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Styrodur®

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# Technical Data

Application Recommendations  
Dimensioning Aids

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# 1. Application Recommendations for Styrodur®

	Application type according to DIN 4108-10 or	Product properties according to DIN EN 13164 and DIN 4108-10					
		General					
			2800 C/Q	3000 CS/SQ	4000 CS/SQ	5000 CS/SQ	Hybrid
			CS(10Y)	CS(10Y)	CS(10Y)	CS(10Y)	
general construction type approval (CTA)/ETA	200 (20–60 mm)	300	500	700	300		
	300 (80–200 mm)						
Perimeter <sup>1)</sup> floor	PB	wd		dh	ds	dx	
Perimeter <sup>1)</sup> wall	PW	wd		dh	ds	dx	dh
Perimeter <sup>1)</sup> foundation slab	See CTA	wd		dh	ds	dx	
Perimeter <sup>1)</sup> groundwater	See CTA	wd		dh	ds	dx	dh
Living area floor	DEO		dm	dh			
Industrial and refrigerated warehouse floor	DEO		dm	dh	ds	dx	
Cavity insulation	WZ	tf	dm	dh			
Interior insulation	WI	tf	dm				
Permanent formwork	WAP	tf	dm				dh
Thermal bridges	WAS	tf	dm	dm			
Base insulation	WAS	wf	dm	dm			
Plaster base	WAP	wf	dm				
Inverted roof	DUK	wd		dh	ds	dx	
Duo and plus roof	DUK	wd		dh	ds	dx	
Patio roof	DUK	wd		dh	ds	dx	
Green roof	See CTA	wd		dh	ds	dx	
Parking roof	See CTA	wd			ds <sup>2)</sup>	dx	
Conventional flat roof <sup>3)</sup>	DAA	wf		dh	ds	dx	
Parapets/rising building elements	DAA	wf	dm	dh			
Basement ceiling/underground garage ceiling	DI	tf	dm	dh			
Attic floor	DEO	tf	dm	dh			
Pitched roof	DAD	wf	dm	dh			






<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

## 2. Technical Data for Styrodur®

Property	Unit	2800C	3000CS	3000SQ	4000CS	5000CS	Hybrid	Standard/ CTA*/ETA**
Edge profile								
Surface		Textured	Smooth	Smooth	Smooth	Smooth	one side smooth one side grooved	
Length x width	mm	1250 x 600	1265 x 615	1265 x 615	1265 x 615	1265 x 615	1265 x 615	
Compressive strength or compressive stress at 10% deformation <sup>1)</sup>	kPa	200 (20–60 mm) 300 (80–200 mm)	300	300	500	700	300	DIN EN 826
Permissible compressive stress over 50 years at <2% deformation <sup>1)</sup>	kPa	–	130	130	180	250	–	DIN EN 1606
Rated value of compressive stress under foundation slabs <sup>1)</sup>	kPa							
50–120 mm (single-layer)		–	185	–	255	355	–	
120–200 mm (single-layer)		–	–	–	230	–	–	
50–120 mm (multi-layer)		–	–	–	230	300	–	
160–240 mm (single-layer)		–	–	185	–	–	–	See CTA
Adhesive strength on concrete	kPa	200	–	–	–	–	–	DIN EN 1607
Modulus of elasticity E <sub>50</sub>	kPa		6.000	6.000	9.000	11.500	–	CTA
Modulus of elasticity E	kPa	15.000	20.000	20.000	30.000	40.000	–	CTA
Dimensional stability 70°C; 90% r.h.	%	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	DIN EN 1604
Deformation behaviour: Load 40 kPa; 70°C	%	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	≤ 5 %	DIN EN 1605
Linear coefficient of thermal expansion								
Longitudinal	mm/(m·K)	0,08	0,08	0,08	0,08	0,08	0,08	
Transverse		0,06	0,06	0,06	0,06	0,06	0,06	DIN 53752
Fire behaviour	Euroclass	E	E	E	E	E	E	DIN EN 13501-1
Water absorption with long-term immersion	% by vol.	3,0	0,7	0,7	0,7	0,7	0,7	DIN EN 12087
Water absorption in diffusion test***	% by vol.	–	1	1	1	1	1	DIN EN 12088
Water vapour diffusion resistance factor		200 – 50	150 – 50	150 – 50	150 – 80	150 – 100	150 – 50	DIN EN 12086
Water absorption after freeze-thaw cycle	% by vol.	–	1	1	1	1	1	DIN EN 12091
Application temperature limit	°C	75	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> Declared value of the creep stress as per ETA

<sup>3)</sup> Rated value of the creep stress as per CTA

\* CTA = Construction Type Approval

\*\* ETA = European Technical Assessment

\*\*\* From 100 mm, smaller than 100 mm WD(V) 3

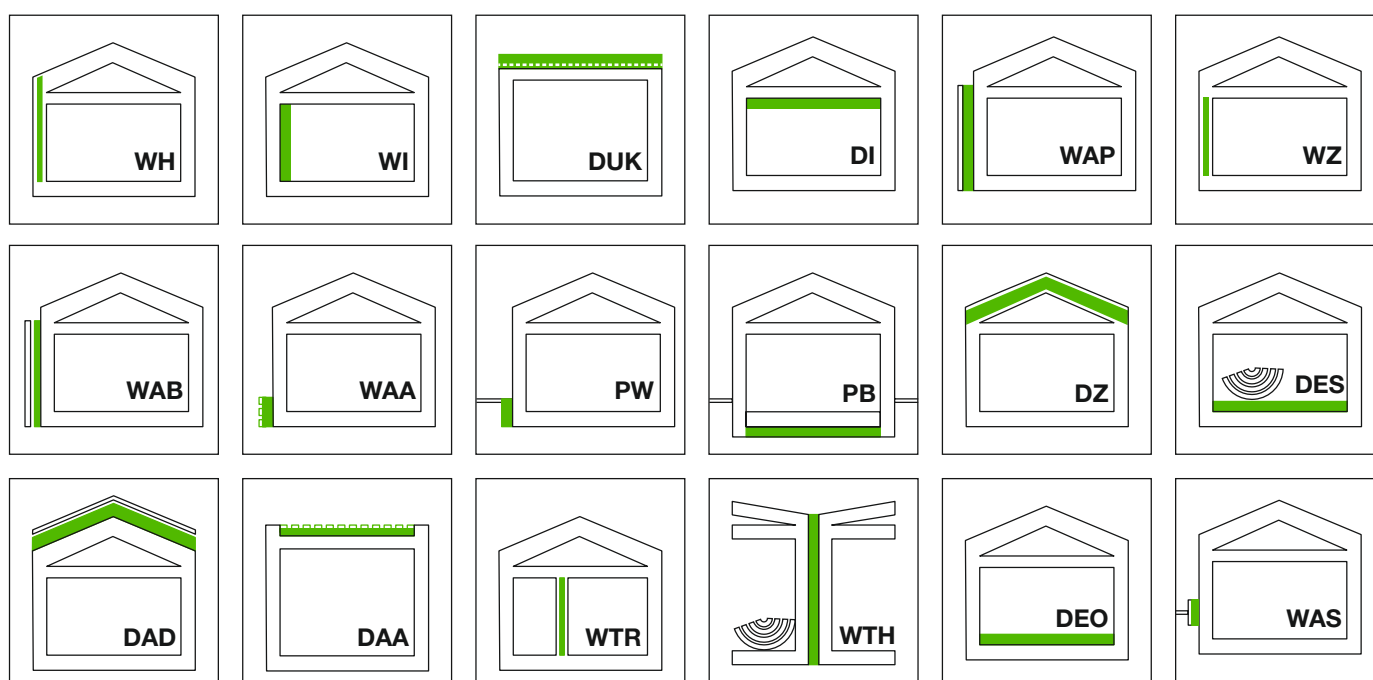
Area of application	Application types	
	Kurzzeichen <sup>1)</sup>	Description
Ceiling, roof	DAD	Exterior insulation of roofs or ceilings, protected against weathering, insulation under coverings
	DAA	Exterior insulation of roofs or ceilings, protected against weathering, insulation under sealing barrier
	DUK	Exterior insulation of roofs, exposed to weathering (inverted roof) <sup>2)</sup>
	DZ	Between-rafter insulation, ventilated roof, non-walkable but accessible attic floor
	DI	Interior ceiling insulation (on the underside) or roof insulation, insulation under the rafters/supporting structure, suspended ceiling, etc.
	DEO	Interior ceiling insulation or floor slab insulation (on the top) under screed, without sound insulation requirements
	DES	Interior ceiling insulation or floor slab insulation (on the top) under screed, with sound insulation requirements
Wall	WAB <sup>2)</sup>	Exterior wall insulation behind cladding
	WAA	Exterior wall insulation behind sealing barrier
	WAP <sup>2), 3)</sup>	Exterior wall insulation under plaster
	WAS	Base insulation
	WZ	Insulation of ventilated walls, cavity insulation
	WH	Insulation of wooden frame and wood panel structures
	WI	Interior wall insulation
	WTH	Insulation between the walls separating houses, with sound insulation requirements
	WTR	Insulation of partition walls
Perimeter	PW	Exterior thermal insulation of walls in contact with the ground (outside the sealing barrier) <sup>4)</sup>
	PB	Exterior thermal insulation of walls under the floor slab and in contact with the ground (outside the sealing barrier) <sup>4)</sup>

<sup>1)</sup> The abbreviations used refer to areas of application for thermal insulation. Graphical symbols are given below this table.

<sup>2)</sup> Including application from below, in contact with the outside air.

<sup>3)</sup> Area of application/abbreviation WAP does not apply to insulation boards in external thermal insulation composite systems (ETICS). ETICS are not a standardised application.

<sup>4)</sup> The specifications according to DIN 4108-2 are applicable.



Product properties	Abbreviation <sup>1)</sup>	Description	Examples
Pressure resistance	dk	No pressure resistance	Cavity insulation, between-rafter insulation
	dg	Low pressure resistance	Living and office areas below screed (except sheet asphalt screed) <sup>1)</sup>
	dm	Moderate pressure resistance	Unused roof with sealing barrier
	dh	High pressure resistance	Utilised roof surfaces, patios, flat roofs with solar systems
	ds	Very high pressure resistance	Industrial flooring, parking deck
	dx	Extremely high pressure resistance	Highly stressed industrial flooring, parking deck
Water absorption	wk	No water absorption requirements	Interior insulation in living and office areas
	wf	Water absorption through liquid water	Exterior insulation of exterior walls and roofs
	wd	Water absorption through liquid water and/or diffusion	Perimeter insulation, inverted roof
Tensile strength	zk	No tensile strength requirements	Cavity insulation, between-rafter insulation
	zg	Low tensile strength	Exterior wall insulation behind cladding
	zh	High tensile strength	Exterior wall insulation under plaster, roof with glued sealing barrier
Acoustic noise properties	sk	No acoustic noise requirements	All applications without acoustic noise requirements
	sh	Impact sound insulation, increased compressibility	Floating screed, walls between houses
	sm	Moderate compressibility	
Deformation	sg	Impact sound insulation, low compressibility	
	tk	No deformation requirements	Interior insulation
	tf	Dimensional stability with moisture and temperature	Exterior wall insulation under plaster, roof with sealing barrier
	tl	Deformation with load and temperature	Roof with sealing barrier

<sup>1)</sup>When using sheet asphalt screeds, temperature-resistant insulation materials (ds or dx) are required for the insulation layer directly below the screed.

# 3. Thermal Conductivity of Styrodur®

## 3.1 Applications According to DIN 4108

Thermal conductivity W/(m·K) and thermal resistance (m<sup>2</sup>·K)/W of Styrodur®

May 2024

		2800 C/Q			3000 CS/SQ			4000 CS/SQ			5000 CS/SQ			Hybrid <sup>1)</sup>		
Thermal conductivity		$\lambda_{D(90d)}$			$\lambda_{D(90d)}$			$\lambda_{D(90d)}$			$\lambda_{D(90d)}$			$\lambda_{D(90d)}$		
Thermal resistance		$R_D$			$R_D$			$R_D$			$R_D$			$R_D$		
Rated value as per 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	–	–	–	–	–	–	–	–	–
	60 mm	0,034	1,75	0,035	0,033	1,80	0,034	0,035	1,70	0,036	0,035	1,70	0,036	–	–	–
	80 mm	0,035	2,25	0,036	0,033	2,40	0,034	0,035	2,25	0,036	0,035	2,25	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	0,033	2,80	0,034
	120 mm	0,036	3,30	0,037	0,033	3,60	0,034	0,035	3,40	0,036	0,035	3,40	0,036	0,033	3,40	0,034
	140 mm	0,036	3,85	0,037	0,033	4,20	0,034	0,035	4,00	0,036	0,035	4,00	0,036	0,033	4,00	0,034
	160 mm	0,036	4,40	0,037	<b>0,033</b>	<b>4,80</b>	<b>0,034</b>	<b>0,035</b>	<b>4,55</b>	<b>0,036</b>	<b>0,035</b>	<b>4,55</b>	<b>0,036</b>	–	–	–
	180 mm	0,036	5,55	0,037	<b>0,033</b>	<b>5,45</b>	<b>0,034</b>	–	–	–	–	–	–	–	–	–
	200 mm	–	–	–	<b>0,033</b>	<b>6,05</b>	<b>0,034</b>	<b>0,035</b>	<b>5,70</b>	<b>0,036</b>	<b>0,035</b>	<b>5,70</b>	<b>0,036</b>	–	–	–
	240 mm	–	–	–	<b>0,033</b>	<b>7,25</b>	<b>0,034</b>	<b>0,035</b>	<b>6,85</b>	<b>0,036</b>	<b>0,035</b>	<b>6,85</b>	<b>0,036</b>	–	–	–

$\lambda_{D(90d)}$  = declared thermal conductivity according to EAD-040650-00-1201, the value indicates the thermal conductivity to be expected after a service life of 50 years, verified in our own FPC (factory production control) and tested by a certified monitoring institute

$R_D$  = declared thermal resistance as per DIN EN 13164

$\lambda_B$  = Design value of the thermal conductivity according to DIN 4108-4:2020-11

1) The thickness of the extruded foam panels is the nominal thickness minus the groove depth of 5 mm.

CS/SQ/Q = thicknesses  $\geq 160$  mm are referred to as SQ/Q

## 3.2 Technically Approved Applications

Overview of general construction type approvals (CTA):

May 2024

Styrodur® 3000 CS/SQ, 4000 CS, 5000 CS, Hybrid

Material		3000 CS	3000 SQ	4000 CS/ 5000 CS	Hybrid
Thickness		See CTA			
Thermal insulation under load-bearing foundation slabs	Soil moisture and pressing water	Z-23.34-2089	Z-23.34-2114	Z-23.34-1325	
Perimeter insulation of walls with ground contact and basement floors (non-load-bearing building elements)		Z-23.33-2080	Z-23.33-2084	Z-23.5-223	
Perimeter insulation for concrete pouring with waterproof concrete exterior basement walls					Z-23.33-2098
Inverted roof construction	Green	Z-23.31-2079	Z-23.31-2083	Z-23.4-222	
	Frequented	–	–		
	Single-layer with gravel layer and separation layer	Z-23.31-2079	Z-23.31-2083		
	Multi-layer with gravel layer and separation layer	–	–		
ETA		ETA 17/0913	ETA 20/0219	ETA 19/0120	ETA 17/0913

### 3.3 Technically Approved Applications

Rated values of thermal conductivity in W/(m·K) as per DIBt construction type approval

May 2024

Approved Styrodur® types: 3000 CS/SQ, 4000 CS, 5000 CS

Thickness in mm	Thermal insulation under load-bearing foundation slabs		See CTA				Inverted roof constructions			
	Soil moisture	Pressing water	Multi-layer with soil moisture		In pressing water		Green	Fre- quented	With gravel layer and separation layer	
			Wall area	Under basement floors	Single- layer	Multi- layer			Single- layer	Multi- layer
	<b>3000 CS/SQ</b>									
60–120	0,034	0,039	0,034	0,034	0,039	–	0,039	0,039	0,034	–
160–240	0,034	0,039	0,034	0,034	0,039	–	0,039	–	0,034	–
<b>4000 CS</b>										
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	0,036*	0,041
120–140	0,039	0,041	0,044	0,039	0,042	0,044	0,041	0,041	0,036*	0,042
160	0,039	0,041	0,044	0,039	0,042	0,044	0,041	0,041	0,039	0,042
<b>5000 CS</b>										
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	0,036*	0,041
120	0,039	0,041	0,034 <sup>1)</sup>	0,039	0,039	0,044	0,041	0,041	0,036*	0,042
<b>Hybrid</b>										
100–140	–	–	0,034 <sup>1)</sup>	–	0,039	–	–	–	–	–

\* According to DIN 4108, the rated lambda value  $\lambda_g$  may be used for these standardised applications.

<sup>1)</sup> single-layer installation with soil moisture

## 4. Mechanical Parameters (Mean Values, Standard Values) of Styrodur®

### 4.1 Dynamic Stiffness

Dynamic stiffness of Styrodur® 3000 CS/SQ, 4000 CS/SQ, and 5000 CS/SQ

Board thickness	mm	30	40	60	80	100	120	140	160	180	240
Styrodur 3000 CS/SQ	MN/m <sup>3</sup>	500	380	260	190	150	130	100	80	60	45
Styrodur 4000 CS	MN/m <sup>3</sup>	550	400	280	210	170	150	120	100	80	65
Styrodur 5000 CS	MN/m <sup>3</sup>	600	420	300	230	190	170	140	120	100	80

## 5. Dimensioning Aids for 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										
	50	60	80	100	120	140	160	180	200	220	240
3000 CS/SQ	0,110	0,092	0,069	0,055	0,046	0,039	0,034	0,031	0,028	0,025	0,023
4000 CS single-layer / multi-layer	–	0,167	0,125	0,100	0,083	0,071	0,063	0,056	0,050	0,045	0,042
5000 CS single-layer / multi-layer	–	0,233	0,175	0,140	0,117	0,100	0,088	0,078	0,070	0,064	0,058

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

### 5.2 Permissible Installation Depths

Dimensioning aids for Styrodur® applications in perimeter insulation

#### Permissible installation depths

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

Area of application	Installation depth for Styrodur® types in m			
	3000 CS/SQ	4000 CS	5000 CS	Hybrid
Without pressing water DIN 4108-10	12	17	24	12
Long-term or permanent pressing water (groundwater)	3,5	7,0	7,0	3,5



## 5.3 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	Wheel load	Contact surface	180	200	220	240	90	100	110	120
	in tonnes	in kN	in mm x mm								
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.

<sup>\*)</sup> 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/SQ	4000 CS	5000 CS
Permissible compressive strength with traffic load in kPa	130	230	300

## 6. Adhesive Bonds for 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.

## Styrodur® – A Strong Product Line

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

### Styrodur® 2800 C/Q

The thermal insulation board with an embossed honeycomb pattern on 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<sub>2</sub> emissions.

### Styrodur® Hybrid

The thermal insulation board with longitudinal grooves on one side and a shiplap for use as perimeter insulation for concrete pouring with waterproof concrete exterior basement walls.

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



#### 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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