Styrodur® C
Europe's green insulation

BASF
The Chemical Company

Over 45 Years of Trust in Styrodur® Thermal Insulation

BASF developed Styrodur® more than 45 years ago, and today it is synonymous with XPS in Europe.

Styrodur C is the green extruded rigid polystyrene foam (XPS) from BASF. As a thermal insulation, it makes a significant contribution to climate protection by reducing CO_2 emissions.

The key features of Styrodur C are high compressive strength, low water absorption, and outstanding thermal insulation. It is also rot-proof and easy to handle on site. Compressive strength is the major factor that differentiates the various grades of Styrodur C.

Developers can quickly offset the costs of using Styrodur C for thermal insulation because reduces energy consumption. Thermal insulation is also a factor in providing a healthier living environment and protects constructions from high and low temperatures, prolonging the life and increasing the value of buildings.

Styrodur C is manufactured in accordance with DIN EN 13 164. In terms of fire protection, it is classified in Euroclass E in accordance with DIN EN 13501-1 and is fire-retardant (material class B1) under DIN 4102. It is quality-controlled by the Forschungsinstitut für Wärmeschutz e. V. in Munich and has national technical approval from the Deutsches Institut für Bautechnik in Berlin under No. Z-23.15-1481.

New building and refurbishment

Styrodur C—the optimum insulation for high and low temperatures. Reduces your energy consumption and enhances your living environment.

Styrodur® C: continuous advances in product properties and potential applications

Extending Potential Applications

Its particularly high compressive strength makes Styrodur® C ideal for all insulation applications subject to compressive stress. And in the future, developers will have even greater flexibility in the design of insulation under floor slabs.

Because the general national technical approval by the Deutsches Institut für Bautechnik (DIBt) for the application of Styrodur C under load-bearing floor slabs has been extended for:

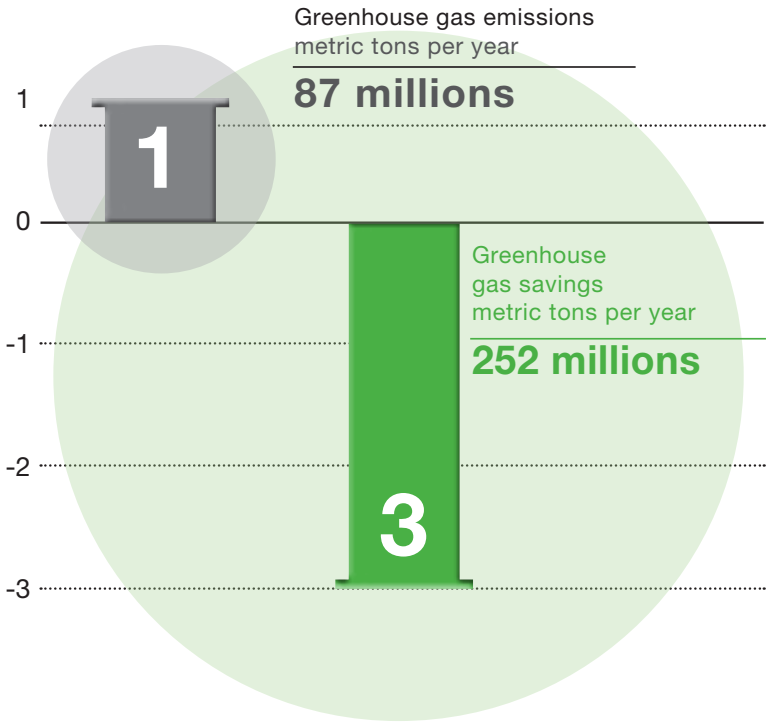
- Fitting several layers of Styrodur C under load-bearing floor slabs
- Insulating layers up to 300 mm thick

The CO_2 balance of Styrodur® C

CO_2 emissions of 1 to 14 kg are created in the production of one square meter of Styrodur C, depending on the thickness and bulk density of he board. In a number of applications, Styrodur C avoids CO_2 emissions of 6 to 7 metric tons per square meter of insulated surface over a period of 50 years.

Improved Product Properties

Further process optimization has led to further improvement of the insulating performance of Styrodur C (for details, see Technical Data on page 15).



BASF's 3:1 balance illustrates that BASF products save three times more greenhouse gas emissions than are generated in the production and disposal of all BASF products.

Anyone contemplating modernization with energy efficiency in mind can save money and protect the environment

Thermal Insulation — More Than Just Climate Protection

Optimum thermal insulation using Styrodur® C makes a significant contribution to reducing carbon dioxide (CO_2) emissions, the major cause of the greenhouse effect.

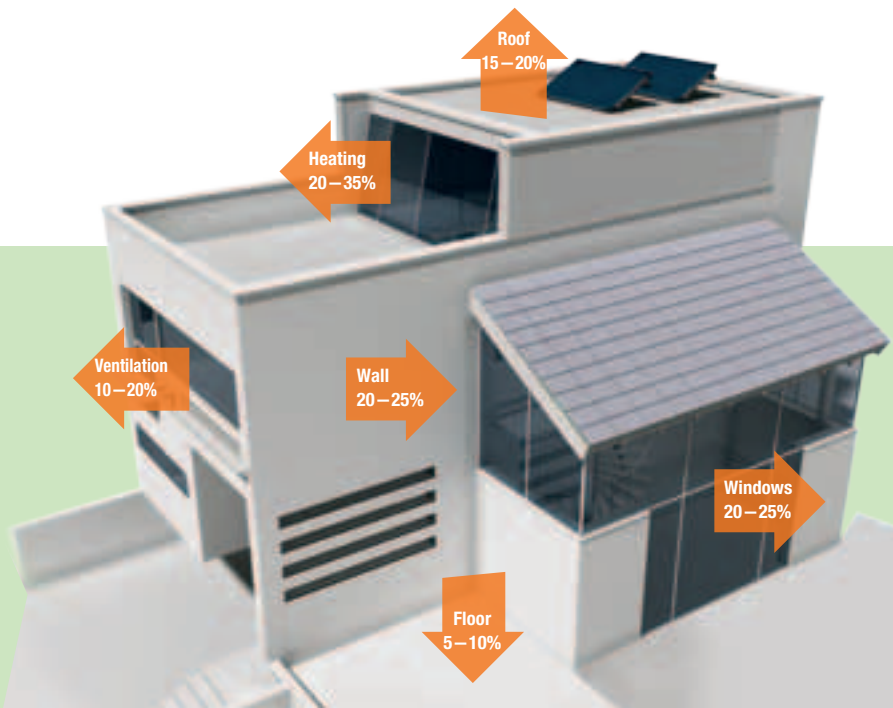
One of the positive effects is that investment in comprehensive thermal insulation measures can be quickly offset by developers as a result of a significantly lower energy consumption.

Thermal insulation with Styrodur C represents thermal comfort that makes a real contribution to a healthy living environment.

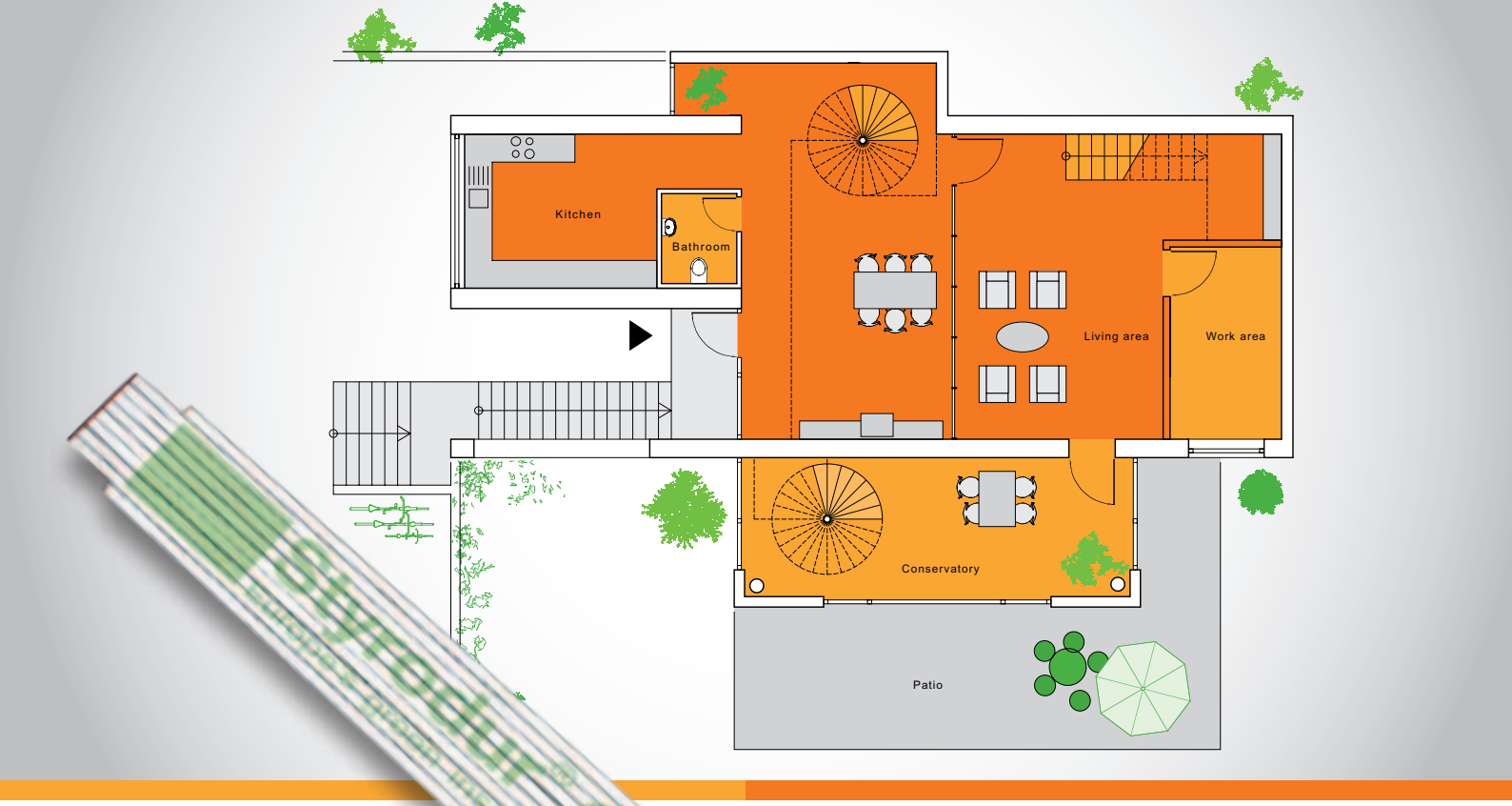
A Real Contribution to Environmental Protection

As the largest chemical company in the world, BASF leads the pack in researching and developing environmentally friendly insulating solutions. BASF was the first and is so far the only company to make a voluntary commitment to supply XPS that is free of CFCs, HCFCs, and HFCs. Styrodur C contains only air as the cell gas. Simply environmentally friendly.

Heat losses in an uninsulated house



Styrodur C considerably reduces energy losses through walls, roof, and floor



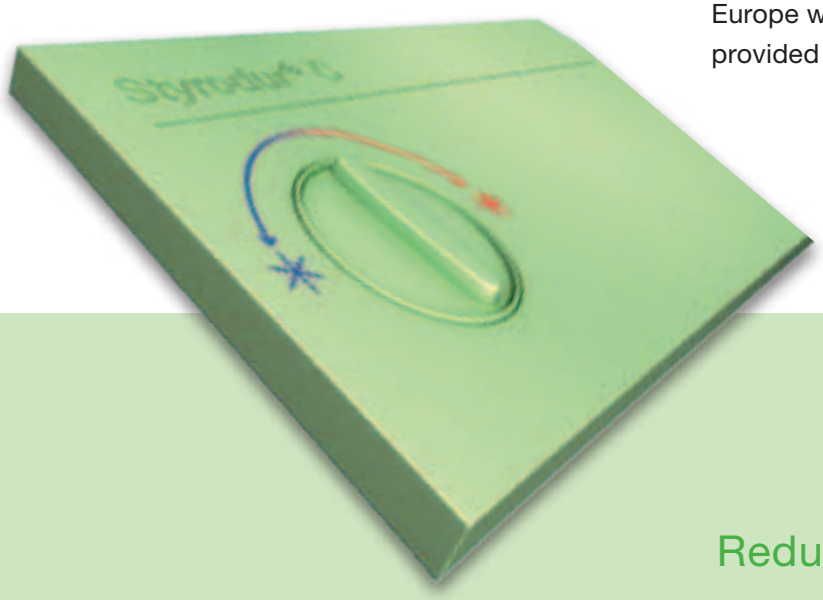
A Material for Engineers and Architects

For over 45 years, Styrodur® C has been the first choice of architects and engineers for protecting buildings against high and low temperatures. Styrodur C can meet the structural requirements and demands of the different climatic conditions throughout Europe.

The Versatile Solution for the Building Industry

The building industry across Europe prefers Styrodur C's versatile applications, outstanding material properties, and ease of installation to meet practical requirements. The comprehensive Styrodur C range makes it possible to cater for different building cultures and traditions.

Styrodur C is a versatile, easy-to-install product that can be fitted in any weather. BASF also offers an extensive logistics network throughout Europe with a professional customer service provided by local distributors.



Enhances lifestyle.

Protects the environment.

Reduces energy consumption.

Increases the value of the building.

Quality and reliability—throughout Europe

An Indispensable Stock Item for Building Materials Wholesalers

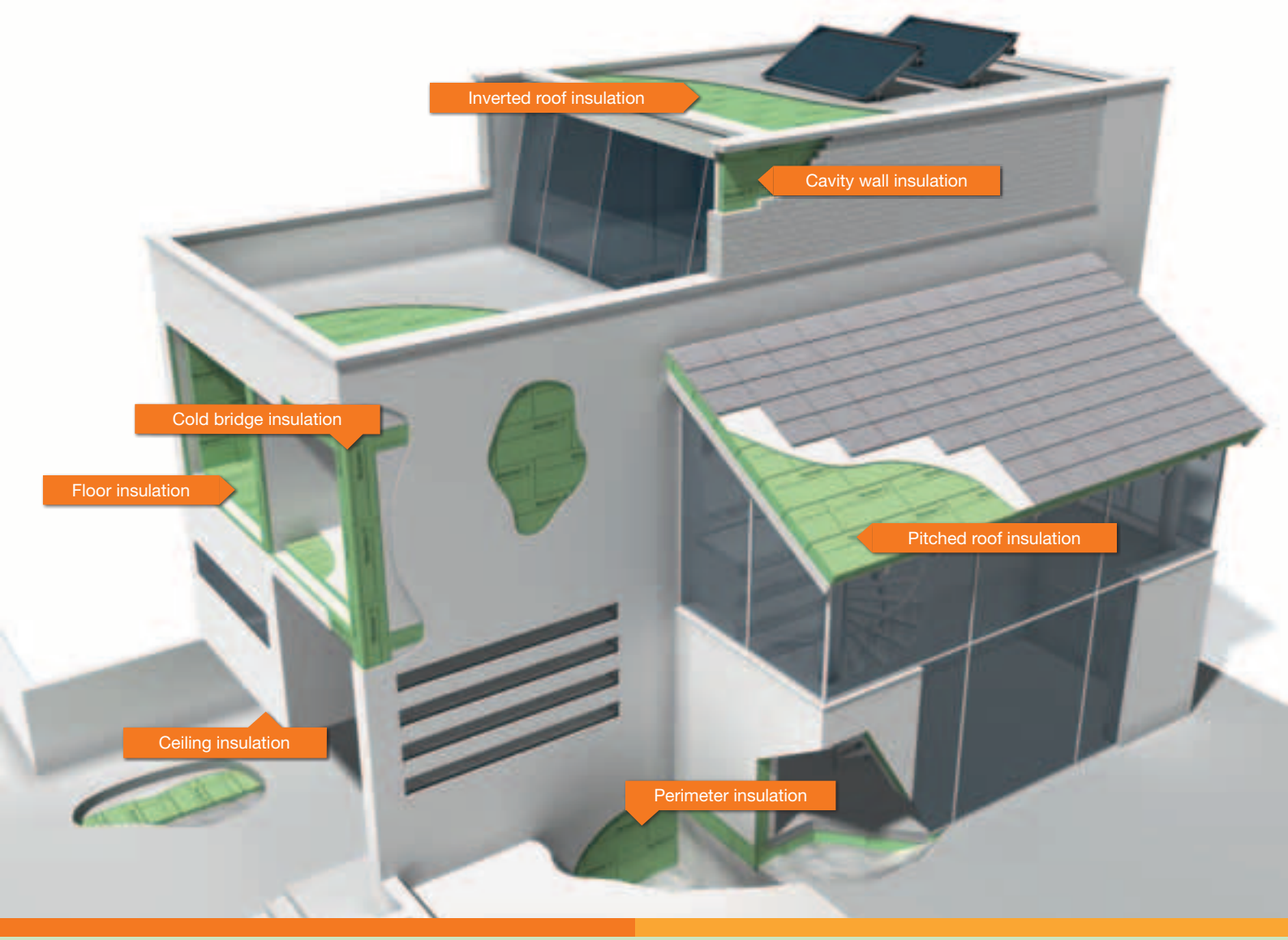
The extensive production checks and monitoring of Styrodur® C, documented by CE marking and the Ü mark, guarantee the same high quality throughout Europe. This, combined with the expertise and Europe-wide presence of BASF and its distributors, means that there is a constant demand by planners, architects, and the building industry. An integrated logistics chain for Styrodur C—from production via transport through to storage—means that the building industry always has the right product with a high value added potential available—any time, anywhere.

Styrodur® C— A Product for Europe

The excellent product properties of Styrodur C and its versatile applications make the green polystyrene rigid foam board an essential insulating material in structural and civil engineering throughout Europe.

You can find a full list of distributors on the internet at www.styrodur.com by clicking on “Sales Partners” in the menu.

Packaging volume		m^3 board	Boards per bundle	m^3 bundle	m^2 bundle	Bundles per jumbo packaging	m^3 jumbo packaging	m^2 jumbo packaging
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

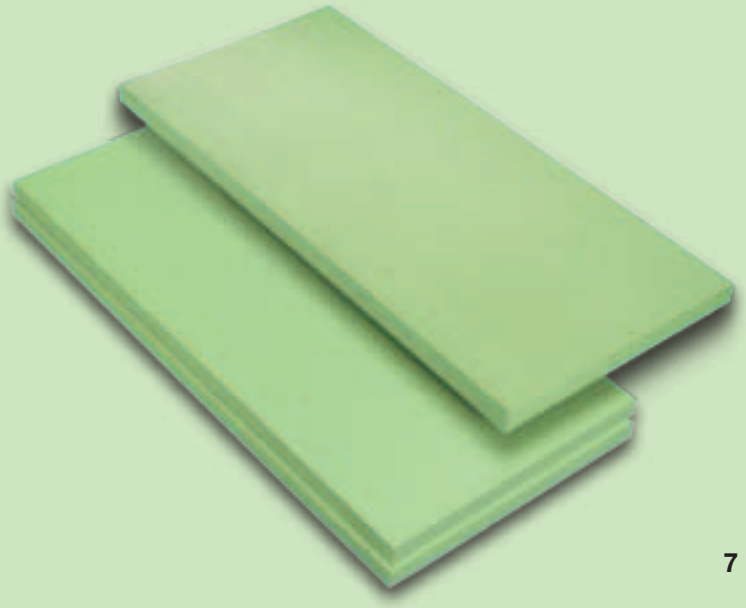


Top Insulating Performance— From Floor to Roof

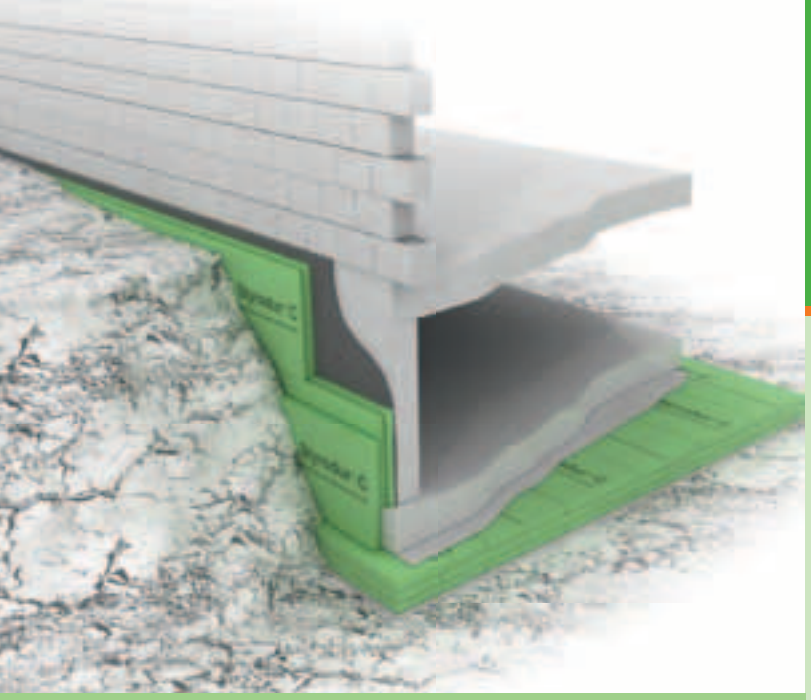
Modern XPS insulating materials are subject to a wide variety of requirements in structural and civil engineering. In the ground, they have to be pressure-resistant, dimensionally stable and rot-proof; they should not absorb moisture and must provide durable thermal insulation.

Another requirement is that can to be used in a wide range of structural components for external constructions—on walls as thermal or thermal bridge insulation, on roofs as flat or pitched roof insulation, and indoors as insulation for floors and ceilings.

Styrodur® C can be used in all these applications because of its versatile product properties. Virtually all structural and practical requirements can be met with Styrodur C.



Styrodur® C
Europe's green insulation



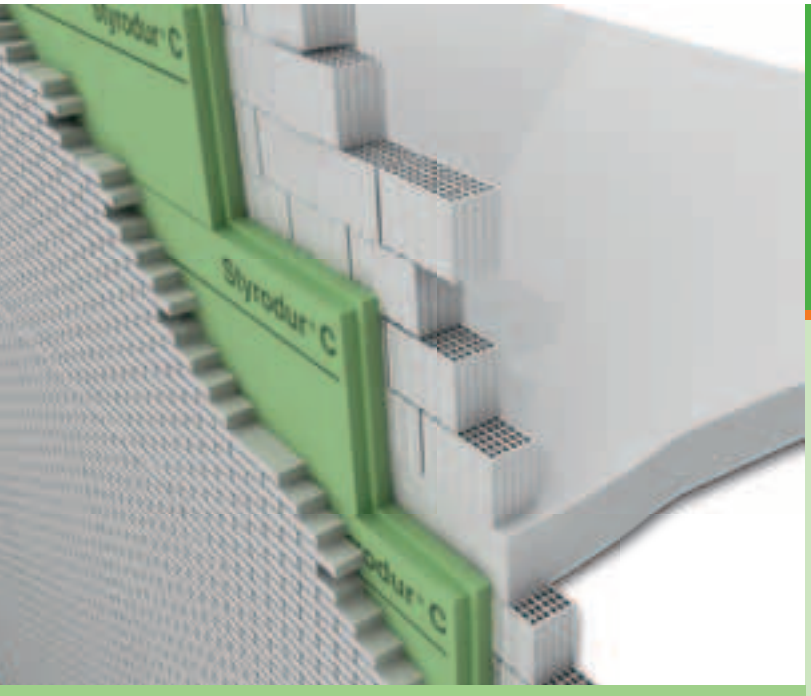
Perimeter insulation

The external insulation of structural components in contact with the earth—perimeter insulation—reduces heat losses through the building's foundations. Perimeter insulation surrounds the shell of the building without forming any thermal bridges and securely protects the seal against mechanical damage.

Styrodur® has had general national technical approval for perimeter insulation for over 30 years and, for 15 years, for areas subject to persistent or constant exposure to water (groundwater) up to a maximum depth of 3.5 m. And for more than 10 years, it has also been fitted under load-bearing floor slabs.

Advantages:

- Moisture-resistant
- High compressive strength
- Aging- and rot-proof
- Excellent, durable thermal insulation properties



Cavity wall insulation

For decades, double-skin masonry constructions with cavity wall insulation have proved effective in areas subject to high levels of wind and rain, such as coastal regions, and are regarded as a traditional construction in many areas in Europe.

The low absorption of water, good thermal insulation properties, and long service life of Styrodur C mean it can be installed between the two sections of the wall even without an air gap.

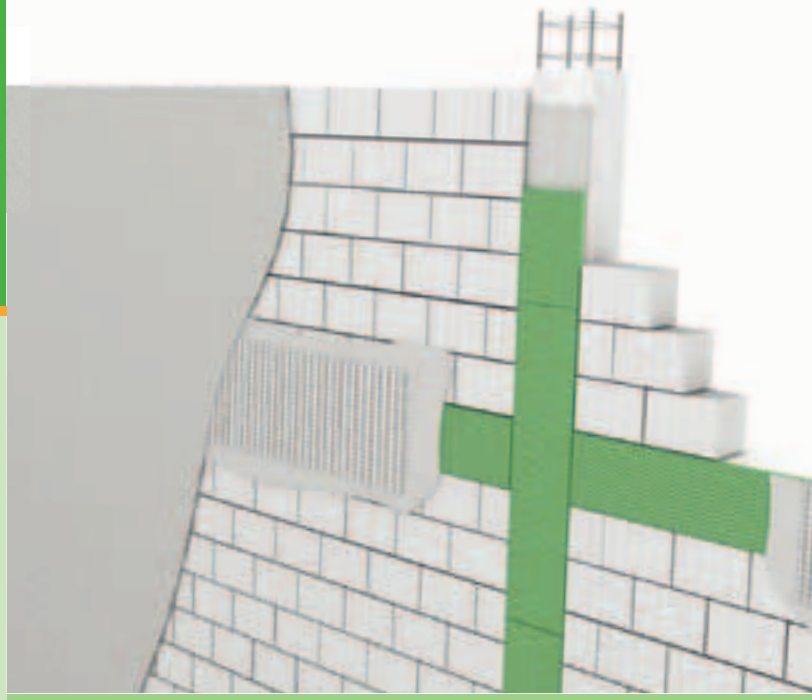
Advantages:

- Excellent thermal insulation
- Water-repellent properties
- Dimensional stability
- Durability

Cold bridge insulation

It is absolutely vital to avoid thermal bridges for energy, health, and hygiene reasons. Based on the structural components of a building, avoiding thermal bridges is very important for long-term conservation and functional safety.

Styrodur® 2800 C can be concreted in as “lost formwork” or glued on later. The embossed surface (honeycomb) also provides a strong bond with concrete without the need for additional adhesives and consitutes an excellent plaster substrate.



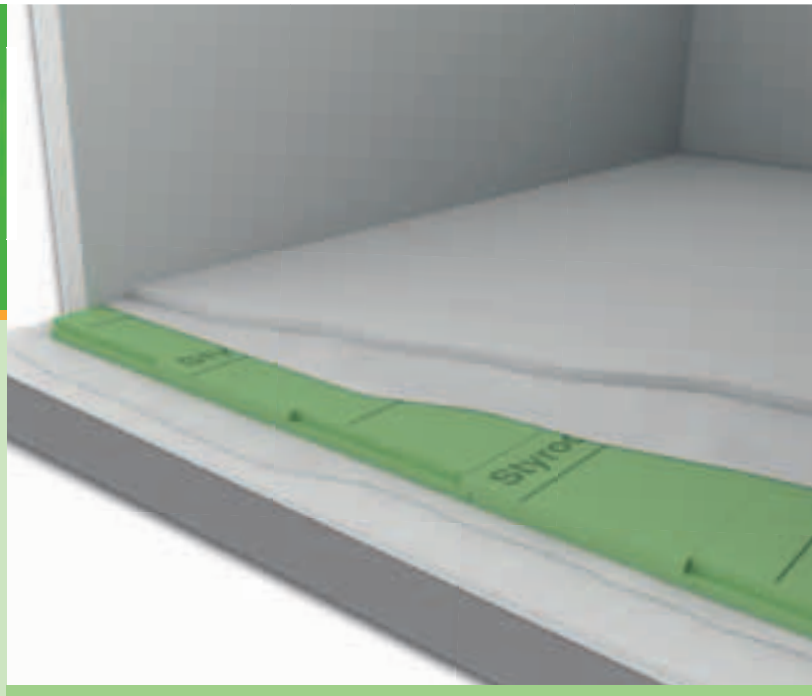
Advantages:

- Reduces energy losses
- Increases internal surface temperatures
- Prevents the formation of condensation and mold

Floor insulation

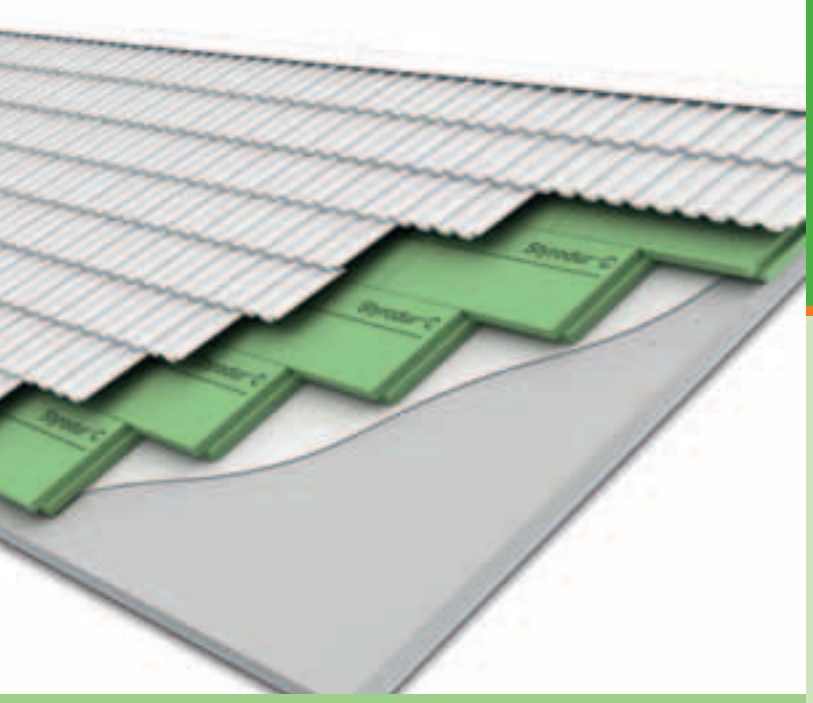
There are a number of requirements regarding insulating materials, floors, and ceilings. The compressive strength in many applications is a key factor in the choice of insulating material.

Because of its high compressive strength, Styrodur C is suitable for insulating virtually all floor constructions, including floors subjected to heavy loads in warehouses, production areas, and aircraft maintenance hangars, but at the same time it is so flexible that it can adjust to uneven surfaces under pressure and can absorb local peak loads.



Advantages:

- High load-bearing capacity
- Dimensional stability



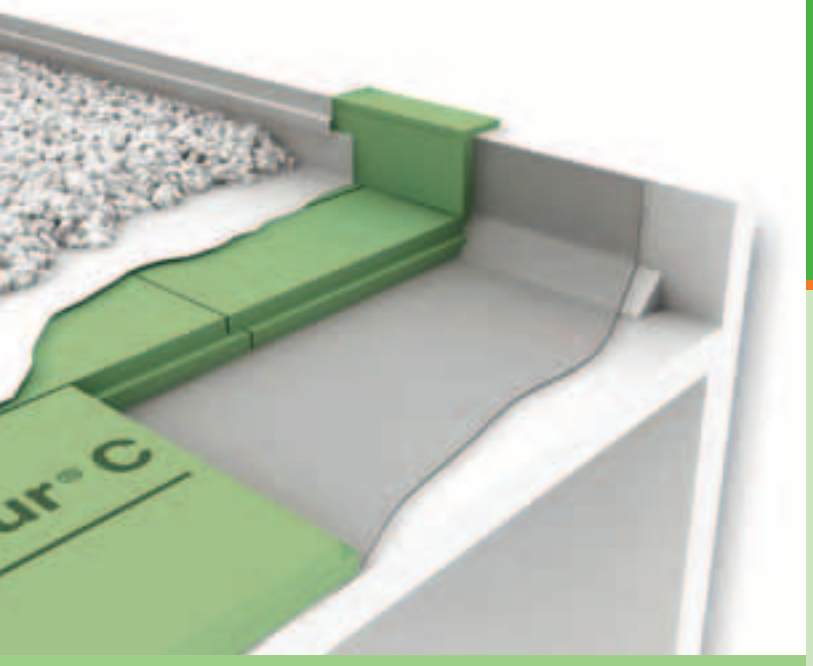
Pitched roof insulation

In times of rising property prices, roof space conversions under pitched roofs offer valuable and economic living space. It is important that living areas under the roof do not become unbearably hot in summer, while energy loss should be kept to a minimum in winter.

Over-rafter insulation with Styrodur® C offers optimum structural results because the layer of thermal insulation can be fitted in a virtually continuous layer over the roof construction. Over-rafter insulation can be used in new buildings and in renovated property if, for example, new roof cladding is needed.

Advantages:

- No thermal bridges
- Even thickness of the insulation layer
- Can be used in new and existing buildings



Inverted roofs

As a result of solar radiation and low temperatures, flat roofs are exposed to extreme fluctuations in temperature, high thermal loads, and stress, placing very high demands on the seal and thermal insulation. In inverted roofs, the insulating layer is fitted over the seal. The construction is easier and quicker to manufacture than with a conventional single-shell roof because fewer layers have to be fitted and bonded, and the seal thereby becomes more durable.

Because of its high compressive strength and excellent material properties, Styrodur C is suitable for inverted roofs, duo or plus roofs, roof gardens and promenade roofs, and for parking decks.

Advantages:

- High compressive strength
- Durable, does not rot or decompose
- Suitable for foot traffic and heavy loads
- Dimensional at stablility
- Protects the seal

Ceiling insulation

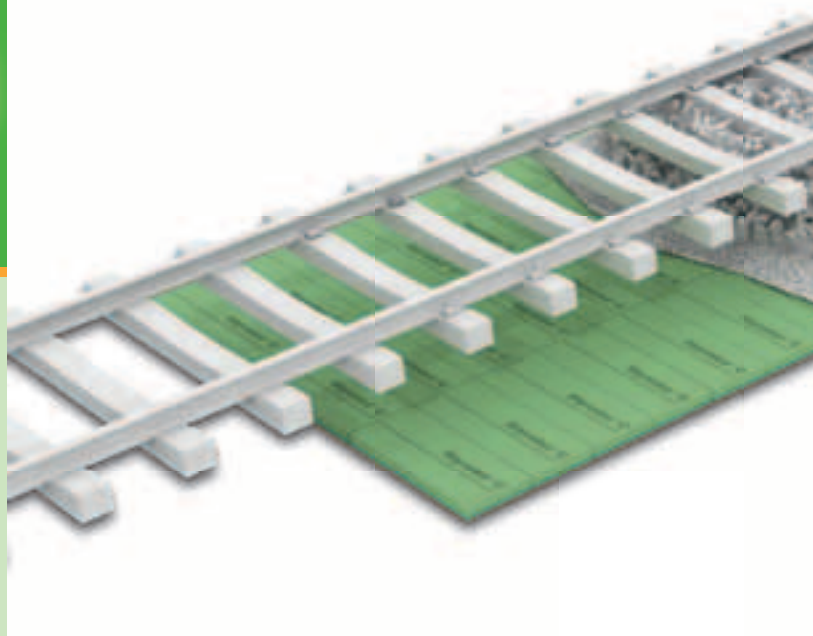
Insulating materials that are quick and easy to assemble and place very little stress on the support construction thanks to their low dead load are particularly attractive for insulating the underside of ceilings in sports halls, agricultural buildings, fruit, vegetable, and wine stores. Underside ceiling insulation is a simple and economic way to improve insulation in unheated basement areas and to avoid cold floors above the ceiling.

Styrodur® 3035 CN is used as a thermal insulation layer for insulating ceilings. The large tongue-and-groove boards can be fitted quickly and easily.

Advantages:

- Large tongue-and-groove system
- Low dead load
- Quick and easy to assemble
- Solid, clean, smooth surface
- Easy to clean with a water jet

Frost protection under roads and railways

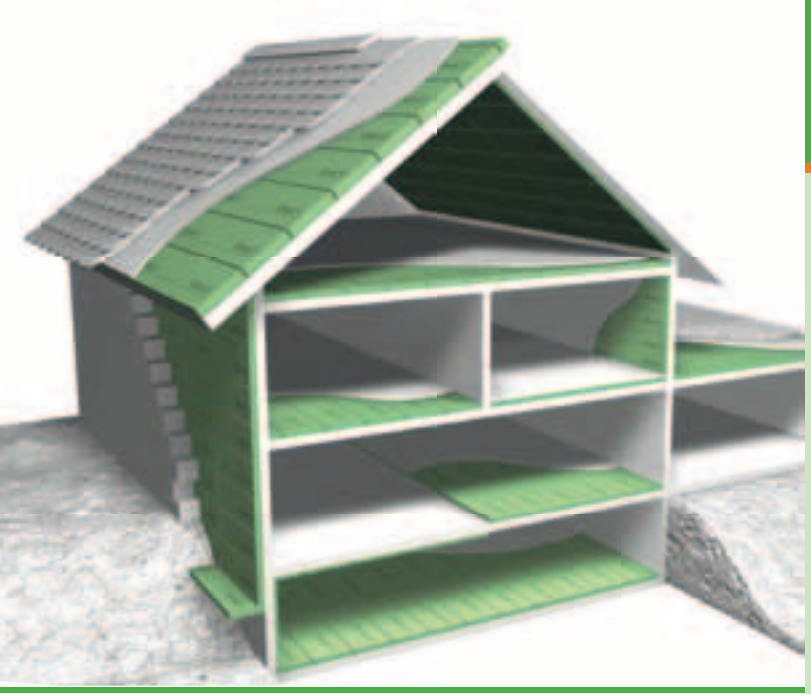


Insulation can be laid under roads and rail tracks to protect them from frost damage. Insulating materials used for this purpose must meet high requirements and be able to withstand vibration.

Styrodur C is a reliable solution as a frost protection layer because of its high compressive strength, low water absorption, good insulating performance, and resistance to rotting. Frost damage is avoided and maintenance costs for highways sustainably reduced.

Advantages:

- Moisture-resistant
- High compressive strength
- Aging- and rot-proof
- Dimensional stability



Reconstruction and refurbishment

Steadily rising energy costs are a major factor in refurbishment and modernization.

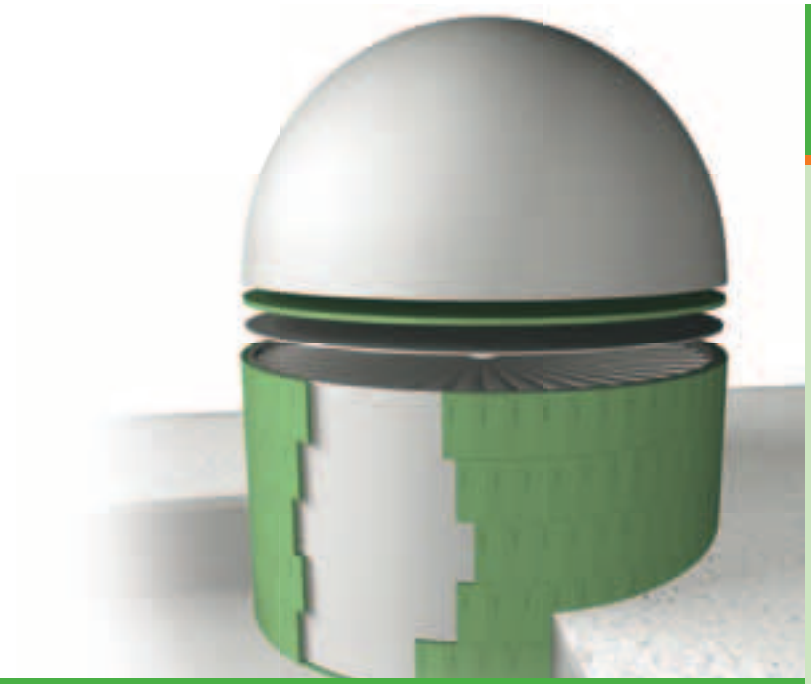
Before embarking on any refurbishment, it is important to check which planned measures should usefully be carried out in terms of energy savings.

Styrodur® C offers the ideal product mix for virtually all thermal insulation work.

Passive house

In a passive house, all the structural components of the building shell are so well insulated that heat losses in winter are virtually completely offset by the heat gains from the sun in combination with internal heat gains.

Thanks to its outstanding product properties, Styrodur C can meet the special requirements for passive houses.



Thermal insulation of biogas plants

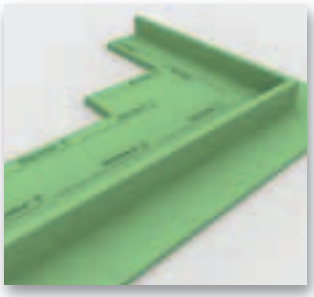
Animal feeding operations produce large quantities of slurry from which biogas can be produced, which in turn can be used to generate energy or heat. To keep the process at the optimum operating temperature for biogas yield, suitable thermal insulating materials are fitted to the walls, floors, and ceilings of the tanks.

Styrodur C meets the requirements for thermal insulation in biogas plants with an outstanding price-performance ratio and exhibits excellent resistance to the composition of the gas.

Building Systems Using Styrodur® C— Installation Systems

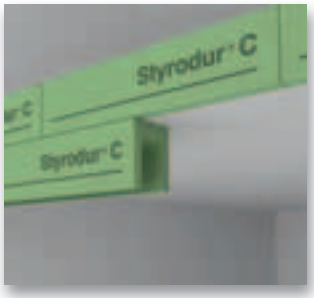
In addition to its use as insulating board, Styrodur® C's properties can be utilized in a number of other applications that come under the term "Installation Systems".

New solutions are being increasingly developed in which Styrodur C plays a vital role. If you are planning to develop new products and would like to use Styrodur C, please contact us at **styrodur@basf.com** for further information.

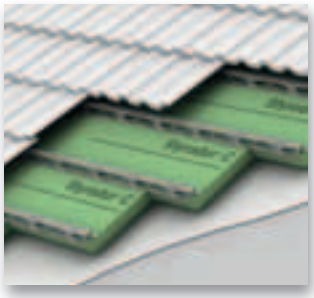


Floor slab systems offer the advantage that the floor slab of a building is completely and comprehensively encased in insulating material.

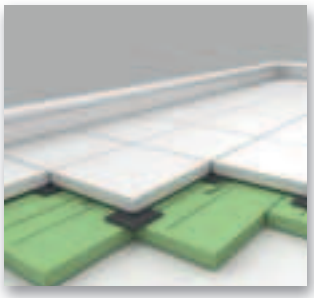
Formwork for ceiling edges is an ideal solution to avoid thermal bridges and energy losses.



Eased frames can be produced for plaster formwork and are an ideal solution to avoid energy losses.



Metal profile systems for pitched roofs are produced from Styrodur C with an integrated metal sub-construction to accommodate the roof decking and provide safe ventilation of the roof construction.



Parking deck systems enable roof areas to be converted into parking decks to reduce heat escaping from the heated area below.

Wet room units or shower tray installation sets make it easier to fit a permanently stable shower.

Tiles made of Styrodur C have a coating of special mortar on both sides for the rapid and professional modernization of baths.

Insulation of refrigerated vehicles (vans) with Styrodur C guarantees that frozen food can be kept at the correct temperature during transport and thus remains fresh.

For suppliers of installation systems using Styrodur C, go to: www.styrodur.com and click on "Installation Systems using Styrodur C."

Recommended Applications

Styrodur® C	2500 C	2800 C	3035 CS	3035 CN	4000 CS	5000 CS
Load-bearing floor slabs[1]			■		■	■
Domestic floors	■	■	■			
Load-bearing floors	■	■	■		■	■
Perimeter[1] floor slabs			■		■	■
Perimeter[1] basement walls			■		■	■
Perimeter[1]/subsoil water areas			■		■	■
Cavity walls	■		■	■		
Internal walls		■				
Lost formwork		■				
Cold bridges		■				
Exterior basement wall insulation		■				
Plaster base		■				
Inverted flat roofs			■		■	■
Duo roofs			■		■	■
Plus roofs			■		■	■
Parking decks					■[2]	■
Promenade roofs			■		■	■
Roof gardens			■		■	■
Conventional flat roofs	■		■		■	■
Parapet walls	■	■	■			
Pitched roofs	■	■		■		
Ceilings				■		
Plasterboard laminates		■				
Sandwich panels	■	■				
Warehouses	■		■	■	■	■
Roads and railways			■		■	■
Ice rinks			■		■	■

[1] Insulation in direct contact with the ground

[2] Not for installation under concrete paving stones

Styrodur® C: Product approval: DIBt Z-23, 15-1481, extruded polystyrene foam conforming to DIN EN 13164
Free of CFC, HCFC, and HFC

Technical Data

Property	Unit[1]	Code according to DIN EN 13164	2500 C	2800 C	3035 CS	3035 CN	4000 CS	5000 CS	Standard
Edge profile									
Surface			skin	embossed	skin	skin	skin	skin	
Length x width	mm		1250 x 600	1250 x 600	1265 x 615	2515 x 615[2]	1265 x 615	1265 x 615	
Density	kg/m³		28	30	33	30	35	45	DIN EN 1602
Thermal conductivity Thermal resistance	λ_D [W/(m·K)] R_D [m²·K/W]		λ_D / R_D	λ_D / R_D	λ_D / R_D	λ_D / R_D	λ_D / R_D	λ_D / R_D	DIN EN 13164
Thickness 20 mm		–	0.030 / 0.65	0.030 / 0.65	– / –	– / –	– / –	– / –	
30 mm		–	0.031 / 1.00	0.031 / 1.00	0.031 / 1.00	0.031 / 1.00	0.031 / 1.00	– / –	
40 mm		–	0.032 / 1.25	0.032 / 1.25	0.032 / 1.25	0.032 / 1.25	0.032 / 1.25	0.032 / 1.25	
50 mm		–	0.033 / 1.55	0.033 / 1.55	0.033 / 1.55	0.033 / 1.55	0.033 / 1.55	0.033 / 1.55	
60 mm		–	0.034 / 1.80	0.034 / 1.80	0.034 / 1.80	0.034 / 1.80	0.034 / 1.80	0.034 / 1.80	
80 mm		–	– / –	0.035 / 2.35	0.035 / 2.35	0.035 / 2.35	0.035 / 2.35	0.035 / 2.35	
100 mm		–	– / –	0.037 / 2.80	0.037 / 2.80	– / –	0.037 / 2.80	0.037 / 2.80	
120 mm		–	– / –	0.038 / 3.30	0.038 / 3.30	– / –	0.038 / 3.30	0.038 / 3.30	
140 mm		–	– / –	– / –	0.038 / 3.70	– / –	0.038 / 3.70	– / –	
160 mm		–	– / –	– / –	0.038 / 4.20	– / –	– / –	– / –	
180 mm		–	– / –	– / –	0.040 / 4.55	– / –	– / –	– / –	
Compressive stress or compressive strength at 10% deformation	(kPa)	CS(10\Y)	200	200	300	250	500	700	DIN EN826
Compressive creep over 50 years at < 2% deformation	(kPa)	CC(2/1,5/50)	80	80	130	100	180	250	DIN EN 1606
Rated value of the compressive stress under foundation slabs	(kPa) σ_{perm} / f_{cd}	–	– / –	– / –	130[3] / 185	– / –	180 / 255	250 / 355	DIBT Z-23.34-1325
Adhesive strength on concrete	kPa	TR 200	–	> 200	–	–	–	–	DIN EN 1607
Compressive modulus of elasticity	(kPa) Short term E / Long term E50	CM	10,000 / –	15,000 / –	20,000 / 5,000	15,000 / –	30,000 / 10,000	40,000 / 14,000	DIN EN 826
Dimensional stability 70 °C; 90% r.h.	%	DS(TH)	≤ 5%	≤ 5%	≤ 5%	≤ 5%	≤ 5%	≤ 5%	DIN EN 1604
Deformation behaviour: load 40 kPa; 70 °C	%	DLT(2)5	≤ 5%	≤ 5%	≤ 5%	≤ 5%	≤ 5%	≤ 5%	DIN EN 1605
Linear coefficient of thermal expansion Longitudinal Transverse	mm/(m·K)	– –	0.08 0.06	0.08 0.06	0.08 0.06	0.08 0.06	0.08 0.06	0.08 0.06	DIN 53752
Reaction to fire[4]	Class	–	E	E	E	E	E	E	DIN EN 13501-1
Long term water absorption by immersion	% v/v	WL(T)0.7	0.2	0.3	0.2	0.2	0.2	0.2	DIN EN 12087
Long term water absorption by diffusion[2]	% v/v	WD(V)3	≤ 3	≤ 5	≤ 3	≤ 3	≤ 3	≤ 3	DIN EN 12088
Water vapour transmission[2]		MU	200 – 100	200 – 80	150 – 50	150 – 100	150 – 80	150 – 100	DIN EN 12086
Freeze-thaw-resistance	% v/v	FT2	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	DIN EN 12091
Maximum service temperature	°C	–	75	75	75	75	75	75	DIN EN 14706

[1] N/mm² = 1 MPa = 1,000 kPa [2] Thickness 30 mm and 40 mm: 2510 x 610 mm [3] For multilayer laying: 100 kPa [4] Building material class DIN 4102-B1

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 their 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 be changed without prior notice 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)

KTFS 0901 BE - ENGLISH VERSION - July 2010

Further Information on Styrodur® C

- **Product Brochure: Europe's Green Insulation**

- **Applications**
  - Basement Insulation
  - Load-bearing Applications and Floor Insulation
  - Wall Insulation
  - Roof Insulation
  - Ceiling Insulation

- **Special Themes**
  - Reconstruction and Refurbishment
  - Thermal Insulation of Biogas Plants
  - Styrodur® 2500 CNS—Insulation for Underfloor Heating Systems

- **Technical Data**
  - Recommended Applications and Technical Data
  - Technical Data and Assistance Data for Dimensioning

- **Chemical Resistance**

- **Styrodur C Film: Europe's Green Insulation**

- **Website: www.styrodur.com**

BASF SE

Performance Polymers Europe
67056 Ludwigshafen
Germany

www.styrodur.com

If you have any questions on Styrodur® C, log on to: styrodur@basf.com