

# Experience You Can Rely On

Insulate with the Original.



Neopor® – The Power of the Original Grey

 **BASF**  
We create chemistry

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# GOOD REASONS TO CHOOSE NEOPOR®

## THE HIGH-END EPS

### Neopor® - the New-Generation EPS

With Neopor®, BASF has succeeded in further developing the insulation classic Styropor®. The grey insulation boards made from the expandable polystyrene (EPS) perform better than conventional white EPS and set high standards of quality, as a large number of reference projects throughout Europe have shown.

Planners, architects and builder-owners benefit from insulation made of Neopor® because of the special advantages this material offers. They are crucial for the energy efficiency, cost-effectiveness and sustainability of construction projects:

- Excellent cost-benefit-ratio
- Eco-efficiency: good for budgets and the environment
- Successfully used in numerous reference projects
- Thinner boards, enabling more flexible planning and design
- Wide range of applications and design possibilities

### Cradle-to-Grave Efficiency and Effectiveness

BASF produces Neopor® in the form of grey plastic beads, which insulation producers process into boards and specially shaped elements. First steam is applied to foam the raw material, causing its volume to swell by a factor of up to 50. The foamed beads are then fused by applying heat in special moulds to make blocks, boards, or shaped elements. After undergoing this process, products made from Neopor can consist to up to 98 percent of air. The good thermal insulating properties of air greatly contribute to the outstanding performance of Neopor.

It takes energy to make insulation from Neopor. But this is offset many times over during the product's service life by reducing the amount of energy needed to heat buildings insulated with it. At the end, insulation made of Neopor can also be incinerated to extract its energy in the form of heat.

### Often Copied But Never Matched—the Original Grey Sets the Highest Standards

Neopor®'s excellent insulating properties have set the standard in the EPS market. The outstanding Original Grey from BASF derives benefits from the company's high safety standards and strong R&D infrastructure. So make sure you get the Original Grey from your building materials supplier—insist on insulation made of Neopor® from BASF!



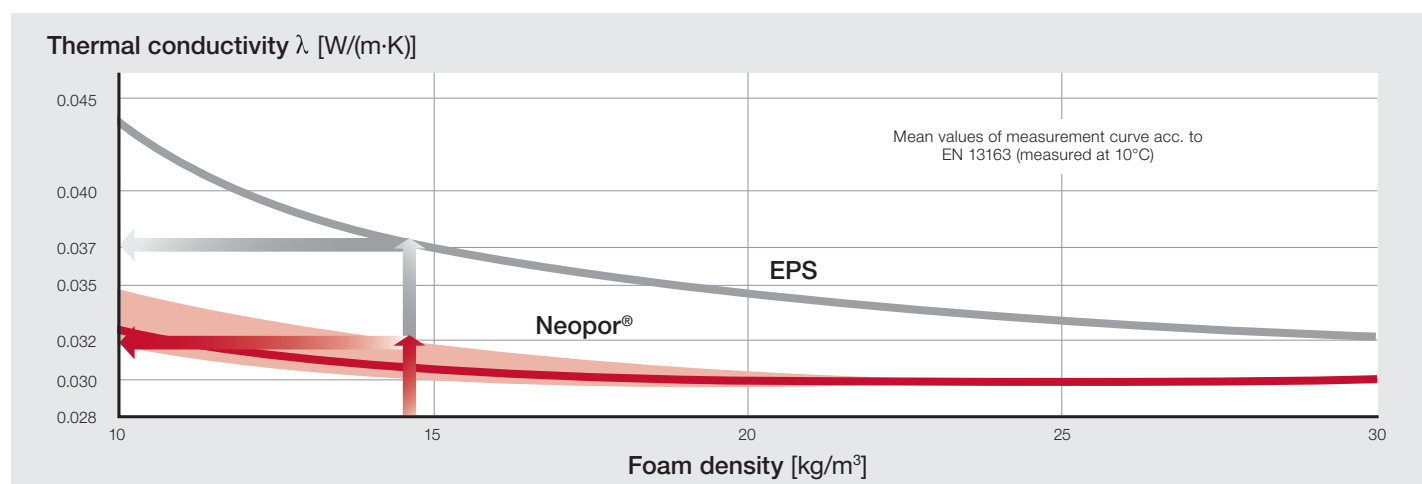
Made of  
**Neopor**  
provided by BASF

# NEOPOR® – THE POWER OF THE ORIGINAL GREY

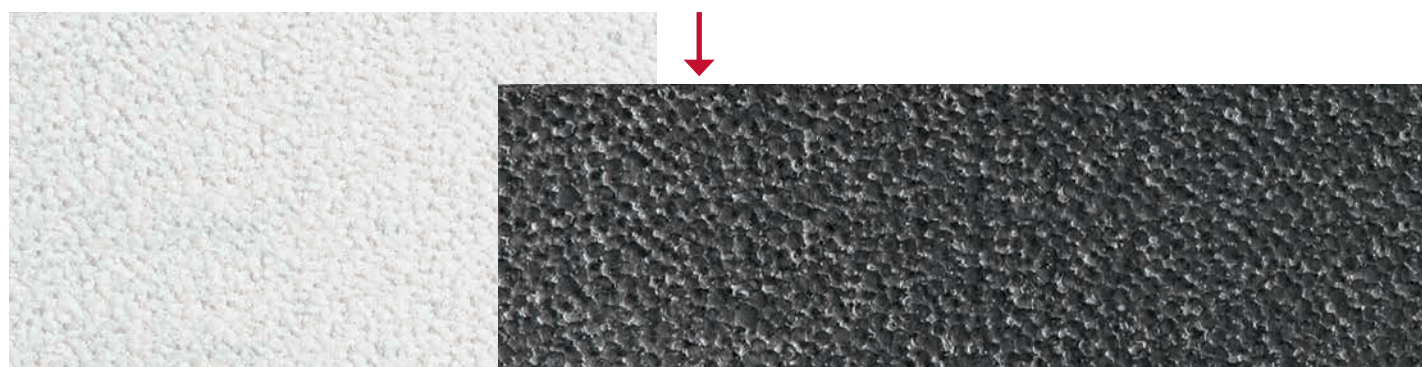
## Excellent Value for Money

Neopor® contains minute particles of graphite that absorb or reflect infrared radiation. Boards made from it therefore insulate up to 20 percent more efficiently than conventional EPS. The bottom line is excellent value for money and a major contribution to sustainable, eco-efficiently building and living. This in turn yields many benefits for planner, architects, the building trades and builder-owners:

- Boards can be thinner while providing the same insulating effect:
  - More flexible planning
  - More living space without sacrificing effective insulation
- Being lighter, the boards are easier to install
- Reduced use of materials and thus less use of resources



Insulation that is up to 20% more efficient, permitting the use of thinner boards



Insulation made from conventional EPS

Insulation made from Neopor®



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# NEOPOR® – A STRONG CONTRIBUTION TO SUSTAINABLE CONSTRUCTION

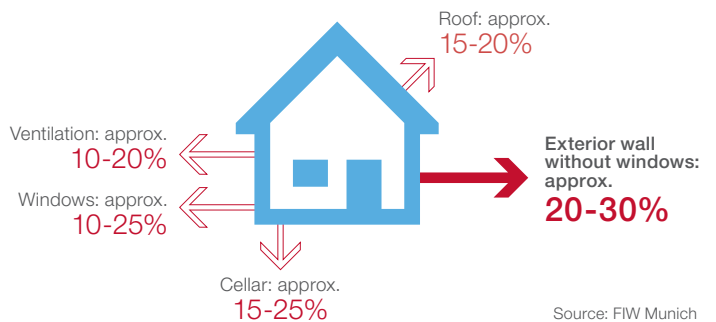
## Insulating for the Future with Neopor®

To tell whether a building qualifies as sustainable, it has to be assessed in its entirety. Neopor®'s exemplary eco-efficiency greatly improves overall sustainability assessments.

Houses mainly lose energy through their outer envelope. In the case of a single-family home, an uninsulated external wall without windows can account for between 20 and 30 percent of the total energy loss. For achieving energy-saving targets, whether these are prescribed by law or voluntary, there is a need for efficient solutions. Neopor provides a convincing answer to this challenge, as numerous reference projects in Europe have shown:

- Properly executed and installed insulation made of Neopor lasts for many years and greatly contributes to reducing heating costs.
- Especially in the context of integrated concepts for increasing the energy efficiency of new or renovated older buildings, insulation made of Neopor makes good economic sense.

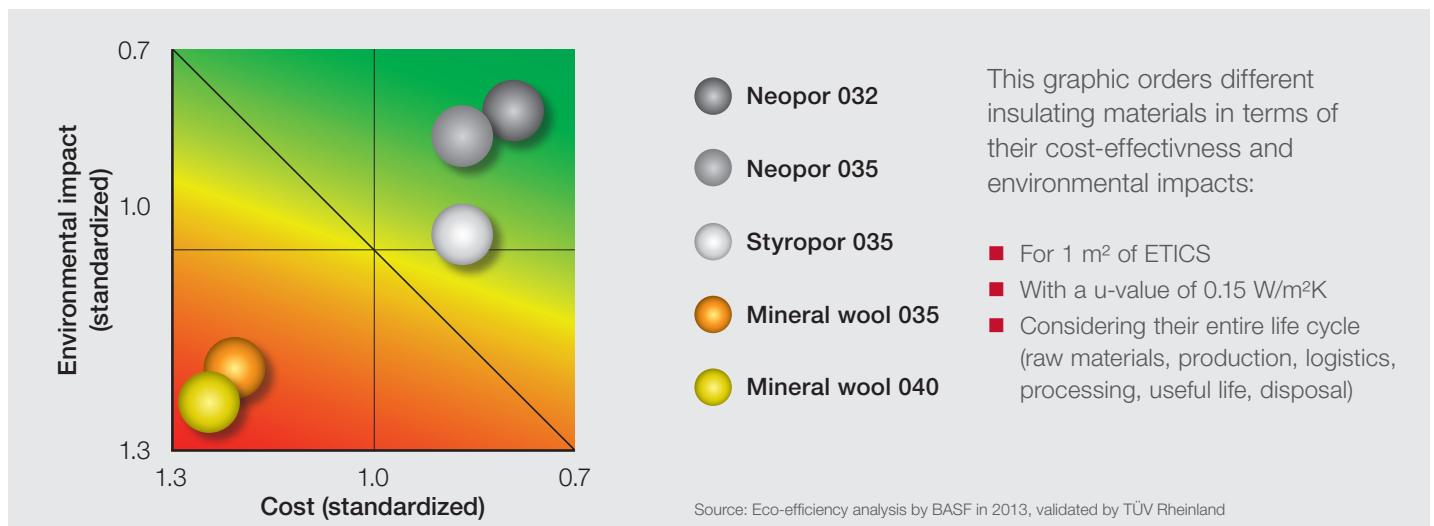
## Shares of heat losses in a typical unrenovated single-family home



## Exemplary Eco-Efficiency

The special properties of Neopor® make it possible to reduce insulation thicknesses and consume fewer raw materials. This makes insulation boards based on Neopor much more eco-efficient than other types of insulation. Per

square meter of an external thermal insulation composite system (ETICS), Neopor has the most favorable effect on costs and environmental impacts throughout its lifecycle.





Made of  
**Neopor**  
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# NEOPOR® ENHANCES QUALITY OF LIFE

## Good Insulation Ensures a Pleasant Indoor Climate

Thermal comfort in a room depends on two factors: the temperature of the air and the surface temperature on the insides of external walls. Insulating external walls increases the temperature of their inside surfaces, which therefore helps create a better indoor climate. Insulation made of Neopor® provides two benefits at once, because of its greater insulating performance, thinner boards achieve the same effect.

Good insulation is also essential for ensuring good hygiene indoors. Mildew can thrive in moist spots inside a house. These can result when condensation forms on cold surfaces. When walls are properly insulated with boards

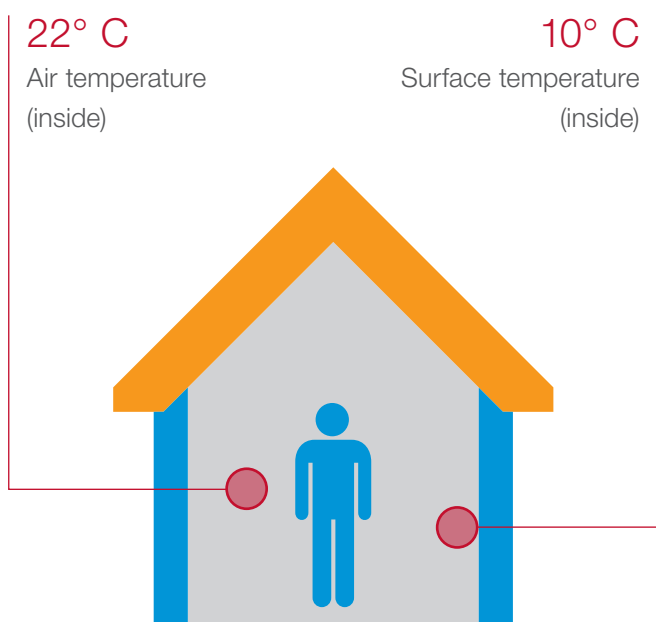
made of Neopor®, they are warm on the inside and free of thermal bridges. The risk of mildew developing is therefore much smaller than on the insides of uninsulated and therefore cold external walls.

## Professional Insulation Protects the House

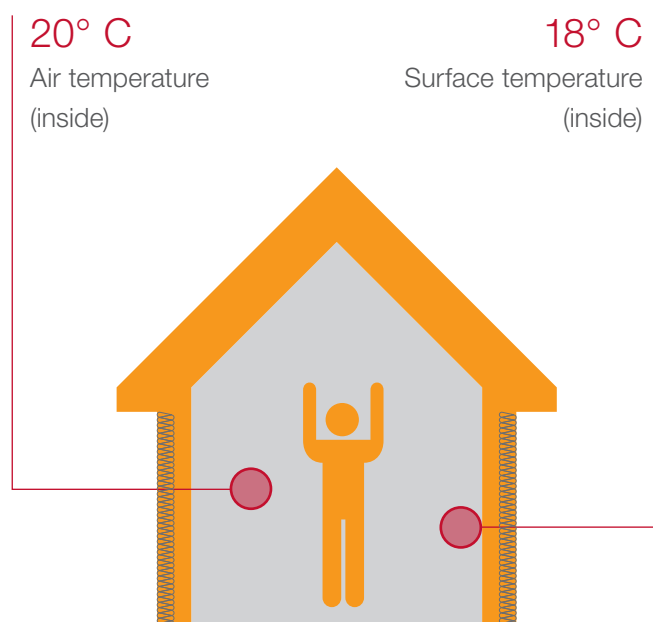
Insulation made of Neopor® offers a lot of possibilities when planning new buildings and renovating existing ones. To make sure that insulation has the desired effect of keeping a building in good shape for many years – and, ideally, even increasing its value – it is absolutely essential for the work to be planned and executed by experienced experts.

## Thermal Comfort – a Comparison:

Building **WITHOUT** thermal insulation



Building **WITH** thermal insulation



Source: Forschungsinstitut für Wärmeschutz e.V. München, FIW

# REFERENCE PROJECTS WITH NEOPOR®

## BRUNCKVIERTEL DISTRICT IN LUDWIGSHAFEN, GERMANY



### FACTS & FIGURES:

External thermal insulation composite system (ETICS), roof insulation, cellar roof insulation with Neopor®

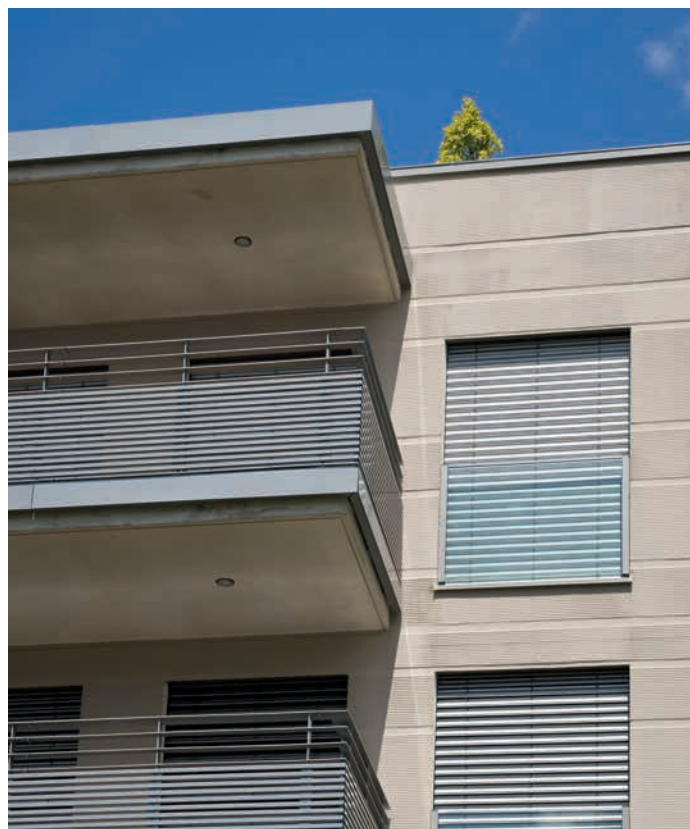
- Originally built in 1930 to accommodate workers
- Work to revitalize the district began in 1996
- Germany's first "three-liter houses"
- Development of innovative system solutions
- Residents involved in planning phase
- Long-term monitoring results in 2013: insulation system intact, reduction in heat consumption even greater than predicted in some cases, high level of tenant satisfaction



"In our climate zone, it's always a good thing when the heat stays inside. And we hardly ever have to turn on the heating, only on a few really cold days in the winter. [...] We've benefitted enormously from the insulation and the ventilation system."

*Peter Doland, Tenant*

## BUILDTOG IN DARMSTADT, GERMANY



### FACTS & FIGURES:

External thermal insulation composite system (ETICS) with Neopor®

- EURHONET, the European Housing Network, initiated the BuildTog project to plan and implement a new generation of residential buildings
- Goals: to combine best energy performance with cost-efficient construction and high-quality architecture while optimizing planning methods and replicability
- In Darmstadt: 37 apartments on four floors and the penthouse level (total living space: 3,600<sup>2</sup>)
- Quality of insulated building envelope: 0.26 W/m<sup>2</sup>K
- Thickness of external insulation: 0.12 W/m<sup>2</sup>K (26 cm of Neopor® 031)



“The enhanced insulating effect and reduced insulation thicknesses of Neopor® open up new architectural possibilities. And by improving energy efficiency while being so easy and practical to use, Neopor enables a giant step in the right direction.”

Stefan Reuther, Architect  
planungsgruppe DREI, Mühlthal

## DOKTORNBERG IN HAMBURG, GERMANY



### FACTS & FIGURES:

#### Core Insulation with Neopor®

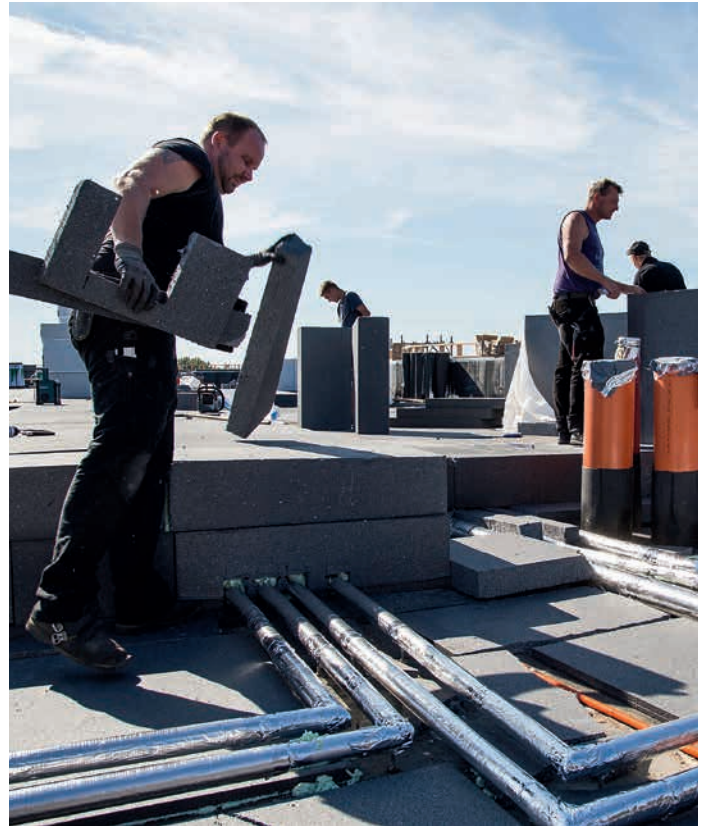
- Villa built in 1928 (typical of the era and region: two stories with a cellar and hipped roof with unfinished attic)
- U-value of uninsulated external wall:  $1.64 \text{ W/m}^2\text{K}$
- An external wall with an area of  $256 \text{ m}^2$  had high energy losses.
- Damaged joints had to be repaired.
- It was essential to avoid changing the building's external appearance.
- An injection nozzle was used to blow prefoamed Neopor® and a water-based adhesive into the wall.
- The u-value of the insulated wall is now  $0.38 \text{ W/m}^2\text{K}$ . The heat losses via the wall have been reduced by 77%.



"Core insulation was the ideal solution – all of the requirements were met by a single product."

*Georg Seimel, Proprietor of EuGon Consulting GmbH, Energy Consultancy*

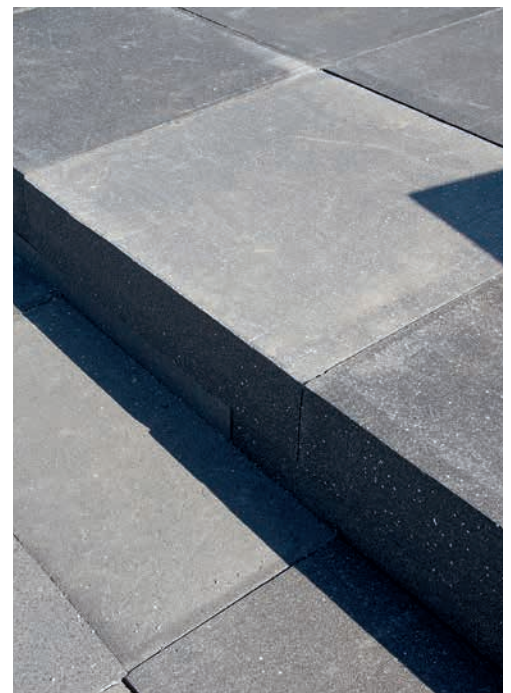
## WÄLDERHAUS IN HAMBURG, GERMANY



### FACTS & FIGURES:

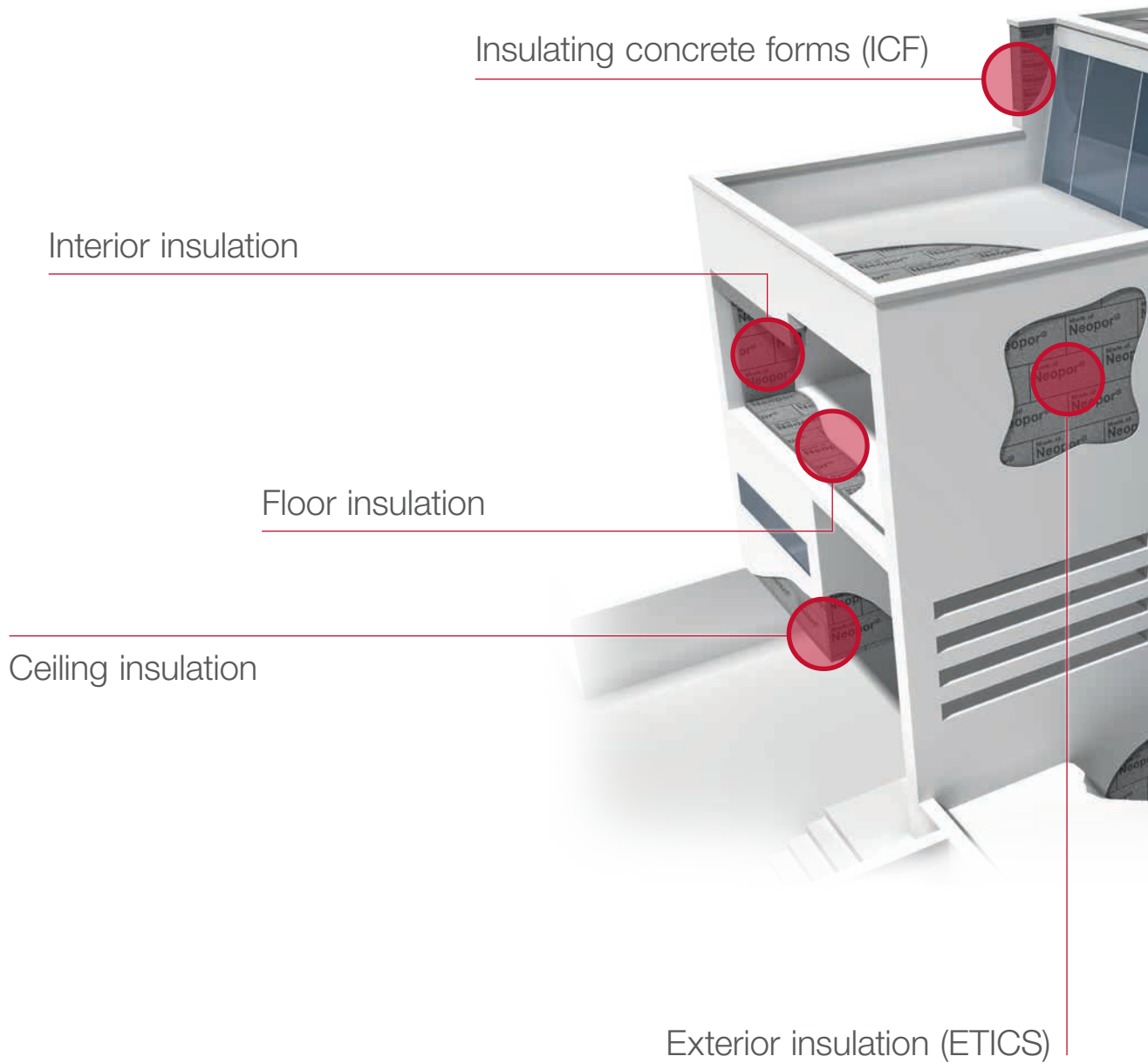
#### Flat Roof Insulation with Neopor®

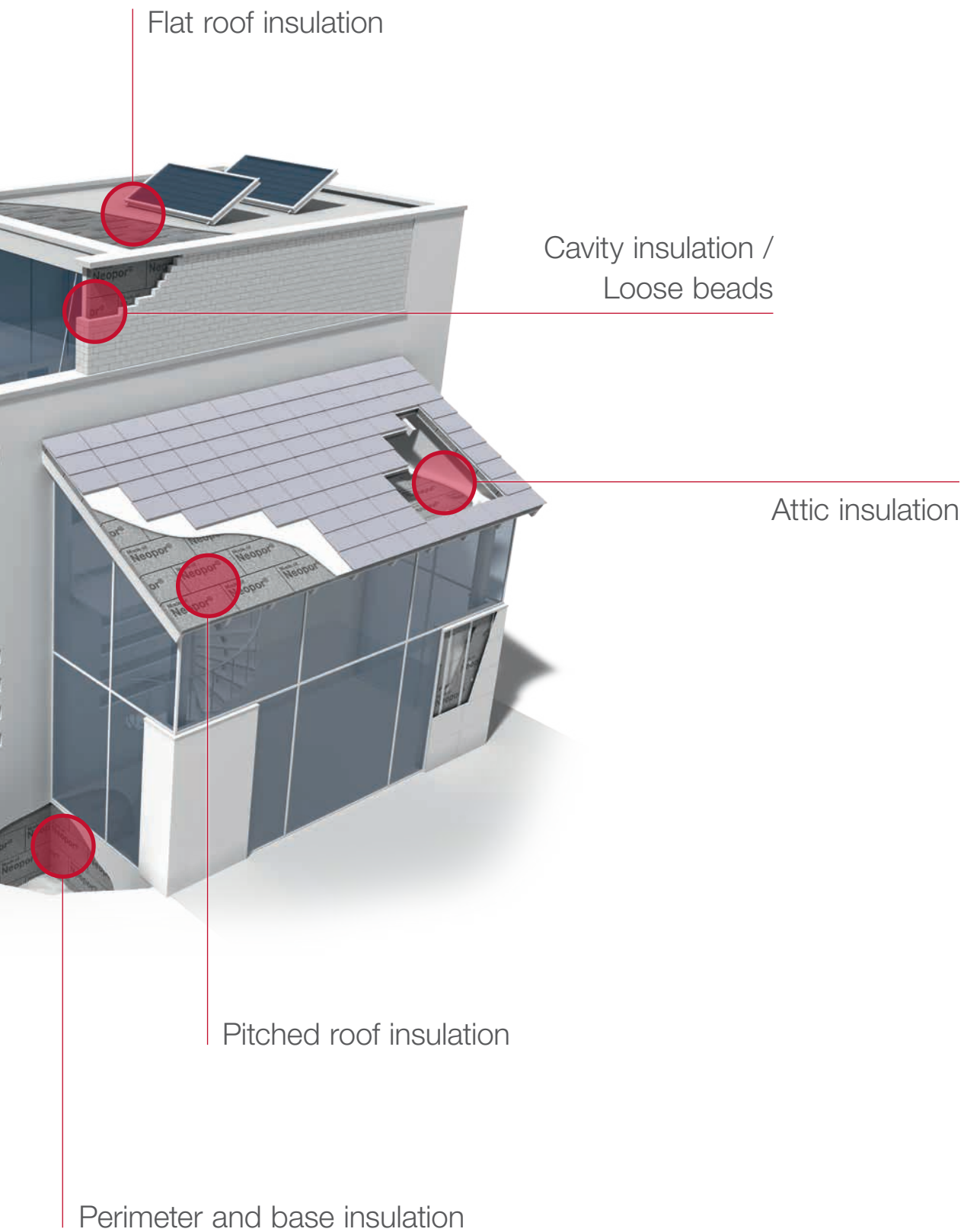
- Award-winning project at the 2013 International Building Exhibition in Hamburg
- Builder-owner: Association for the Protection of German Forests, which has the motto "Learning About, Understanding, and Practicing Sustainability"
- The proven excellent eco-efficiency of Neopor® supports the goal of sustainability.
- Its ease of use enables quick and simple installation on flat roofs.
- Its very good insulating properties yield considerable energy savings.



# NEOPOR® – FROM CELLAR TO ROOF

ONE INSULATION, MANY USES







Exterior insulation (ETICS)



Interior insulation

## Advantages

- Efficient thermal insulation
- Uncomplicated and economical
- Excellent for facade renovations

## EXTERIOR INSULATION (ETICS)

Exterior insulation with ETICS has excellent structural-physical properties for the thermal insulation of facades. ETICS with EPS (Styropor®) have proved their worth in practice for more than 50 years. Insulation boards made of Neopor® continue in this tradition.

ETICS with Neopor thermal insulation fulfills the thermal insulation requirements manifold and even up to the level of a “zero heating energy house”.

Insulation boards made of Neopor® are the most-used gray facade insulation board in Europe: more than 10 million laid square meters per year testify to the success of this BASF quality product.

## Advantages

- Rooms heat up quickly
- Simple and cost-effective implementation
- Improved thermal and sound insulation

## INTERIOR INSULATION

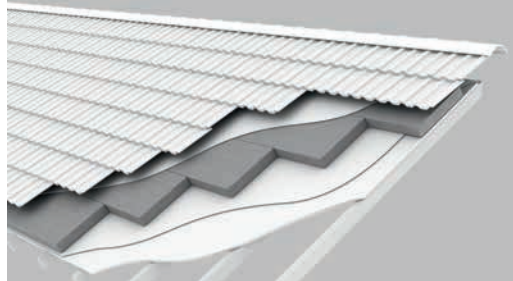
Internal thermal insulation achieves very good insulation results for new construction or renovation projects wherever external thermal insulation is not an option. Spaces that have to be heated up quickly or only for brief periods of time definitely benefit from interior thermal insulation.

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 by insulating materials made of Neopor® can also improve sound insulation.

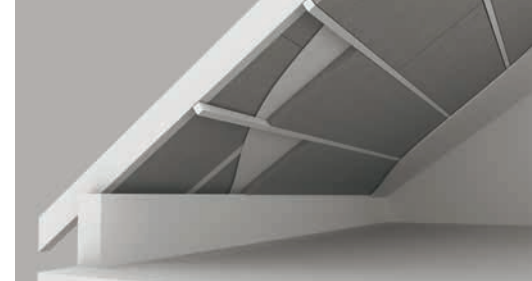




Flat roof insulation



Above-rafter Insulation



Between-/Under-rafter Insulation

## FLAT ROOF INSULATION

Flat roofs are subject to high thermal stress and the resulting strains, which has an effect on the roof waterproofing and the building construction. Insulation boards made of Neopor® protect the construction from the effects of temperature fluctuations and heat loss. Insulation boards made of Neopor® are used for warm roof constructions. They are suitable for almost all conceivable sealing materials, as well as protective and top layers. Environmentally friendly and economical flat roofs are realized with insulation boards made of Neopor®. An additional thermal insulation layer with insulation boards made of Neopor® is used for roof renovations. This modernizes the flat roof to meet today's thermal insulation standards.

### Advantages

- Protection against heat loss
- Economical constructions
- Installation independent of weather conditions

## PITCHED ROOF INSULATION

### Above-rafter Insulation

From a structural-physical point of view, above-rafter insulation is an optimal construction, since the insulating layer is installed virtually without gaps above the roof construction. In doing so, the visible rafters are integrated as a decorative element in the interior design of the rooms.

In order to optimally fulfill the thermal insulation requirements, insulation materials made of Neopor® are installed efficiently in form of panels or roof elements for above-rafter insulation. Professionally renovated areas under steep roofs offer valuable living space. The sufficiently dimensioned insulation layer made of Neopor is of special importance in this regard. In the summer, living spaces under the roof should not heat up unbearably, and in the winter, the thermal insulation must restrict the loss of expensive heating energy.

### Between-/Under-rafter Insulation

Slotted thermal insulation boards made of Neopor® are ideal for between-rafter insulation. Special longitudinal slits make the insulation board flexible and elastic, which enables a perfect fit of the panels between the rafters.

The combination of between- and under-rafter insulation with insulation boards made of Neopor® provides increased thermal insulation with minimal installation height. The energetic restoration of the attic with insulation boards made of Neopor® provides a healthy and cozy living space and contributes to the conservation of and increase in value of the building.

### Advantages

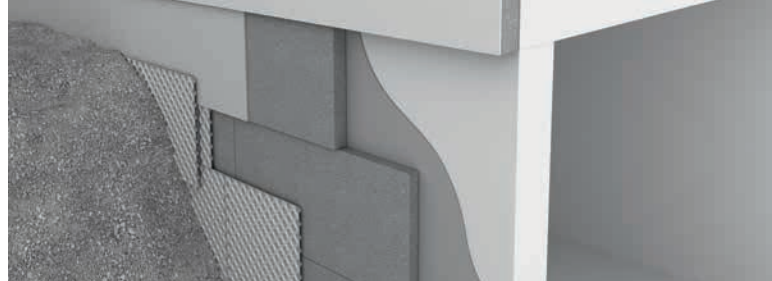
- Complete insulation layer
- Water-repellent and open to diffusion
- Easy handling

### Advantages

- Dust-free and fast laying
- No skin-irritant effects
- Firm and dimensionally stable



Floor insulation



Perimeter and base insulation

## FLOOR INSULATION

### Advantages

- Low water uptake
- Resistant to aging and decay
- High compression strength and bulk density

Floor insulation is important for preventing heat loss to the soil substrate. Due to their high compression strength, Neopor® boards are excellently suited for distributing loads when used for this application. Because Neopor insulates more effectively than conventional EPS, thinner boards can be installed. This reduces construction costs in addition to delivering other benefits.

## PERIMETER AND BASE INSULATION

### Advantages

- High resistance to normal soil moisture
- Perfect supplement to thermal insulation composite systems

Heat loss from heated basements to the surrounding ground can be significantly reduced by installing technically approved Neopor® perimeter insulation panels on the exterior of basement walls.

Perimeter insulation panels made of Neopor have good lambda values and therefore strong thermal insulation properties. In addition, they are stable under pressure at different installation depths and pressure loads, and are highly resistant to normal soil moisture.

During installation, it is important to follow the specifications of the national technical approval for the relevant area of application.

Neopor insulation panels also provide the base of a building with effective protection against heat loss.

Perimeter and base insulation panels do not assume functions such as providing drainage or sealing buildings against moisture.



Ceiling insulation (basement)



Attic insulation

## CEILING INSULATION (BASEMENT)

Basement ceilings can be optimally insulated with insulation boards made of Neopor®, the existing ceiling height is only minimally reduced, and as a result, the heating energy consumption is lowered – thanks to Neopor's improved insulation performance compared to conventional EPS.

### Advantages

- Improved insulation performance
- Low installation height
- Cool basements, warm living spaces

## ATTIC INSULATION

Regardless of the legal requirements, it is recommendable for all owners of old buildings to check the thermal insulation in the attic, which may help to significantly save costs. In many buildings, the ceiling of the top floor is poorly insulated or not insulated at all. The attic can be optimally insulated using insulation boards made of Neopor®.

### Advantages

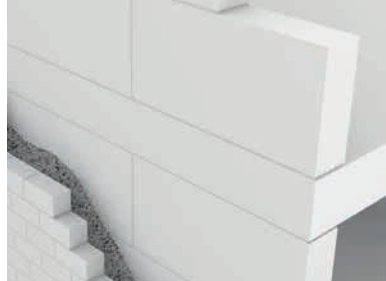
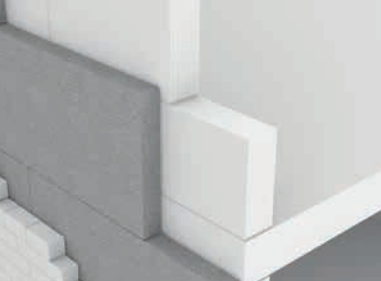
- Optimal insulation
- High energy cost savings
- Recommendable for old buildings

# TECHNICAL DATA

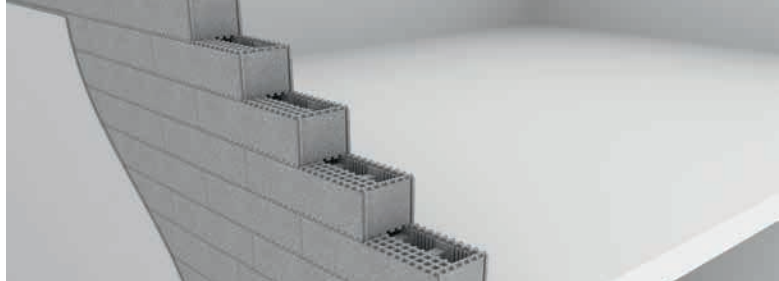
Property	Unit	Designation code acc. to EN 13163	Metrics for insulation products made of Neopor®			Standard
			EPS 70	EPS 100	EPS 150	
Thermal conductivity $\lambda_p$	W/(m · K)	–	≥ 0.031	≥ 0.030	≥ 0.030	EN 13163
Thermal conductivity, rated value	W/(m · K)	–	≥ 0.032	≥ 0.031	≥ 0.031	German approval
Compressive strength at 10% deformation	kPa	CS ( 10)	≥ 70	≥ 100	≥ 150	EN 826
Tensile strength perpendicular to plane of board	kPa	TR	≥ 100	≥ 150	≥ 200	EN 1607
Flexural strength	kPa	BS	≥ 115	≥ 150	≥ 200	EN 12089
Shear strength	kPa	t	≥ 35	≥ 60	≥ 85	EN 12090
Dimensional stability after 48 h at 70°C	%	DS (70,-)	≤ 1	≤ 1	≤ 1	EN 1604
Deformation after 48 h at 20 kPa and 80°C	%	DLT (1) 5	–	≤ 5	≤ 5	EN 1605
Deformation after 168 h at 40 kPa and 70°C	%	DLT (2) 5	–	–	≤ 5	EN 1605
Water vapor diffusion resistance factor $\mu$	–	–	20 - 40	30 - 70	30 - 70	EN 12086
Thermal linear change coefficient	K <sup>-1</sup>	–	60 - 80 · 10 <sup>-6</sup>	60 - 80 · 10 <sup>-6</sup>	60 - 80 · 10 <sup>-6</sup>	EIN 53752
Reaction to fire	Euroclass	–	E	E	E	EN 13501-1
Chemical resistance	Insensitive to water, most acids, and lyes. Sensitive to organic solvents.					
Biological behavior	No influence on microorganisms. Does not decay or rot. Chemically neutral, not soluble in water. No known health hazards.					

**Please note:**

The technical and physical metrics provided in this table are reference values for insulation products made of Neopor®. The values and properties may vary depending on how they are processed and produced. Neopor® P does not include flame retardant.



Cavity insulation / Loose beads



Insulating concrete forms (ICF)

## 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 backventilated.

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. This provides complete and lasting thermal insulation.

### Advantages

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

## INSULATING CONCRETE FORMS (ICF)

Insulating concrete forms made of Neopor® are suitable for all types of building elements, particularly for those requiring thermal insulation and a simple design. They are used as wall and ceiling elements for single-family houses as well as high-rise buildings. They offer enormous potential savings for do-it-yourself builders.

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 thermal-insulating properties, formwork elements made of Neopor® are well-suited for the construction of low-energy and passive houses.

### Advantages

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

#### Important Note

The information provided in this publication is based on our current knowledge. However, because of the many factors that can influence the processing and use of our product it does not free users from the obligation to carry out tests and trials of their own. No guarantee of certain properties or the suitability of the product for specific applications may be derived from our information. All descriptions, drawings, photographs, data, ratios, weights etc. contained in this publication may change without notice and do not represent contractually agreed properties of the property. Recipients of our product are responsible for observing any existing property rights as well as applicable laws and regulations. (November 2014)



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 **BASF**  
We create chemistry