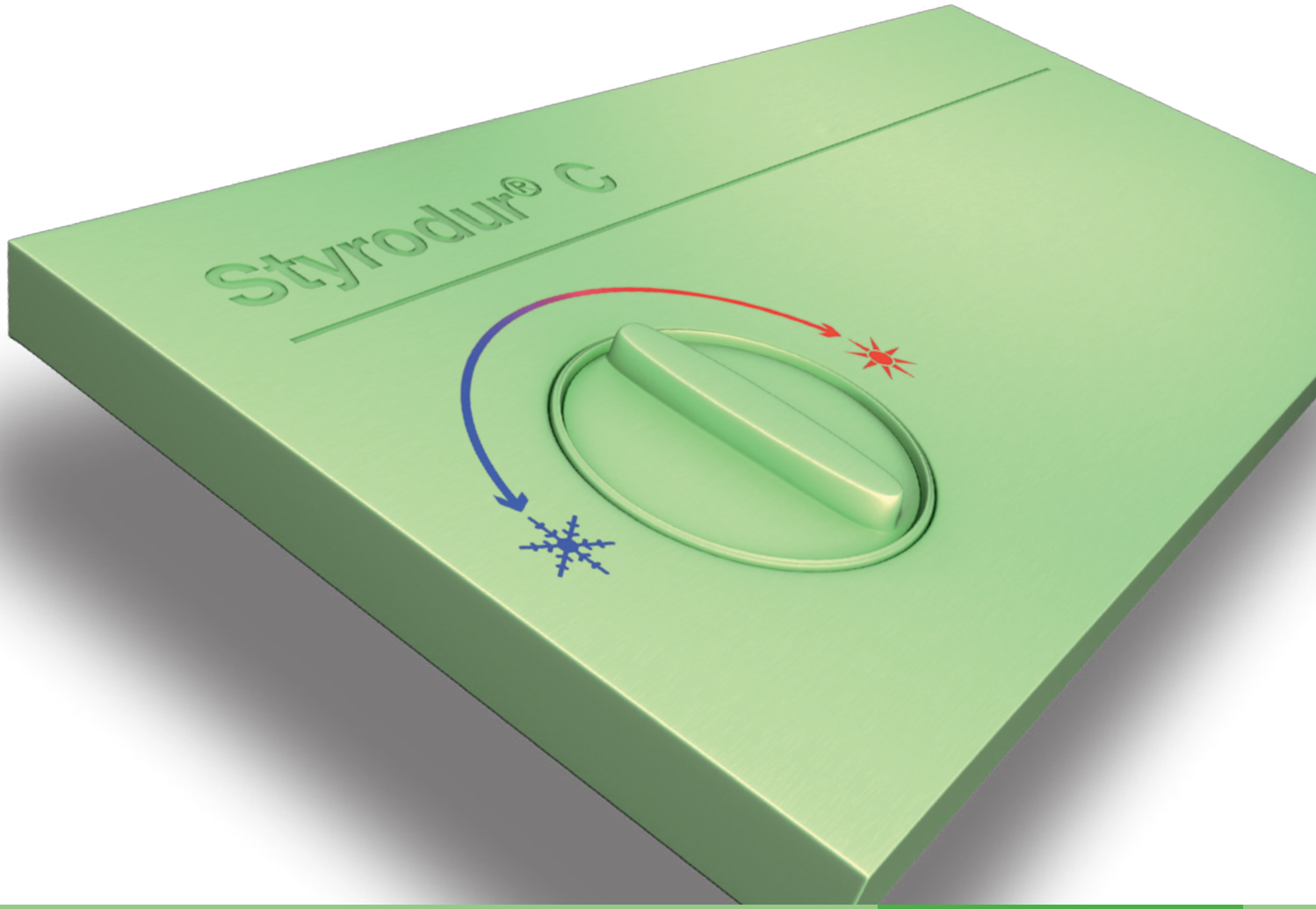
Styrodur® C
Europe's green insulation

Technical Data

Recommended Applications
Assistance Data for Dimensioning



BASF
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1. Recommended Applications Styrodur® C

Styrodur® C	2500 C	2800 C	3035 CS	3035 CN	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 base		■				
Inverted flat roofs			■		■	■
Duo roofs / Plus roofs			■		■	■
Promenade roofs			■		■	■
Roof gardens			■		■	■
Parking decks					■ [2]	■
Conventional flat roofs [3]	■		■		■	■
Parapet walls	■	■	■			
Basement ceiling / Underground garage ceiling		■				
Attic ceiling			■			
Pitched roofs	■	■		■		
Drywall composite board		■				
Sandwich panels	■	■				
Warehouses	■		■	■	■	■
Ice rinks			■		■	■
Road transport infrastructure / Rail construction			■		■	■

Styrodur® C: Product approval: DIBt Z-23.15-1481,
extruded polystyrene foam in accordance with EN 13164;
Free of HFC

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

2. Technical Data Styrodur® C

Property	Unit	Code according to 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 [1]	1265 x 615	1265 x 615	
Compressive stress or compressive strength at 10% deformation [2]	kPa	CS(10\Y)	200	200 (20-60 mm) 300 (80-200 mm)	300	250	500	700	EN 826
Compressive creep over 50 years at < 2% deformation [2]	kPa	CC(2/1.5/50)	–	80 (20-60 mm) 100 (80-200 mm)	130	100	180	250	EN 1606
Rated value of the compressive stress under foundation slabs [2]	kPa		–	–	185	–	255	355	DIBT Z-23.34-1325
Adhesive strength on concrete	kPa	TR 200	–	200	–	–	–	–	EN 1607
Compressive modulus of elasticity kPa	Short-term E	CM	10,000	15,000	20,000	15,000	30,000	40,000	EN 826
	Long-term E50		–	–	6,500	–	10,000	14,000	
Dimensional stability: 70 °C; 90 % r. H.	%	DS(70,90)	≤ 5%	≤ 5%	≤ 5%	≤ 5%	≤ 5%	≤ 5%	EN 1604
Deformation behavior: load 40 kPa; 70°C	%	DLT(2)5	≤ 5%	≤ 5%	≤ 5%	≤ 5%	≤ 5%	≤ 5%	EN 1605
Linear coeffi cient 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	Building material class	–	B1	B1	B1	B1	B1	B1	DIN 4102
	Euroclass	–	E	E	E	E	E	E	EN 13501-1
Long-term water absorption by immersion	% v/v	WL(T)	0.7	–	0.7	0.7	0.7	0.7	EN 12087
Long-term water absorption by diffusion	% v/v	WD(V)	5	–	3	3	3	3	EN 12088
Water-vapor transmission (thickness-dependent)	μ	MU	200 – 100	200 – 80	150 – 50	150 – 100	150 – 80	150 – 100	EN 12086
Freeze-thaw resistance	% v/v	FTCD	–	–	1	1	1	1	EN 12091
Maximum service temperature	°C	–	75	75	75	75	75	75	EN 14706

[1] Thickness 30 and 40 mm: 2510 x 610 mm

[2] 100 kPa = 10 N/cm² = 100 kN/m² = 10 to/m²

3. Thermal Conductivities Styrodur® C

3.1 Declared Thermal Conductivities

Thermal conductivity W/(m·K) and Thermal resistance (m²·K)/W Styrodur® C April 2013

Property	Unit	Rated values of thermal conductivity to DIN 4108	2500 C		2800 C		3035 CS		3035 CN		4000 CS		5000 CS	
Thermal conductivity		λ	λ_D		λ_D		λ_D		λ_D		λ_D		λ_D	
Thermal resistance				R_D		R_D		R_D		R_D		R_D		R_D
Thickness	20 mm	0.031	0.030	0.65	0.030	0.65	–	–	–	–	–	–	–	–
	30 mm	0.032	0.031	0.95	0.031	0.95	0.031	0.95	0.031	0.95	0.031	0.95	–	–
	40 mm	0.033	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	0.034	0.033	1.50	0.033	1.50	0.033	1.50	0.033	1.50	0.033	1.50	0.033	1.50
	60 mm	0.035	0.034	1.75	0.034	1.75	0.034	1.75	0.034	1.75	0.034	1.75	0.034	1.75
	80 mm	0.036	–	–	0.035	2.30	0.035	2.30	0.035	2.30	0.035	2.30	0.035	2.30
	100 mm	0.038	–	–	0.037	2.70	0.037	2.70	–	–	0.037	2.70	0.037	2.70
	120 mm	0.039	–	–	0.038	3.20	0.038	3.20	–	–	0.038	3.20	0.038	3.20
	140 mm	0.039	–	–	0.038	3.70	0.038	3.70	–	–	0.038	3.70	–	–
	160 mm	0.039	–	–	0.038	4.20	0.038	4.20	–	–	–	–	–	–
	180 mm	0.039	–	–	0.038	4.70	0.038	4.70	–	–	–	–	–	–
	200 mm	0.039	–	–	0.038	5.25	0.038	5.25	–	–	–	–	–	–

3.2 Approved Applications

Rated values of thermal conductivity in W/(m·K) as per DIBt approval (German Institute for Building Technology) March 2012

Approved Styrodur® types: 3035 CS, 4000 CS, and 5000 CS

Board thickness in mm	Thermal insulation under foundation slab load-bearing DIBt Z-23.34-1325		Perimeter insulation of walls with ground contact and basement floors (non-load-bearing building elements) DIBt Z-23.5-223				Inverted roof constructions DIBt Z-23.4-222			
	Ground moisture	Pressing water	Wall area	under basement floors	Installation in pressing water and accumulating seepage water		Green roof	Frequented	With gravel layer and water-draining separation layer	
			Multi-layer [1]		Single-layer [2]	Multi-layer [2]			Single-layer	Double-layer
≤ 60	0.035	0.037	0.040	0.035	0.037	0.040	0.037	0.037	0.035	–
≤ 80	0.037	0.039	0.042	0.037	0.039	0.042	0.039	0.039	0.037	–
≤ 120	0.039	0.041	0.044	0.039	0.041	0.044	0.040	0.040	0.039	0.042
≤ 160	0.039	0.041	0.044	0.039	0.041	0.044	0.040	0.040	0.039	0.042
≤ 200	0.041	0.043	0.046	0.041	0.043	0.046	0.042	0.042	0.041	0.044

[1] Application for ground moisture and nonaccumulating seepage water in accordance DIBt Z-23.5-223 Table 5 and Section 4.1 and 4.2
[2] Application in accordance with DIBt Z-23.5-223 Table 5 and Section 4.1 and 4.3

λ_D = Declared Thermal conductivity to EN 13164

R_D = Declared Wärmedurchlasswiderstand to EN 13164

3.3 Temperature Dependence

Thermal conductivity of Styrodur® C (reference values)

Example: Styrodur® 3035 CS, thickness 60 mm

Temperature [°C]	Thermal conductivity in W/(m·K) Styrodur® C
-80	0.026
-60	0.029
-40	0.030
-20	0.032
0	0.034
10	0.035
20	0.036
30	0.037
40	0.038
50	0.039

3.4. Moisture Dependence

Thermal conductivity of Styrodur® C (reference values)

Between 0–12% by volume of moisture content, thermal conductivity increases 2.3% per 1% by volume

Moisture content [Vol.-%]	Thermal conductivity in W(m·K) Styrodur® C
0	0.035
1	0.036
2	0.036
3	0.037
4	0.037
5	0.038
6	0.039
8	0.040
10	0.041
12	0.042

4. Mechanical Characteristic Values Styrodur® C

4.1 Dynamic Stiffness

Dynamic stiffness of Styrodur® grades 3035 CS, 4000 CS and 5000 CS

Board thickness	mm	30	40	60	80	100	120	140	160	180	200
Styrodur 3035 CS	MN/m³	500	380	260	190	150	130	100	80	60	50
Styrodur 4000 CS	MN/m³	550	400	280	210	170	150	120	100	80	70
Styrodur 5000 CS	MN/m³	600	420	300	230	190	170	140	120	100	90

5. Assistance Data for Dimensioning Styrodur® C

5.1 Floor Slabs

Assistance data for dimensioning of Styrodur® C applications under floor slabs

Type	Long-term bedding modulus in N/mm³ for board thicknesses in mm														
	40	50	60	80	100	120	140	160	180	200	220	240	260	280	300
3035 CS	0.163	0.130	0.108	0.081	0.065	0.054	0.046	0.041	0.036	0.033	0.030	0.027	0.025	0.023	0.022
4000 CS	0.250	0.200	0.167	0.125	0.100	0.083	0.071	0.063	0.056	0.050	0.045	0.042	0.038	0.036	0.033
5000 CS	0.350	0.280	0.233	0.175	0.140	0.117	0.100	0.088	0.078	0.070	0.064	0.058	0.054	0.050	0.047

Modules of subgrade reaction = modulus of long-term compressive elasticity / thickness of insulating layer

5.2 Traffic Load

Traffic load

Vehicle [1]				Compressive stress at traffic load in kPa							
				Nonreinforced layered construction [2] thickness of layer above insulation in mm				Reinforced concrete static height in mm			
Type	Weight	Wheel load	Contact area	180	200	220	240	90	100	110	120
	in meric tons	in kN	in mm x mm								
Heavy truck	30	50	200 x 400	200	180	170	140	230	200	190	180
Truck	16	50	200 x 400	200	180	170	140	230	200	190	180
Truck	12	40	200 x 300	190	170	160	150	220	200	180	170
Truck	9	30	200 x 260	160	140	130	120	180	160	150	140
Truck	6	20	200 x 200	120	110	100	90	140	130	100	100
Truck	3	10	200 x 160	60	50	50	40	70	60	60	50
Truck	< 3	10	200 x 200	60	50	50	40	60	60	60	50
Forklift	7	32,5	200 x 200	200	170	160	140	220	200	180	170
Forklift	3,5	15	200 x 200	90	80	70	60	100	90	80	80
Forklift	2,5	10	200 x 200	60	50	50	40	70	60	60	50

[1] Heavy truck, truck, and car according to DIN 1072; forklift according to DIN 1055.

[2] **Important note:** For reasons of long-term positional stability, the deformation under compressive stress caused by traffic loads must not exceed 0.7 mm *); this is why Styrodur® 5000 CS must always be used with concrete paving stones in parking roof structures, even under compressive stress values that would allow the use of Styrodur 3035 CS or Styrodur 4000 CS.

*) According to the information sheet on surface reinforcement with pavement and slabstone paving issued by the German Road and Transportation Research Association, Cologne/Germany, 1994.

Styrodur® C grade	Dimensioning of Styrodur® C grade				
	2500 C	2800 C	3035 CS	4000 CS	5000 CS
Allowable long-term compressive traffic load in kPa	80	80	130	230	300

5.3 Allowable Mounting Depth

Assistance data for dimensioning of Styrodur® C applications in basements Allowable mounting depth

Calculations for soil pressure with silt sand

Application	Mounting depth in m for Styrodur® C grades		
	3035 CS	4000 CS	5000 CS
Without ground water pressure DIN 4108-10	12	17	24
With ground water pressure	3.5	3.5	3.5

Note for other materials:

EPS:
- Maximum mounting depth: 3 or 6
- Minimum distance of traffic loads: 3 m
- Not allowable in case of water pressure
- ΔU of 0.05 W/(m²·K) must be added to take into account water absorption

Cellular glass:
- Maximum mounting depth with water pressure: 12 m

6. Adhesiveness and Bond Strength Styrodur® C

6.1 Which Glue Is Suited for Which Surface Material?

	Mineral surface	Mortar	Metal	Wood	Plastics
Gluing mortar	■	■			
Epoxy resin glue			■	■	■
PUR glue			■	■	■

Important note:
The dimensioning aids are noncommittal planning aids.
They do not replace the technical and structural design of an engineering specialist.

Notes

All technical information can be found online:
www.styrodur.com

Please contact us at styrodur@basf.com in case you have any technical questions concerning our products and applications.

Styrodur® C—A Strong Product Line

With the Styrodur® C product line, BASF offers the ideal insulation solution for almost every application.

Styrodur 2500 C

- The light thermal insulation board with smooth surface and smooth edges for applications with normal compressive strength requirements.

Styrodur 2800 C

- The thermal insulation board with embossed honeycomb pattern and smooth edges for application in combination with concrete, plaster, and other covering layers.

Styrodur 3035 CS

- The all-round thermal insulation board with smooth surface and overlap is suitable for almost all applications in structural and civil engineering.

Styrodur 3035 CN

- The long thermal insulation board with smooth surface and groove and tongue for quick, thermal bridge-free installation.

Styrodur 4000/5000 CS

- The extremely compression-proof thermal insulation board with smooth surface and overlap for applications with highest compressive strength requirement

Styrodur NEO

- The silver-gray thermal insulation board with an up to 20% better insulating performance thanks to the use of graphite as an infrared absorber, as patented by BASF.
  Further information: www.styrodur.com

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