

# Technical Data

Application Recommendations  
Dimensioning Aids





# Application Recommendations Styrodur®

## 1. Application Recommendations Styrodur®

	Application type according to DIN 4108-10 or technical approval	Product properties according to DIN EN 13164 and DIN 4108-10					
		General	New				
			2800 C	3000 CS	3035 CS	4000 CS	5000 CS
			CS(10\Y)	CS(10\Y)	CS(10\Y)	CS(10\Y)	CS(10\Y)
		200 (20–60 mm)	300	300	500	700	
		300 (80–200 mm)					
Perimeter <sup>1)</sup> floor	DIBt Z-23.5-223, PB	wd		dh	dh	ds	dx
Perimeter <sup>1)</sup> wall	DIBt Z-23.5-223, PW	wd		dh	dh	ds	dx
Perimeter <sup>1)</sup> foundation slab	DIBt Z-23.34-1325	wd			dh	ds	dx
Perimeter <sup>1)</sup> groundwater	DIBt Z-23.5-223	wd			dh	ds	dx
Living area floor	DEO		dm	dh *	dh		
Industrial and refrigerated warehouse floor	DEO		dm	dh *	dh	ds *	dx *
Cavity insulation	WZ	tf		dh *	dh		
Interior insulation	WI	tf	dm				
Permanent formwork	WAP	tf	dm				
Thermal bridges	WAP	tf	dm				
Base insulation	WAP	wf	dm				
Plaster base	WAP	wf	dm				
Inverted roof	DUK	wd		dh	dh	ds	dx
Duo/plus roof	DUK	wd		dh	dh	ds	dx
Patio roof	DUK	wd		dh	dh	ds	dx
Green roof	DIBt Z-23.4-222	wd			dh	ds	dx
Parking roof	DIBt Z-23.4-222	wd				ds <sup>2)</sup>	dx
Conventional flat roof <sup>3)</sup>	DAA	wf		dh *	dh	ds *	dx *
Parapets/rising building elements	DAA	wf	dm	dh *	dh		
Basement ceiling/ underground garage ceiling	DI	tf	dm	dh *			
Attic ceiling	DEO	tf		dh *	dh		
Pitched roof	DAD	wf	dm	dh *			
Drywall composite board	WI	tf	dm				
Sandwich core	–	tf	dm				
Artificial ice rink	–	wd		dh *	dh	ds *	dx *
Road transport infrastructure/ rail construction	–	wd		dh *	dh	ds *	dx *

Styrodur®: product approval: DIBt Z-23.15-1481, extruded polystyrene foam according to DIN EN 13164

<sup>1)</sup> Insulation with ground contact

<sup>2)</sup> Not under composite stone pavement

<sup>3)</sup> With protective layer over sealing barrier

dm = 200 kPa, dh = 300 kPa, ds = 500 kPa, dx = 700 kPa





\* including boards produced in multi layer





# Technical Data Styrodur®

## 2. Technical Data Styrodur®

Property	Unit	Designation code according to DIN EN 13164	2800 C	New 3000 CS	3035 CS	4000 CS	5000 CS	Standard
Edge profile								
Surface			textured	smooth	smooth	smooth	smooth	
Length x breadth	mm		1,250 x 600	1,265 x 615	1,265 x 615	1,265 x 615	1,265 x 615	
Compressive strength or compressive stress at 10% deformation <sup>1)</sup>	kPa	CS(10Y)	200 (20–60 mm) 300 (80–200 mm)	300	300	500	700	DIN EN 826
Permissible compressive stress over 50 years at < 2% deformation <sup>1)</sup>	kPa	CC(2/1.5/50)	–	110	130	180	250	DIN EN 1606
Rated value of compressive stress under foundation slabs <sup>1)</sup>	kPa							
40–120 mm (single-layer)		–	–	–	185	255	355	DIBT Z-23.34-1325
140–200 mm (single-layer)		–	–	–	140	255	–	
40–120 mm (multi-layer)		–	–	–	185	255	355	
Adhesive strength on concrete	kPa	TR 200	200	–	–	–	–	DIN EN 1607
Modulus of elasticity E <sub>50</sub>	kPa							
40–120 mm (single-layer)		–	–	–	6,500	10,000	14,000	DIBT Z-23.34.1325
140–200 mm (single-layer)		–	–	–	5,000	10,000	–	
40–120 mm (multi-layer)		–	–	–	6,500	10,000	14,000	
Dimensional stability: 70°C; 90% R H	%	DS(70,90)	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	DIN EN 1604
Deformation behaviour: load 40 kPa; 70°C	%	DLT(2)5	≤ 5	≤ 5	≤ 5	≤ 5	≤ 5	DIN EN 1605
Linear coefficient of thermal expansion								
Longitudinal		–	0.08	0.08	0.08	0.08	0.08	DIN 53752
Transverse	mm/(m·K)	–	0.06	0.06	0.06	0.06	0.06	
Fire behaviour	Building material class <sup>2)</sup>	–	B1	–	B1	B1	B1	DIN 4102
	Euroclass	–	E	E	E	E	E	DIN EN 13501-1
Water absorption with long-term immersion	% by vol.	WL(T)	–	0.7	0.7	0.7	0.7	DIN EN 12087
Water absorption in diffusion test	% by vol.	WD(V)	–	3	3	3	3	DIN EN 12088
Resistance coefficient of water vapour diffusion		MU	200–80	150–50	150–50	150–80	150–100	DIN EN 12086
Water absorption after freeze-thaw cycle	% by vol.	FTCD	–	1	1	1	1	DIN EN 12091
Application temperature limit	°C	–	75	75	75	75	75	DIN EN 14706

<sup>1)</sup> 100 kPa = 10 N/cm<sup>2</sup> = 100 kN/m<sup>2</sup> = 10 to/m<sup>2</sup>

<sup>2)</sup> Up to 120 mm



# Thermal Conductivities STYRODUR®

## 3. Thermal Conductivities Styrodur®

### 3.1 Applications According to DIN 4108

Thermal conductivity  $W/(m \cdot K)$  and thermal resistance  $(m^2 \cdot K)/W$  of Styrodur®

April 2016

		2800 C			3000 CS			3035 CS			4000 CS			5000 CS		
Thermal conductivity		$\lambda_D$			$\lambda_D$			$\lambda_D$			$\lambda_D$			$\lambda_D$		
Thermal resistance		$R_D$			$R_D$			$R_D$			$R_D$			$R_D$		
Rated value according to DIN 4108		$\lambda_B$			$\lambda_B$			$\lambda_B$			$\lambda_B$			$\lambda_B$		
Thickness																
20 mm		0.033	0.60	0.034	–	–	–	–	–	–	–	–	–	–	–	–
30 mm		0.033	0.90	0.034	0.033	0.90	0.034	–	–	–	–	–	–	–	–	–
40 mm		0.033	1.20	0.034	0.033	1.20	0.034	–	–	–	–	–	–	–	–	–
50 mm		0.034	1.45	0.035	0.033	1.50	0.034	0.034	1.45	0.035	–	–	–	–	–	–
60 mm		0.034	1.75	0.035	0.033	1.80	0.034	0.034	1.75	0.035	0.035	1.70	0.036	0.035	1.70	0.036
80 mm		0.035	2.30	0.036	0.033	2.40	0.034	0.035	2.30	0.036	0.035	2.30	0.036	0.035	2.30	0.036
100 mm		0.035	2.85	0.036	0.033	3.00	0.034	0.035	2.85	0.036	0.035	2.85	0.036	0.035	2.85	0.036
120 mm		0.036	3.30	0.037	0.033	3.60	0.034	0.036	3.30	0.037	0.035	3.40	0.036	0.035	3.40	0.036
140 mm		0.038	3.70	0.039	0.033	4.20	0.034	0.038	3.70	0.039	0.035	4.00	0.036	–	–	–
160 mm		0.038	4.20	0.039	0.033	4.80	0.034	0.038	4.20	0.039	0.035	4.55	0.036	0.035	4.55	0.036
180 mm		–	–	–	0.033	5.45	0.034	–	–	–	–	–	–	–	–	–
200 mm		–	–	–	0.033	6.05	0.034	0.038	5.25	0.039	0.035	5.70	0.036	0.035	5.70	0.036
240 mm		–	–	–	0.033	7.25	0.034	–	–	–	0.035	6.85	0.036	0.035	6.85	0.036

$\lambda_D$  = declared thermal conductivity according to DIN EN 13164

$R_D$  = declared thermal resistance according to DIN EN 13164

$\lambda_B$  = rated value of thermal conductivity according to DIBt approval in line with DIN 4108

### 3.2 Technically Approved Applications

Rated values of thermal conductivity in  $W/(m \cdot K)$  as per DIBt approval

April 2016

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

Thick-ness in mm	Thermal insulation under load-bearing foundation slabs 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			
	Soil moisture	Pressing water	Wall area	Under basement floors	Installation in pressing water and standing seepage water		Green roof	Fre-quented	With gravel base and water-draining separation layer	
					multi-layer <sup>1)</sup>	single-layer <sup>2)</sup>			multi-layer <sup>2)</sup>	single-layer
40 + 50	0.034	0.036	0.039	0.034	0.036	0.039	0.036	0.036	0.034	–
60	0.035	0.037	0.040	0.035	0.038	0.040	0.037	0.037	0.035	–
80	0.036	0.038	0.041	0.036	0.039	0.041	0.038	0.038	0.036	–
100	0.038	0.040	0.043	0.038	0.041	0.043	0.040	0.040	0.038	0.041
120–200	0.039	0.041	0.044	0.039	0.042	0.044	0.041	0.041	0.039	0.042

<sup>1)</sup> Application in soil moisture and non-standing seepage water in accordance with DIBt Z-23.5-223 Table 5 and Sections 4.1 and 4.2

<sup>2)</sup> Application in accordance with DIBt Z-23.5-223 Table 5 and Sections 4.1 and 4.3



# Thermal Conductivities and Mechanical Parameters STYRODUR®

## 3.3 Temperature Dependency

**Thermal conductivity (standard values) of Styrodur®**  
Example Styrodur® 3035 CS, board thickness 60 mm

Temperature in °C	Thermal conductivity of Styrodur® in W/(m·K)
-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 Content Dependency

**Thermal conductivity (standard values) of Styrodur®**  
% per vol. rise in moisture content increases the thermal conductivity of Styrodur® in the range of 0–12% per vol. for each 2.3%

Moisture content in % per vol.	Thermal conductivity of Styrodur® in W/(m·K)
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 Parameters (Mean Values, Standard Values) Styrodur®

### 4.1 Dynamic Stiffness

**Dynamic stiffness of Styrodur® 3000 CS, 3035 CS, 4000 CS, and 5000 CS**

Board thickness	mm	30	40	60	80	100	120	140	160	180	200
Styrodur® 3000 CS	MN/m³	500	380	260	190	150	130	100	80	60	50
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



# Dimensioning Aids STYRODUR®

## 5. Dimensioning Aids Styrodur®

### 5.1 Load-bearing Floor Slabs

Dimensioning aids for Styrodur® applications under load-bearing floor slabs

Type	Long-term modulus of subgrade reaction in N/mm <sup>3</sup> (for insulation layer thickness in mm)														
	40	50	60	80	100	120	140	160	180	200	220	240	260	280	300
3000 CS <sup>1)</sup> single-layer 40–120 mm	0.163	0.130	0.108	0.081	0.065	0.054	–	–	–	–	–	–	–	–	–
3035 CS <sup>1)</sup> single-layer 40–120 mm	0.163	0.130	0.108	0.081	0.065	0.054	–	–	–	–	–	–	–	–	–
3035 CS <sup>1)</sup> single-layer 140–200 mm	–	–	–	–	–	–	0.036	0.031	0.028	0.025	–	–	–	–	–
3035 CS multi-layer < 300 mm	–	–	–	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 single-layer/multi-layer	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 single-layer/multi-layer	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

Modulus of subgrade reaction = modulus of long-term compressive elasticity/thickness of insulation layer <sup>1)</sup>Thickness of individual board

### 5.2 Vehicle Traffic

Vehicle Traffic

Vehicle <sup>1)</sup>				Available compressive stress with traffic load in kPa							
				Non-reinforced layer structure <sup>2)</sup> Layer thickness above insulation board in mm				Reinforced concrete Static height in mm			
Type	Weight in tonnes	Wheel load in kN	Contact surface in mm x mm	180	200	220	240	90	100	110	120
HGV	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
Car	< 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

<sup>1)</sup> Heavy-goods vehicle (HGV), truck, and car according to DIN 1072; forklift according to DIN 1055

<sup>2)</sup> **Important note:** for reasons of long-term positional stability, the deformation under compressive stress due to traffic loads may not exceed 0.7 mm. \* Therefore, in case of composite stone pavements with compressive stresses, for which the use of Styrodur® types 3035 CS and 4000 CS is permitted, Styrodur® 5000 CS should always be used in parking roof constructions.

\* According to the "Instructions for Securing Surfaces with Plaster and Board Coverings" issued by the Research Association for Roads and Traffic (FGSV), Cologne/Germany, 1994

Type	Dimensioning of Styrodur® type			
	3000 CS	3035 CS	4000 CS	5000 CS
Permissible compressive strength with traffic load in kPa	110	130	230	300



# Dimensioning Aids and Adhesive Bond STYRODUR®

## 5.3 Permissible Installation Depths

Dimensioning aids for Styrodur® applications in perimeter insulation

### Permissible installation depths

For worst-case load scenario: earth pressure with silty sand

Application area	Installation depth for Styrodur® types in m			
	3000 CS	3035 CS	4000 CS	5000 CS
Without pressing water DIN 4108-10	10	12	17	24
Long-term or permanent pressing water (groundwater)	–	3.5	7.0	7.0

### Remarks:

#### EPS:

- Installation depth limited to 3 or 6 m
- Minimum distance from stationary or moving loads 3 m
- Not approved in areas with permanent or long-term pressing water
- $\Delta U$  of 0.05 W/(m<sup>2</sup>·K) to take into account increased moisture absorption

## 6. Adhesive Bond Styrodur®

### 6.1 Which Adhesive for Which Substrate?

	Mineral substrate	Plaster base	Metal	Wood	Plastic
Adhesive mortar	■	■	■		■
Epoxy resin adhesive			■	■	■
PUR adhesive			■	■	■

**Important note:** The dimensioning aids are non-binding planning tools. They are not a substitute for the construction and structural planning of the specialist engineer.



### Remarks:

Up-to-date technical information is available on our homepage: [www.styrodur.com](http://www.styrodur.com)

For any technical queries relating to our products or applications, contact us at the following e-mail address: [styrodur@basf.com](mailto:styrodur@basf.com)

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

### Styrodur® 2800 C

- The thermal insulation board with an embossed honeycomb pattern on both sides and smooth edges for applications in combination with concrete, plaster, and other covering layers.

### Styrodur® 3000 CS

The innovative multipurpose thermal insulation board:

- With smooth surface and shiplap
- For almost all applications in structural and civil engineering
- With uniform thermal conductivity across all board thicknesses

### Styrodur® 3035 CS

- The multipurpose thermal insulation board with smooth surfaces and shiplap that is suitable for almost all applications in structural and civil engineering.

### Styrodur® 4000/5000 CS

- The extremely compression-proof thermal insulation board with smooth surfaces and shiplap for applications that require maximum compressive strength.



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