products and processes from both the economic and the ecological point of view. The result of an evaluation of this nature, in the example of the thermal insulation composite system (ETICS) with a U-value of 0.29 W/(m²·K), is shown in the diagram. The major advantage of Neopor insulating boards lies in the reduced use of raw materials of up to 50 percent, generating savings in terms of costs and resources, which in reduces the impact on the environment. Compared to alternative products, Neopor insulating materials bear economic advantages with lower environmental impact and therefore offer ecoefficient insulating solutions for up-to-date thermal insulation.



Eco-efficiency analysis of thermal insulation composite systems in the example of the threeliter house in the Brunck district of Ludwigshafen in 2000, confirmed by the Öko-Institut in Freiburg, Germany, and by TÜV (German Technical Inspection Agency).

Application and Processing

Preliminary work
Before the exterior insulation with insulating materials made of Neopor® is installed, the load-bearing capacity of the substrate has to be checked. The wall must be dry. The existing stucco has to be free of cavities, and any loose pieces must be removed. Highly absorbent or sandy substrates must be primed.

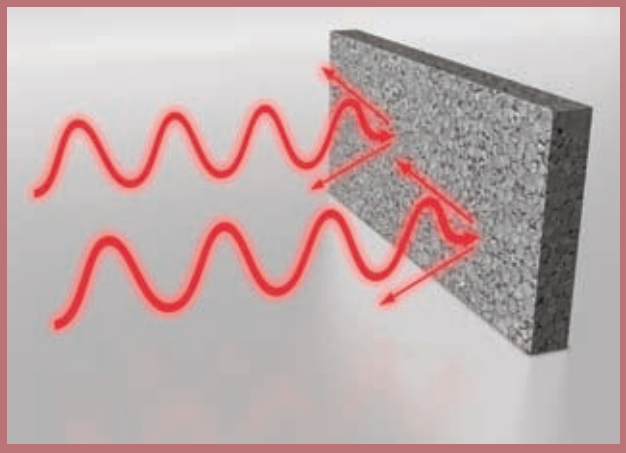
Installation
The insulating panels made of Neopor are fastened to the masonry by means of adhesives, dowels, or rail mounts. The panels should be installed from the bottom to the top so as to be tightly abutting and arranged in a masonry bond (avoid intersecting joints). Dovetail joints should be made in the panels at all corners of the building. Care must be taken to ensure that the surface is vertically and horizontally flat. Small irregularities can be corrected by applying adhesive, and protruding panel edges can be subsequently smoothed.

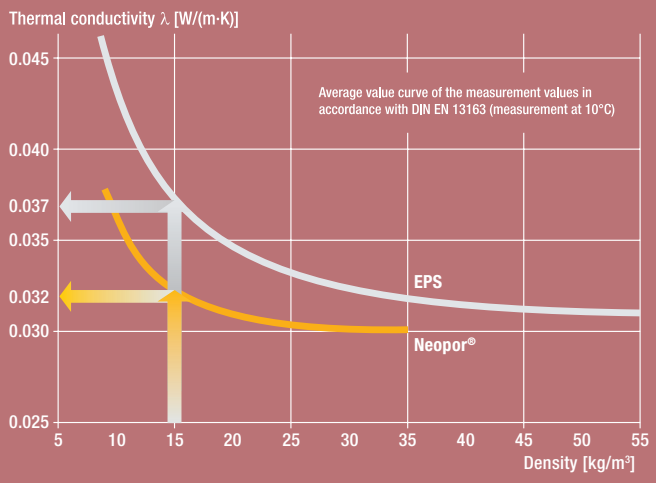
Cutting
Fitted pieces for soffits or cut pieces for windowsills can be dimensioned precisely and quickly using a hot wire.

Reinforcement
In order to avoid cracks and to mechanically protect the facade, a reinforcement of the surface is needed on inside as well as outside areas. It consists of a reinforcement compound and a corresponding reinforcement fabric.

Stucco
After sufficient drying, the outer coating is applied in the form of a suitable and system-compatible finishing plaster or final coat.

Please note:
Only sufficiently proven and authorized systems, in which all the components offer the requisite guarantee for durability and reliability, should be used. The relevant manufacturers have certificates for the use and application of the various systems.





Thermal insulation

The excellent effect of Neopor® insulating materials offers architects, engineers, craftsmen, and builders significant advantages in building practice. The Neopor infrared absorbers or reflectors considerably reduce thermal conductivity, and the heat permeability of the material is lower compared to normal insulating boards.

Thermal conductivity

Vastly improved insulating effects can be achieved with Neopor, particularly with very low bulk densities. The diagram shows that Neopor insulating materials with a bulk density of 15 kg/m³ achieve a thermal conductivity of 0.032 W/(m·K), for instance. For normal EPS with the same bulk density, the thermal conductivity is 0.037 W/(m·K).

Neopor® Insulating Materials— Advantages at a Glance

- **Versatile:** Constructions that call for a restriction on the thickness of the insulating materials, for example in modernization, can easily use thinner insulating boards with the same insulation performance, compared to conventional EPS. The result is considerable savings in energy consumption.
- **Quality:** Neopor insulating boards are aging- and rot-resistant, as well as extremely sturdy and dimensionally stable. They are permeable and highly water-repellent, and have the advantage of low water absorption.
- **Fire protection:** Neopor insulating materials are produced in accordance with the requirements of European standard DIN EN 13163 and are categorized in Euroclass E in accordance with DIN EN 135011 and B1 in accordance with DIN 4102.
- **Handling:** Neopor insulating boards can be laid quickly and in any weather conditions. They are easy to cut and grind, and do not dazzle in sunshine. Processing does not generate dust or cause irritation of the skin.
- **Soundproofing:** In addition to energy savings, elasticized Neopor insulating boards also improve the soundproofing of buildings.
- **Durability:** The ageing- and rot-resistant material properties, in particular, make Neopor insulating materials a durable and long-term, safe thermal insulation.

Passive Houses with Exterior Insulation Made of Neopor®

It is possible to combine modern architecture, high comfort, and low energy consumption. This has been demonstrated by Anliker AG based in Lucerne, Switzerland. In the Konstanz neighborhood of Rothenburg/Lucerne, this company built the first multi-family houses in Switzerland that meet the passive house standard, winning first prize in the Swiss Building Competition awarded by the Solar Agency Foundation. With its contribution of the Neopor® insulating material, BASF is part and parcel of this success.

This expandable polystyrene insulates the facades of all buildings in this neighborhood. In the loft houses, a 30 cm-thick layer of Neopor is applied onto the 15 cm-thick masonry. In the case of the apartment complexes, the more compact building design means that a 24 cm-thick layer of insulating material is sufficient. Together with other measures, the heating energy consumption was lowered by 90 percent in comparison to conventionally built houses.

Neopor®

Innovation in Insulation

Further information on Neopor®

- **Brochure: Neopor®—Innovation in Insulation**
- **Brochure: Building and Modernizing with Neopor**
- **Brochure: Passive House**
- **Brochure: Fast & Easy Construction with Insulating Concrete Forms (ICF)**
- **Brochure: Wall Insulation**
- **Brochure: Roof Insulation**
- **Neopor film: Innovation in Insulation**
- **Website: www.neopor.de**
- **Neopor: Product sample folder**

Note

The data contained in this publication are based on our current knowledge and experience. In view of the many factors that may affect processing and application of our product, these data do not relieve processors from carrying out own investigations and tests; neither do these data imply any guarantee of certain properties, nor the suitability of the product for a specific purpose. Any descriptions, drawings, photographs, data, proportions, weights etc. given herein may change without prior information and do not constitute the agreed contractual quality of the product. It is the responsibility of the recipient of our products to ensure that any proprietary rights and existing laws and legislation are observed. (March 2010)

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KTFN 0813 BE – 02.2010 – GENERAL ENGLISH VERSION