Styrodur® – for 50 Years the Proven Insulation of the Future

www.styrodur.com

BASF
We create chemistry

Safe. Strong.
Styrodur®

CONTENTS

STYRODUR® – the Proven Insulation of the Future Since 1964

Thanks to Styrodur®, BASF can look back on 50 years of experience in the XPS market. It was in 1964 that the company began producing this green insulation, which excels with its high quality, diverse applications, and robustness. Styrodur insulation lasts for generations.

As a proven brand with high market presence, Styrodur stands for technology "Made in Germany" and unique, steadily evolving work to obtain approvals. This has resulted in outstanding reliability and security for planners, architects, users, and builder-owners. With Styrodur, you benefit from consistently high, certified product quality.

Our longtime partners also appreciate the competent technical service that the experts of our Styrodur team provide day in, day out while working with our customers in a spirit of mutual trust. This combination has made Styrodur the XPS package with the greatest experience and expertise on product development and applications.

50 YEARS OF STYRODUR® – the History

Thanks to Styrodur®, BASF can look back on 50 years of experience in the XPS market: we began producing this high-quality, robust insulation in 1964. Today, Styrodur is the leading XPS in terms of knowledge and experience.

1964
Production of Styrodur® begins

1972
Market launch of Styrodur® 4000

1974
Start of sales in other European countries – first exports

1975
First trials with Styrodur® 5000

1978
Approval for inverted roofs

1980
Approval for perimeter insulation

1984
Market launch of Styrodur® 2500

1985
Market launch of Styrodur® 3035

1993
Production of boards up to 200 mm thick

1995
Start of production in Bibbiano, Italy

1996
Voluntary pledge to switch completely to CO_2 as an environmentally friendly cell gas by 2000

1998

Complete switchover in Germany a year earlier than planned

Environmental award for Styrodur® C

1997

First phase of voluntary switch (80%) completed ahead of schedule

1999

Approval for foundation slabs

2002

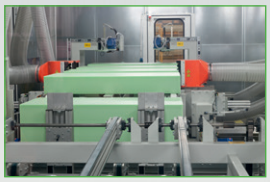
Start of production in Tudela, Spain

2006

Approval for green and drivable inverted roofs

2009

First approval for multi-layer use under foundation slabs



2011

Inauguration of the 4th production line in Ludwigshafen, resulting in Europe's largest contiguous XPS production plant

Approval for doublelayer insulation of inverted roofs

2013

Styrodur® is the first insulation to be approved by the German Institute for Building Technology (DIBt) for insulating foundation slabs in seismically active areas

STRONG – in Every Respect

For 50 years, Styrodur® has stood for BASF technology "Made in Germany". Today it is a proven XPS throughout Europe.

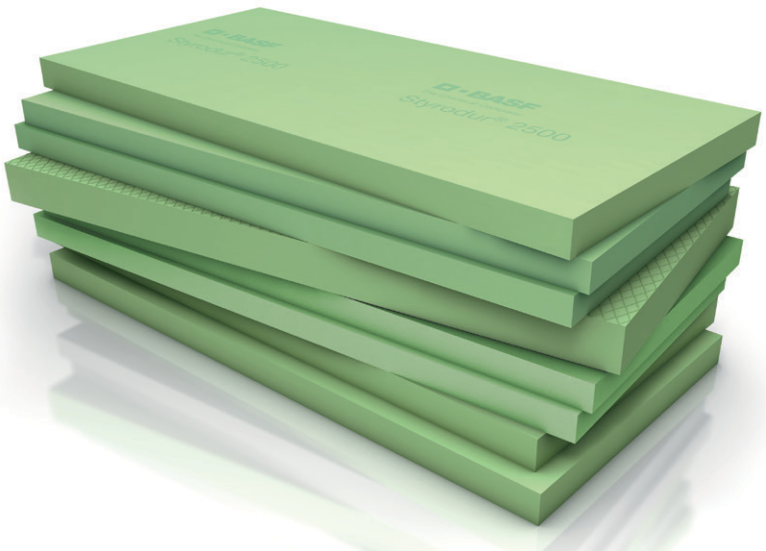
The long list of Styrodur's strengths speaks for itself:

- High compressive strength
- Dimensional stability
- Resistance to decay
- Low water absorption
- Excellent thermal insulation
- Versatility
- Ease of use

Builder-owners recover their investments in Styrodur insulation via the achieved energy savings. Buildings insulated with Styrodur feature a healthier indoor climate and protect their occupants from both cold and heat. This prolongs the life of houses and increases their value. Styrodur is manufactured in accordance with DIN EN 13164 and has been assigned to the reaction-to-fire Euroclass E according to DIN EN 13501-1. In addition, most of the product versions also meet the requirements for flame-resistant building materials according to DIN 410 (material class B1). The quality of the entire product portfolio is monitored by the Forschungsinstitut für Wärmeschutz e.V. (FIW Munich). It has received official approval for construction applications from the German Institute for Building Technology (DIBt) in Berlin under the number Z-3.15-1481.

Do you have any questions about Styrodur?

If so, please write to: **styrodur@basf.com**



PROVEN QUALITY –

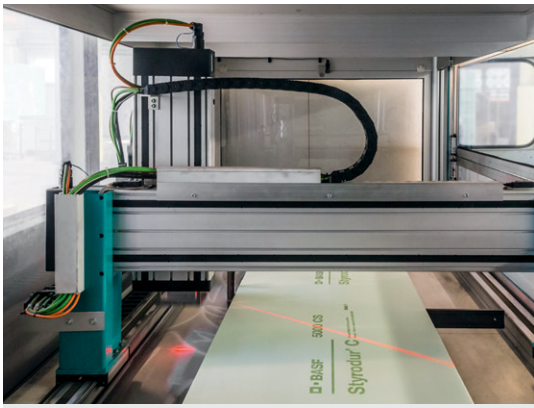
Thanks to Thorough Product Checks

To lastingly ensure the high, proven quality of our product family, all Styrodur® products are carefully checked.

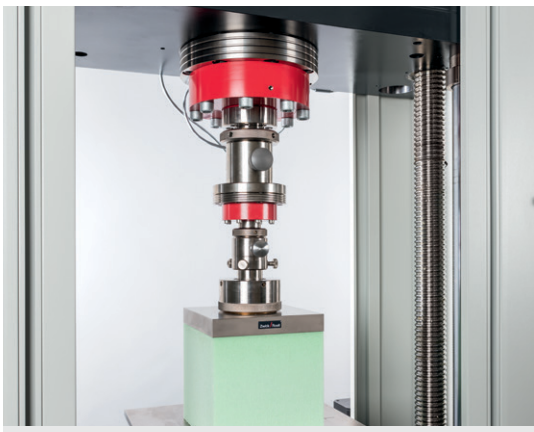
During the production process, the quality of the insulation is checked multiple times. Among other things, its thermal conductivity, compression resistance, fire behavior, and board dimensions are regularly monitored. Continual quality checks in our labs – including creep tests, water absorption and freeze-thaw tests – do more than ensure that Styrodur always meets the high expectations of its users. They also enable us to keep optimizing our insulation and its performance.

Above and beyond the requirements of the applicable standards, for many years BASF has been testing the long-term compressive shear behavior of Styrodur. Short-term compressive shear tests round out the program for all product versions. This enables BASF to provide planners with more comprehensive and detailed data than many other XPS manufacturers. Architects and structural engineers can thus plan their projects based on the most reliable data available.

To make sure that Styrodur boards continue to perform as promised even after many years, random samples are regularly taken from buildings, some of them decades-old, and tested. By means of these quality checks beyond the production process, we ensure that our products fulfill their intended purposes well into the future.



Measurement robot


Compression test


Creep tests

APPROVAL WORK GEARED TO THE FUTURE –

So You Can Plan Confidently

The many different applications pose diverse challenges in the search for the ideal insulating solutions. To reliably ensure that planners, architects, and users can plan with confidence, the entire Styrodur® product family is backed by unique, constantly evolving approval work. We not only monitor, but also continually improve the quality of Styrodur. Thanks to this far-reaching work to obtain certifications, Styrodur boasts more official approvals for building applications than any other XPS product.

Styrodur® is the XPS with the most official approvals for building applications. They include a general approval and use for perimeter insulation, inverted roofs, and load-dissipating foundation slabs.

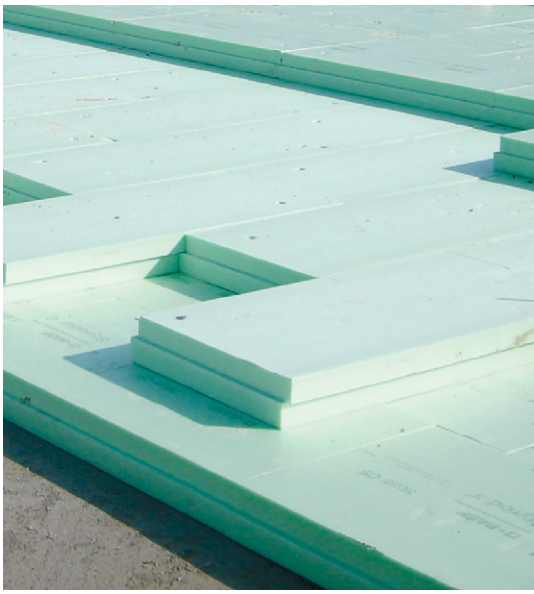
INVERTED ROOFS

Styrodur® has been officially approved for single- and double-layer use in inverted roofs. The maximum permitted insulation thickness is 400 mm. Styrodur may also be used to insulate drivable roofs such as rooftop parking lots and green or gravel roofs covered with water vapour-permeable, water-shedding fleece.

PERIMETER INSULATION

Styrodur® is approved for laying in one, two, or three layers in perimeter areas. Here too, the maximum allowed thickness is 400 mm. Owing to its compressive strength and low water absorption, Styrodur may also be used as perimeter insulation under pressure from groundwater.

LOAD-DISSIPATING FOUNDATION SLABS

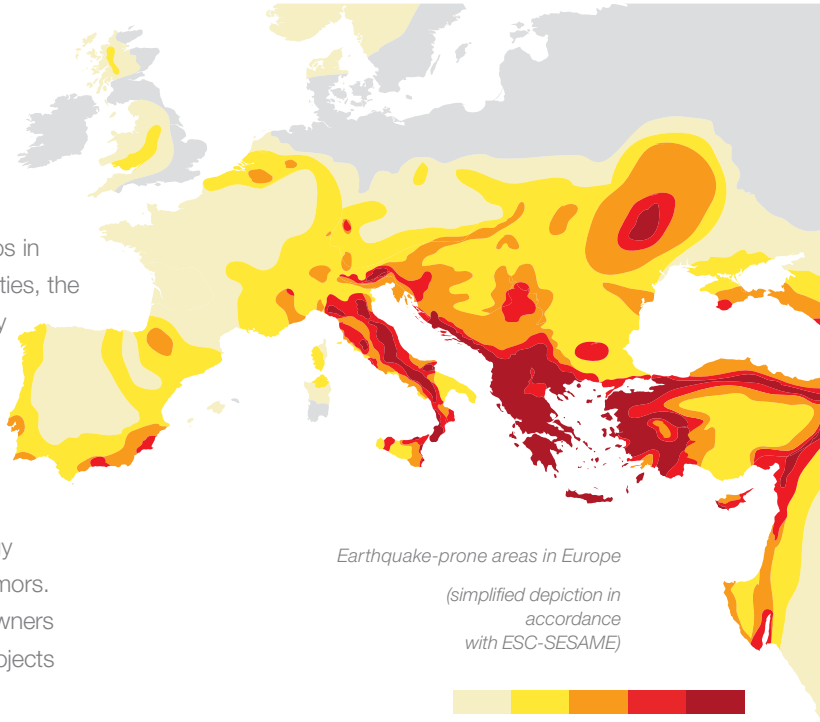


Due to its outstanding compressive strength, Styrodur® has been approved for use as load-dissipating thermal insulation beneath foundation slabs. The maximum permitted thickness in these applications is 300 mm, and it may be immersed in groundwater down to a depth of 3.5 meters. Styrodur is the first insulation that has approval for dissipating horizontal forces such as those induced by wind, ground pressure, and earthquakes. What counts is the material's compressive shear behavior, on account of which Styrodur is approved for dissipating vertical loads of up to 35.5 tonnes per square meter. The horizontal loads may amount to up to 20 percent of this amount, in other words 7.1 tonnes per square meter. That is equivalent to stacking six average-sized cars on top of one another. This makes it possible to dispense with elaborate systems for dissipating horizontal loads, ensuring simple constructions without any thermal bridges.

NEW: Maximum Planning Reliability – Now Also in Seismically Active Areas

BASF experts spent years intensively testing Styrodur® to demonstrate that it is also suitable for use as load-dissipating thermal insulation underneath foundation slabs in earthquake-prone areas. Because of its technical properties, the material is able to transfer horizontal stresses induced by seismic activity. An insulating layer of Styrodur thus also serves to mitigate the stresses that earthquakes subject buildings to.

Styrodur is the world's first insulation that has been approved by the German Institute for Building Technology (DIBt) for deflecting horizontal loads caused by earth tremors. This gives architects, structural engineers, and builder-owners the confidence they urgently require for implementing projects in earthquake-endangered regions.



Earthquake-prone areas in Europe

(simplified depiction in accordance with ESC-SESAME)

STYRODUR® – the Right Choice

… FOR ENGINEERS AND ARCHITECTS

For half a century, Styrodur's consistently high quality, large number of official approvals for building applications, and continuous optimization have made it architects' and engineers' first choice for implementing energy-efficient insulation. The many years of good experience with this proven insulation additionally stress its reliability for planning buildings to meet a wide variety of thermal and constructive requirements.

… FOR CRAFTSMEN

Europe's building trades value Styrodur® for its enormous versatility, its excellent properties, and the ease with which it can be installed in virtually any weather. The large Styrodur product family delivers high-performance solutions to meet the needs of different construction methods in different countries. To top it off, BASF ships to anywhere in Europe and provides professional customer service via its local distributors.

… FOR BUILDING MATERIAL SUPPLIERS

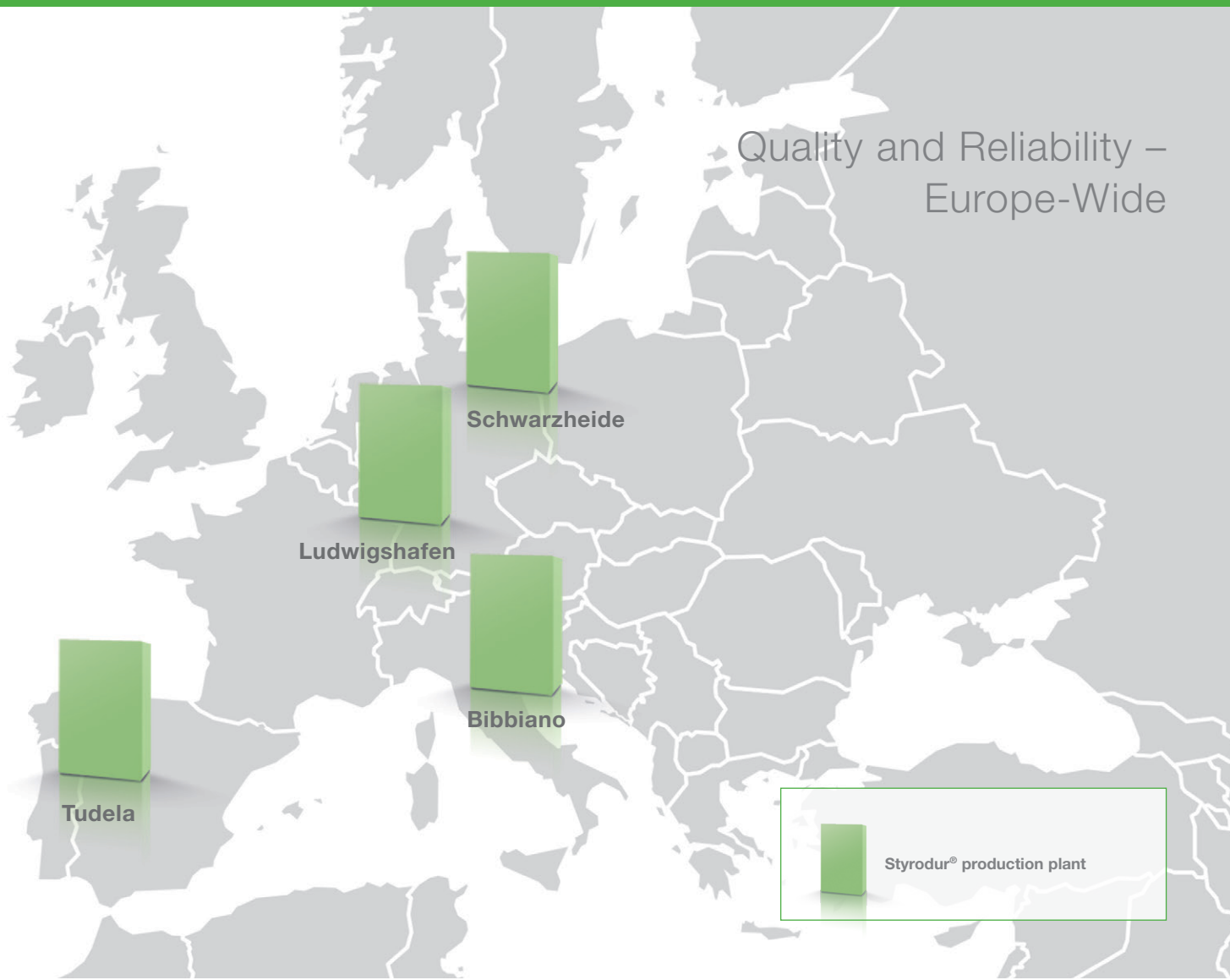
Comprehensive monitoring of Styrodur's production and quality – documented by the CE and Ü marks – guarantee that it is consistently first-rate throughout Europe. Backed by the competence and Europe-wide presence of BASF and its distributors, Styrodur® is in constant demand by planners, builder-owners, and the building trades. And an uninterrupted logistical chain – stretching from production across transport to storage – ensures that building material suppliers can obtain Styrodur – the right product with great value-adding potential – anytime and anywhere.

The CE and Ü marks guarantee top quality throughout Europe.

CE Ü

You'll find a complete list of Styrodur® distributors at:
www.styrodur.com (click "Distributors")

Quality and Reliability – Europe-Wide



Dimensions		m³ per board	Boards per bundle	m³ per bundle	m² per bundle	Bundles per jumbo pack	m³ per jumbo pack	m² per jumbo pack
1250 x 600 x	20	0.015	20	0.300	15.00	12	3.60	180
1265 x 615 x	30	0.023	14	0.315	10.50	12	3.78	126
	40	0.030	10	0.300	7.50	12	3.60	90
	50	0.038	8	0.300	6.00	12	3.60	72
	60	0.045	7	0.315	5.25	12	3.78	63
	80	0.060	5	0.300	3.75	12	3.60	45
	100	0.075	4	0.300	3.00	12	3.60	36
	120	0.090	4	0.360	3.00	10	3.60	30
	140	0.105	3	0.315	2.25	12	3.78	27
	160	0.120	3	0.360	2.25	10	3.60	22,5
	180	0.135	2	0.270	1.50	14	3.78	21
	200	0.150	2	0.300	1.50	12	3.60	18

ENERGY EFFICIENCY –
Strong Contribution to Sustainable Building

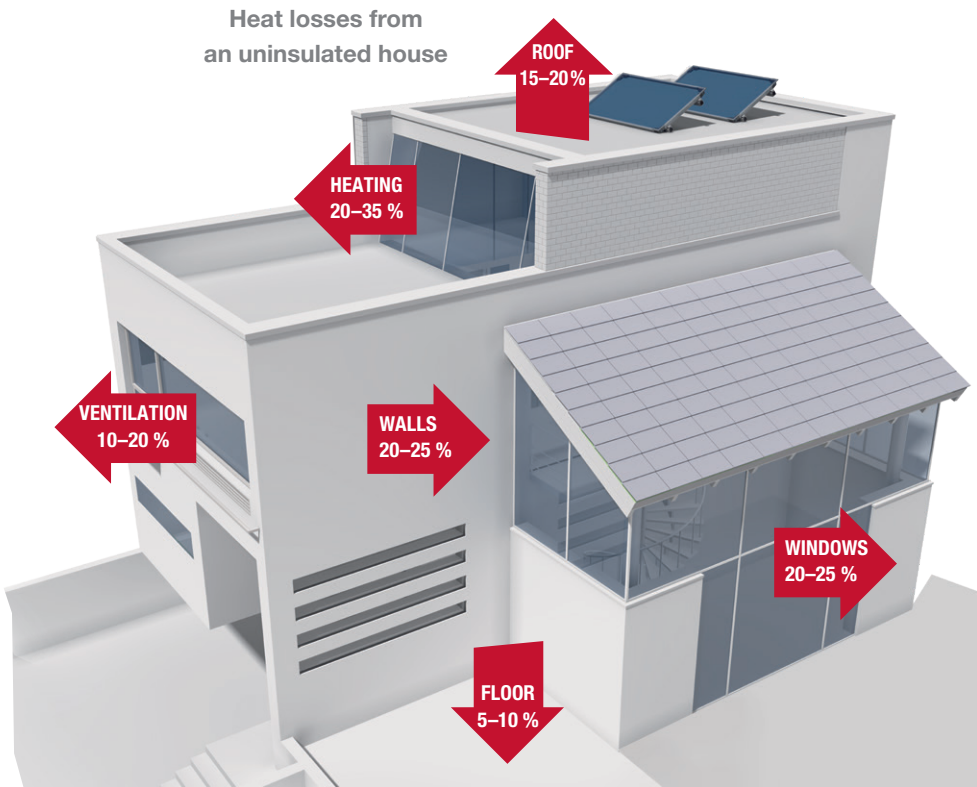
Using Styrodur® to provide optimal thermal insulation also makes a major contribution to reducing carbon dioxide (CO_2) emissions, which are regarded as the principal cause of the greenhouse effect. Added to this is the positive impact of significantly slashing energy consumption, and the resulting savings allow builder-owners to quickly recuperate their investments in comprehensive thermal insulation. You can therefore count on Styrodur to greatly improve the eco-efficiency of your construction project. What's more, Styrodur results in thermal comfort and therefore considerably enhances the indoor climate.

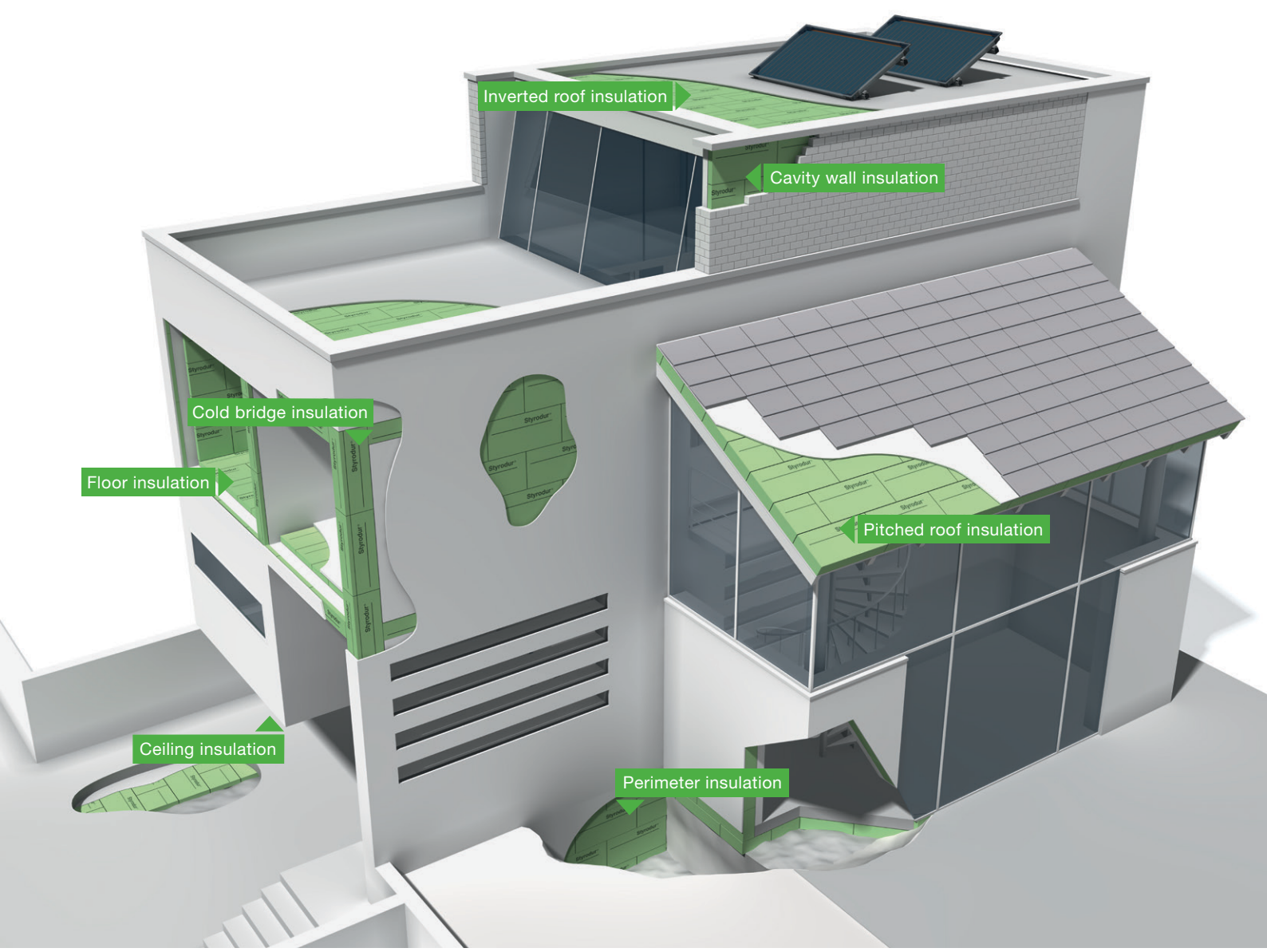
The Carbon Footprint of Styrodur®

Between one and 15 kg of CO_2 are emitted to produce one square meter of Styrodur®, depending on the board thickness and bulk density. In various applications, Styrodur prevents six to seven tonnes of CO_2 emissions per square meter of insulated surface annually. Conclusion: its carbon footprint is extremely favorable.

Air as Cell Gas – A Concrete Contribution to Protecting the Environment

As the world's largest chemical group, BASF plays a leading role in researching and developing environmentally friendly insulation solutions. Being aware of its responsibilities, BASF was also the first company serving the market to completely switch to low-pollutant CO_2 technology. Styrodur received the 2000 Environmental Award of the Federation of German Industry (BDI) for this milestone achievement.



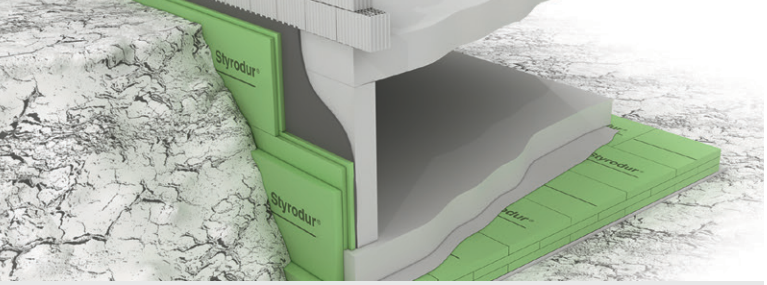


FIRST RATE INSULATING PERFORMANCE –

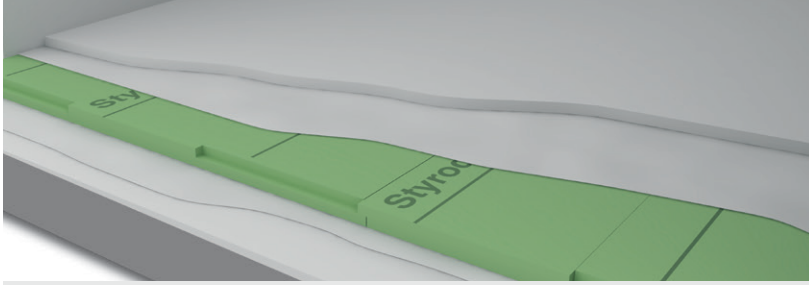
from Floor to Roof

Styrodur® is the XPS with the most officially approved uses. It offers the most flexible XPS portfolio for meeting virtually any thermal or practical requirement in construction, from floors all the way to flat roofs. But because of its dimensional stability, resistance to decay, and low water absorption, this versatile insulation is especially well-suited for implementing perimeter insulation. Thanks to its high compressive strength, Styrodur from BASF is the best choice for all applications that involve pressure.


Erdbeben-
regionen



Perimeter insulation



Floor insulation

PERIMETER INSULATION

Perimeter insulation is installed on the outside of building parts that are in contact with the ground in order to reduce thermal losses. It completely surrounds the building's envelope to eliminate any thermal bridges, and also reliably protects the outer seal from mechanical damage. Styrodur® has been approved for use as perimeter insulation since 1980, and in 1996 this approval was extended to include applications where it is exposed to persistent or constant pressure from water (groundwater) at immersion depths of up to 3.5 m. Since 1996, it has also been possible to install it under load-dissipating foundation slabs. As of 2013, Styrodur is the first insulating material that is officially approved for load-dissipating applications beneath the foundation slab in seismically active areas.

ADVANTAGES

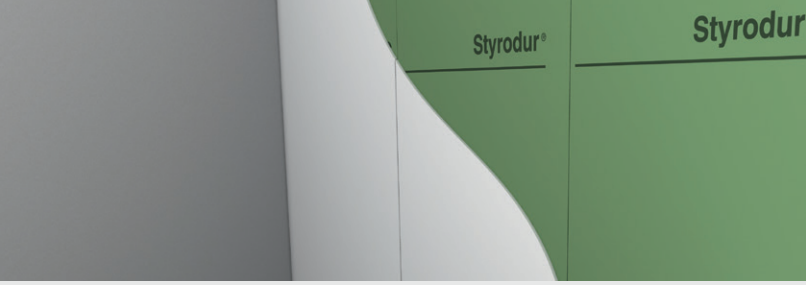
- Excellent, long-lasting insulation
- High compressive strength
- Unaffected by moisture
- Resistant to aging and decay

FLOOR INSULATION

Insulation for ceilings and floors must meet diverse requirements. For many applications, compression resistance is a key criterion when choosing a product. Because of its high compressive strength, Styrodur® is suitable for almost all floor constructions, including floors subject to enormous stresses like those in warehouses, factories, and aircraft hangars.

ADVANTAGES

- Extremely rugged
- Dimensional stability



Interior insulation

Cavity wall insulation

INTERIOR INSULATION

If a building can't be insulated on the outside, for example because it has a heritage-protected facade, it is advisable to insulate the exterior walls on the inside. Styrodur® 2800 C, which has an embossed honeycomb pattern and smooth edges to facilitate coating with concrete, plaster, or other materials, is especially well-suited for this application. The Styrodur insulation can be plastered over or covered with drywall panels.

ADVANTAGES

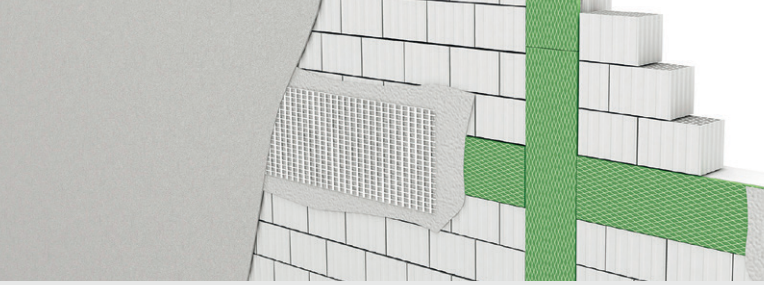
- High compressive strength and loadability
- Embossed surface pattern for excellent adhesion of plaster
- Dimensionally stable

CAVITY WALL INSULATION

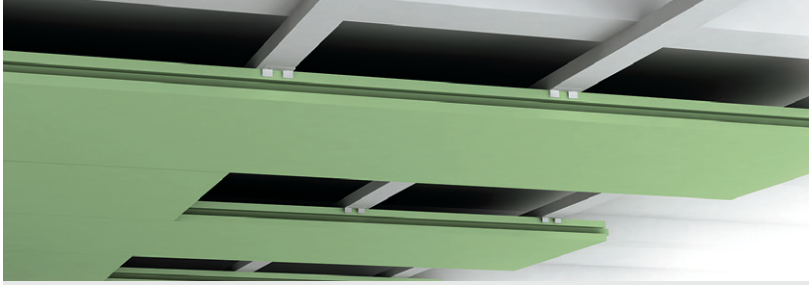
For decades, double-skin masonry constructions with cavity wall insulation have been proving their effectiveness in areas with windy, rainy weather like that typical of coastal regions. A similar approach with a hollow cavity between the skins is traditional in many parts of Europe. Thanks to the low water absorption, good thermal insulating properties, and long service life of Styrodur®, it can also be installed between the two skins without an air gap.

ADVANTAGES

- Excellent thermal insulation
- Water-repellent
- Dimensionally stable
- Long life



Cold bridge insulation



Ceiling insulation

COLD BRIDGE INSULATION

Prevention of cold bridges is absolutely vital for achieving good energy efficiency and avoiding health and hygiene problems. It is also a basic prerequisite for ensuring that a building remains lastingly intact and functional. Styrodur® 2800 C can be used as “left-in-place” formwork or glued on later. Its embossed honeycomb surface ensures a strong bond with concrete without the need for adhesives and is also an excellent substrate for plaster.

ADVANTAGES

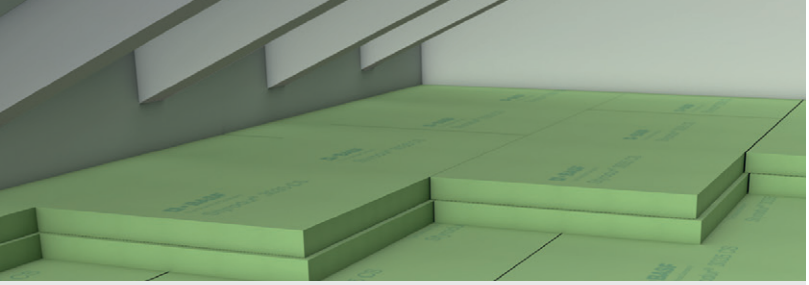
- Reduces loss of heat
- Increases the temperature of indoor surfaces
- Reduces condensation and mildew

CEILING INSULATION

Insulation that is quick and easy to install is ideal for insulating the undersides of ceilings. It should also be lightweight to avoid stressing the load-bearing construction. In the case of unheated cellar rooms, insulating the undersides of the ceilings is a simple, cost-effective way to prevent heat loss and cold floors above them. Styrodur® 2800 C or Styrodur® 3035 CS is just right for these applications.

ADVANTAGES

- Lightweight
- Quick and easy to install
- Firm, clean, smooth surfaces



Attic insulation

Inverted roofs

ATTIC INSULATION

The German Energy Saving Ordinance (EnEV) obliges house owners to install thermal insulation in uninsulated, non-walkable attic floors above heated rooms. This can be done with Styrodur® of any thickness, also by installing multiple plies.

ADVANTAGES

- High compressive strength
- Walkable and loadable
- Quick and easy to install
- Tongue-and-groove system prevents cold bridges
- Long life, resistant to aging and decay

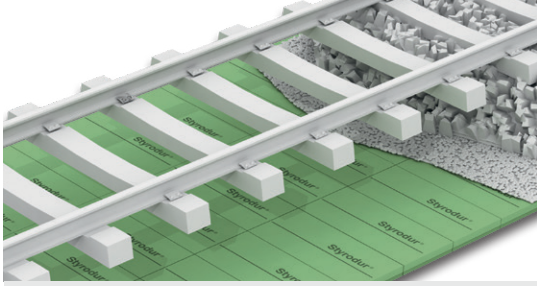
INVERTED ROOFS

Being exposed to sunlight and cold, flat roofs are subject to extreme temperature fluctuations, high thermal loads, and mechanical stresses. The sealing and insulating materials used therefore have to meet heavy demands. In inverted roofs, the insulating layer is installed over the seal. This construction is faster and easier to make than conventional single-skin roofs because fewer layers have to be installed and glued. The seal also lasts longer. Owing to its high compressive strength and other excellent properties, Styrodur® is well-suited for inverted flat roofs, DUO and PLUS roofs, green roofs, terrace roofs, and rooftop parking lots.

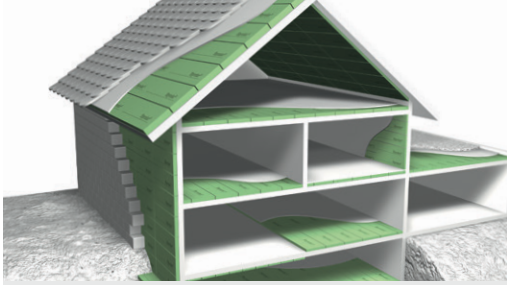
ADVANTAGES

- High compressive strength
- Long life, resistant to aging and decay
- Walkable and loadable
- Dimensionally stable
- Protects the seal

Pitched roof insulation



Frost protection of roads and railways



Renovation and modernization

PITCHED ROOF INSULATION

In these days of rising property prices, it makes sense to convert unused attics under pitched roofs into valuable, cost-effective living space. But it's important to insulate them to prevent them from becoming unbearably hot in the summer and minimize heat loss in the winter.

ADVANTAGES

- No cold bridges
- Uniformly thick insulating layer
- Suitable for new and old buildings

FROST PROTECTION OF ROADS AND RAILWAYS

To prevent frost damage to roads and railways, they can be insulated underneath. Materials used for this must meet demanding requirements and be able to withstand vibrations. Styrodur® can be reliably used to create frost protection layers, owing to its high compressive strength, low water absorption, good insulating performance, and resistance to decay. This wards off frost damage, lastingly reduces maintenance costs, and minimizes the vibration of rails, which contributes to noise abatement.

ADVANTAGES

- Moisture-resistant
- High compressive strength
- Long life, resistant to aging and decay
- Dimensionally stable

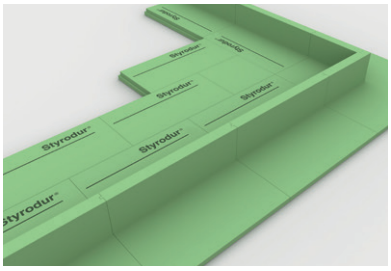
RENOVATION AND MODERNIZATION

As energy costs continue to rise, it is becoming important to renovate and modernize buildings. Before embarking on a project of this kind, it is always essential to determine which measures are best for improving energy efficiency. Styrodur® enables optimal solutions for practically all thermal insulation projects.

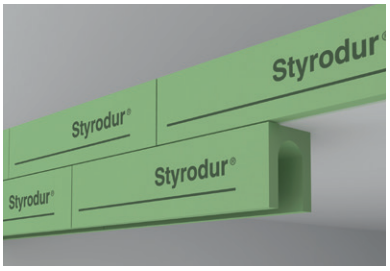

Puren
Styrodur

BUILDING SYSTEMS –
with Styrodur® Fabrication

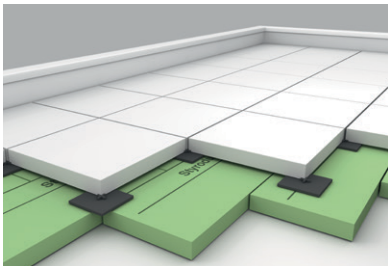
In addition to being used as an insulating board, Styrodur® also lends itself to many other applications that come under the heading of "Fabrication". New solutions are being continually developed in which Styrodur plays a central role. If you are planning to develop new products and would like to incorporate Styrodur, please write us at styrodur@basf.com.



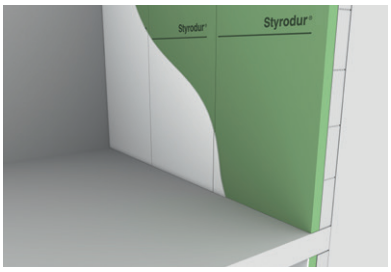
Floor slab systems
in which a building's floor slab is completely surrounded with insulation.



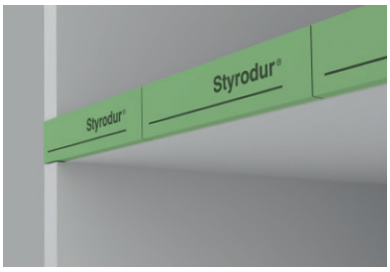
Roller shutter housings
can be made for embedding in plastered walls as an ideal way to prevent energy loss.



Rooftop parking lots
enable the use of roof areas for parking while reducing heat loss from heated floors below.



Tile elements
made of Styrodur are coated with special mortar on both sides for fast, professional modernization of bathrooms.



Slab edge formwork
is ideal for preventing cold bridges and energy loss.

Insulation of refrigerated vehicles
with Styrodur keeps frozen food at the correct temperature to preserve its freshness during transport.

Suppliers of building systems that use Styrodur are listed at: **www.styrodur.com** – (click "Fabrication").

PRODUCT FAMILY –

Proven Insulation for all Requirements

Consult our website to find the distributor nearest you.
www.styrodur.com

The lean Styrodur® portfolio offers ideal insulation solutions for almost any application – thanks to flexibly usable products with outstanding property profiles.

Styrodur® 2800 C/Q
The thermal insulation board with an embossed honeycomb patternon both sides and smooth edges for applications in combination with concrete, plaster, and other top coats.

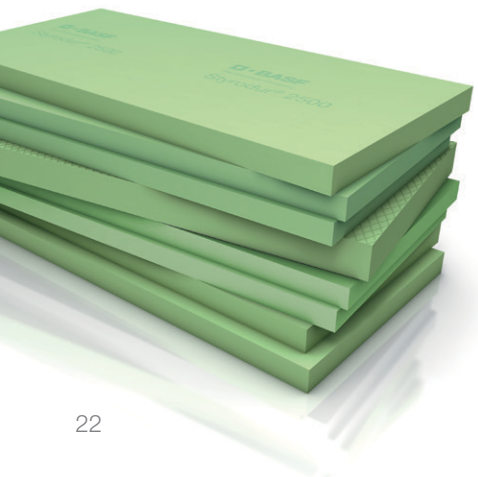
Styrodur® 3000 CS/SQ
The innovative multipurpose thermal insulation board with smooth surfaces and shiplap for almost all applications in structural and civil engineering and with uniform thermal conductivity across all board thicknesses.

Styrodur® 4000/5000 CS/SQ
The extremely compression-proof thermal insulation board with smooth surfaces and shiplap for applications that require maximum compressive strength.

Styrodur® 3000 BMB
The multipurpose thermal insulation board produced using renewable instead of fossil raw materials with the same technical properties as conventional Styrodur CS/SQ, which helps to save resources and reduce CO_2 emissions.

Styrodur® Hybrid
The extremely compression-proof thermal insulating board with smooth surfaces and rabbeted edges for applications that require very high compressive strength.

For more information: **www.styrodur.com**

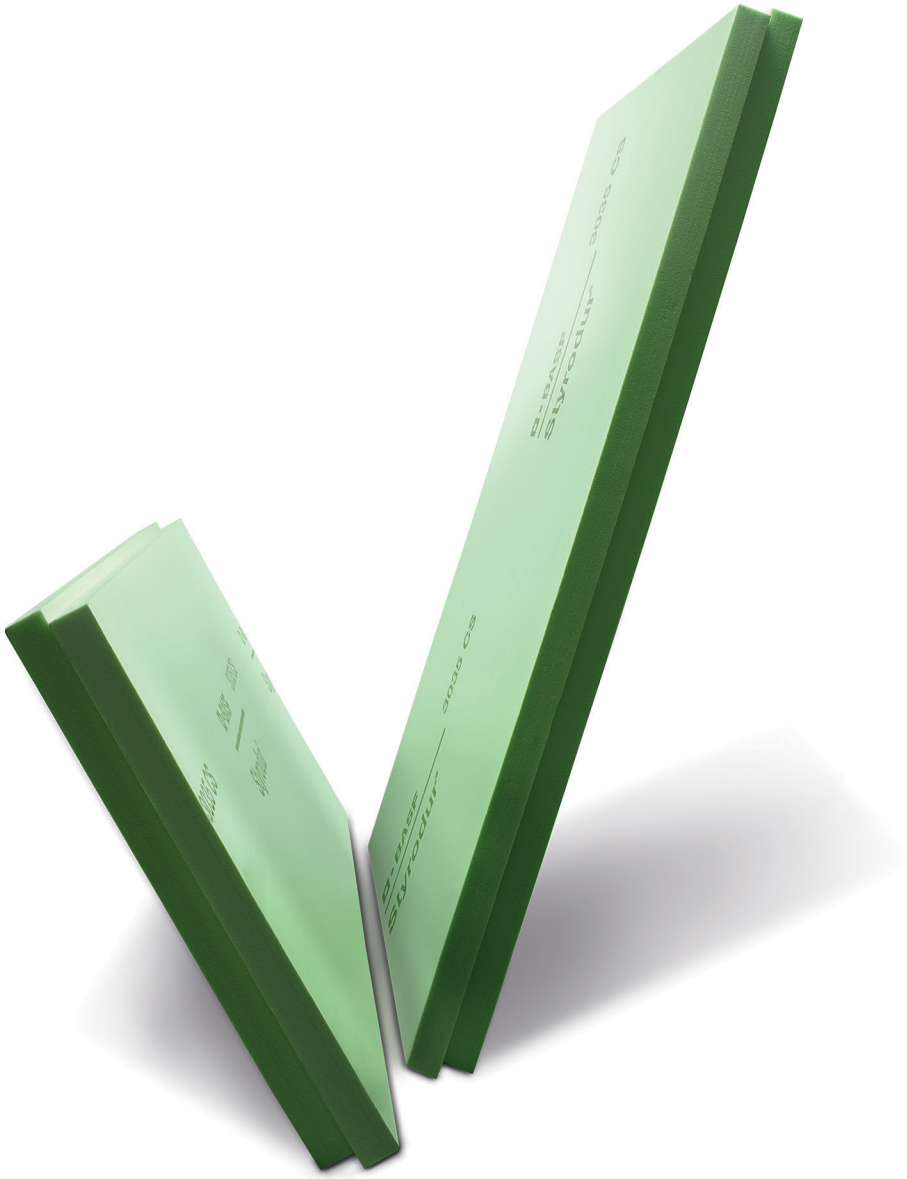


RECOMMENDED APPLICATIONS

Styrodur®	2500 C	2800 C	3035 CS	3035 CNE	4000 CS	5000 CS
Perimeter[1] floor slabs	■		■		■	■
Perimeter[1] basement walls	■		■		■	■
Perimeter[1] load-bearing floor slabs	■		■		■	■
Perimeter[1] / subsoil water areas	■		■		■	■
Domestic floor	■	■	■		■	
Industrial and refrigerated warehouse floors	■	■	■		■	■
Cavity walls	■		■	■	■	
Internal walls	■	■	■		■	
Lost formwork	■	■	■		■	
Cold bridges	■	■	■		■	
Exterior basement wall insulation	■	■	■		■	
Plaster bases	■	■	■		■	
Inverted flat roofs	■		■		■	■
DUO and PLUS roofs	■		■		■	■
Promenade roofs	■		■		■	■
Roof gardens	■		■		■	■
Parking decks	■		■		■ [2]	■
Conventional flat roofs[3]	■		■		■	■
Parapet walls	■	■	■		■	
Basement ceiling/Underground garage ceiling	■	■	■		■	
Attic floors	■		■		■	
Pitched roofs	■	■	■	■	■	
Drywall composite board	■	■	■		■	
Sandwich panels	■	■	■		■	
Warehouses	■		■	■	■	■
Ice rinks	■		■		■	■
Road transport infrastructure/Rail construction	■		■		■	■

Styrodur®: German technical approval Z-23.15-1481, extruded polystyrene foam conforming to EN 13164

[1] Insulation in direct contact with the ground [2] Not for installation under interlocking paving stones [3] With protective layer over the seal



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Important note

The information submitted in this publication is based on our current knowledge and experience and refers only to our product and its properties at the time of going to print. It does not imply any warranty or any legally binding assurance about the condition of our product. Attention must be paid to the requirements of specific applications, especially the physical and technological aspects of construction and building regulations. All mechanical drawings are basic outlines and have to be adapted to each application.

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