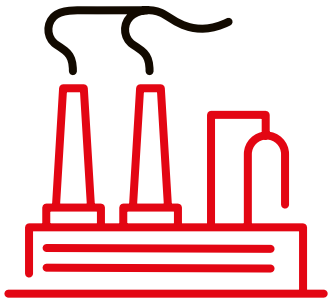
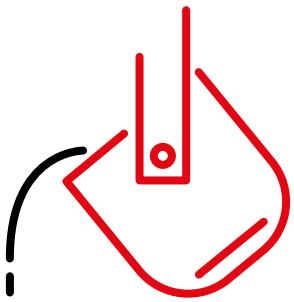
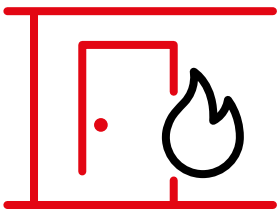
silca
refractory solutions

THERMAL INSULATION, NON-FERROUS METAL CASTING & FIRE PROTECTION







CATALOGUE 2018

SILCA: MORE THAN 30 YEARS OF KNOW-HOW AND INNOVATION

SILCA is an internationally operating service and sales company of the CALSITHERM group specialized in high temperature materials as well as lightweight thermal insulation in different fields of application. Over the past years, we have been the only German producer of calcium silicates to show that with innovative products you can continuously improve both safety and productivity. In refractory technologies, we cover all areas in a wide variety of industries, ranging from aluminium casting over domestic fireplaces and chimneys to heat treatment plants. In addition to the supply of material, we also offer a comprehensive service regarding technical demands and innovations. This service includes technical consultation, engineering, material supply including the assembly of high temperature facilities.

With our companies SILCA Italia, SILCA Insulation (SEA) Malaysia, SILCA South Africa, SILCA Mexico and SRS Amsterdam we are operating on a worldwide basis.

Consistent quality requires the systematical cooperation of all parties involved in the processes of production, sales and application. Thus, we develop efficient products that meet our customers' high quality requirements. The basis for our quality and innovation is our know-how gained from more than 30 years of experience.

The main keys of our success are the exceptional quality of our products, the high level of customer satisfaction as well as our motivated and qualified employees.

www.silca-online.de

Material name	Product description	Data sheet
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SILCAREF	Lightweight refractory bricks	**60.7**
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Composite elements

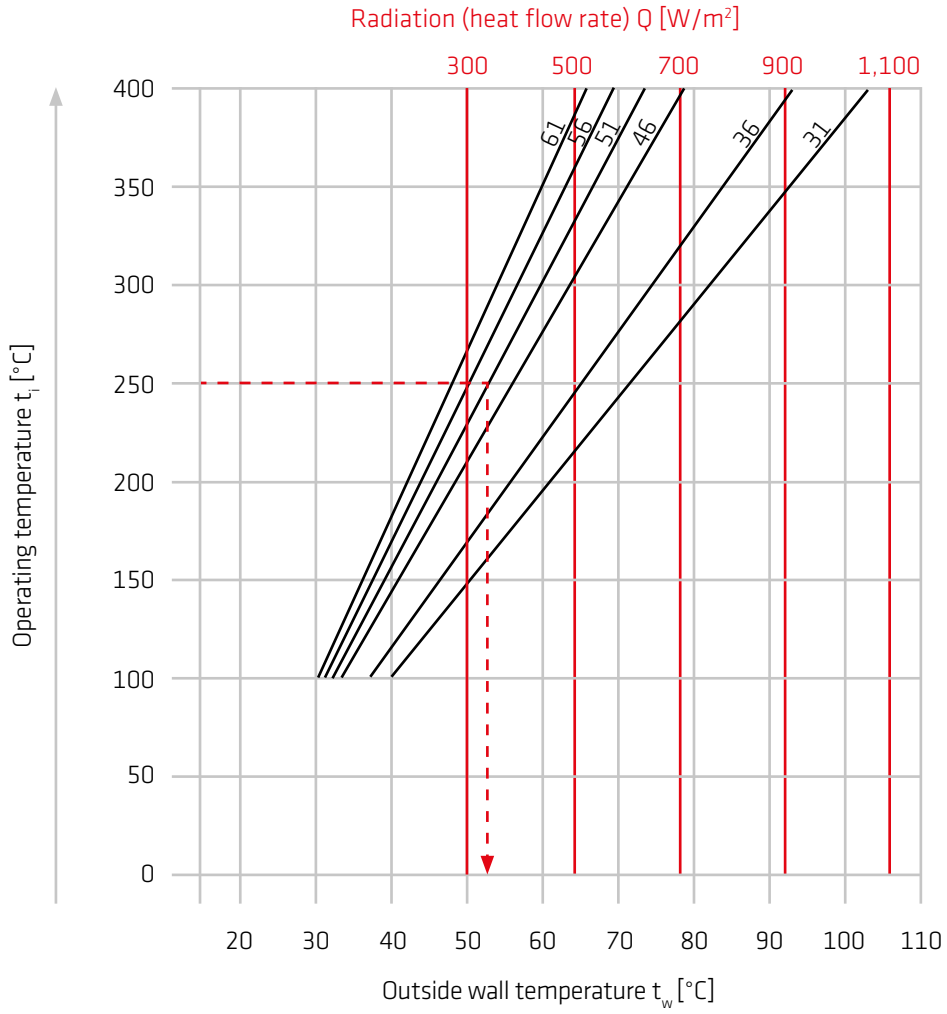
SILCAPAN-KE 400

SILCAPAN-KE composite elements are large-size constructional elements used for heat treatment plants.

SILCAPAN-KE 400 consists of two rigid cover panels of SILCAPAN 400 and an insulating core of the solid SILCAMIN 60-40 boards.

Design examples:
Theoretical thermal throughput as a function of the operating temperature ti and the wall thickness, at an ambient temperature ta = 20 °C, a degree of emission on the outside of 0.85 and free convection (calculated in accordance with ASTM).

Inside temperature 250 °C **>** Element thickness 51 mm **>** Wall temperature 52.8 °C



SPECIAL FEATURES

- large-size
- high strength
- good thermal insulation
- simple processing

SILCAPAN-KE 400		Unit	
Classification temperature	Composite element	°C	400
Upper application limit temperature	Composite element	°C	350
Classification temperature	Cover panels	°C	400
Classification temperature	Insulating core	°C	600
Coefficient of thermal expansion	RT-350 °C	$K^{-1} \times 10^{-6}$	5
Cover panels (on both sides)	Type		Calcium silicate board
	Thickness	mm	8
Insulating core	Type		Mineral fibre board
Dimensions			
Standard sizes	Length	mm	3,000
			2,500
	Width	mm	1,250
	Thickness	mm	31/36/46/51/56/61
	Thickness tolerances	mm	-2.0 / +2.0
Special sizes	Other dimensions are available on request.		

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Furnace with composite elements

Composite elements

SILCAPAN-KE 400

For SILCAPAN-KE elements and SILCAPAN insulating boards the mode of construction with a steel framework has proved itself in practical use. An appropriate carrier framework in the form of a steel frame structure is envisaged. This should be designed in accordance with the statical requirements so that both the insulating boards and any fixtures can be supported.

The steel framework is to be dimensioned in such a way that the boards can lie on it all round to a width of at least 25 mm. With large spans of and in excess of 625 mm, supports or, as the case may be, props are to be provided in the panel area. The boards may not be trodden on. If it is necessary that they be walked on, separate light grids are to be provided.

For mounting the boards on the framework structure there are a number of very different possibilities. However in every case the elements must lie on the framework structure all round and be fixed to it in a firm manner.

When selecting the mode of securing, account must be taken of the difference between the coefficient of thermal expansion of the mounting structure and that of the SILCAPAN elements/boards. The coefficient of thermal expansion of the KE elements is very small at approx. $5 \times 10^{-6}\ K^{-1}$.

Clamp connections
The most cost-favourable solution is that of clamps/clips in the region of the butt joint. In this way the difference in thermal expansion and the manufacturing tolerance of the steelwork are compensated for in the simplest way. The elements are free to move beneath the clamping section.

Through bolts
Where securing is carried out with through bolts, the diameter of the holes in the elements and boards must be at least 2 –3 mm greater than the diameter of the bolts. In order to avoid pointwise compression stress at the securing bolts, clamping strips should be used if possible or washers of an adequate size, e.g. approx. 60 x 60 x 3 mm.

Distances between securing bolts
The distances between the securing bolts when using clamping strips (bent sections) should not be more than 500 mm or, as the case may be, 100 mm at the corners of the clamping strips. In the case of through bolts with large washers the distance between the bolts should not be more than 300 mm.

Seals
The elements or boards can be backed with an adhesive tape (adhesive on one side) of SILCAWOOL 120 strips in accordance with the pressure situation and ambient atmospheric conditions.

Storage
SILCAPAN-KE elements have to be stored dry and without risk of frost. Changes to the thermal properties can come about particularly in the region of the adhesive bond if the elements are permitted to take up moisture or are stored incorrectly. The elements should be stacked on pallets and covered with foil so that the moisture content in the stack remains uniform.

Machining
The elements can be machined using woodworking machines and tools with carbide cutting elements. The use of a dust extraction system is recommended when relatively large numbers of elements have to be machined. We can machine the elements in accordance with your particular requirements. In this way cutting work taking a lot of time and money on the building site can be saved.

Painting and coating
The elements represent an open-pore insulating system. For this reason account should be taken of the changes to the vapour diffusion resistance values that will come about with a decorative paint on the outside. There should always be a downwards pressure gradient from inside to outside. If necessary the resistance should be balanced out on the inside with the aid of impregnation. The surface must be prepared appropriately before paint is applied. Moisture barriers on the outside, e.g. in the form of sheet-metal cladding or film, will lead to the formation of condensation in the elements.

Large-size insulation boards

SILCAPAN 400, 45MA

SILCAPAN 400 has a high thermal stability and is used primarily as a large-size, self-supporting building board for the cladding of dryers and as a composite element cover panel.

SILCAPAN 45MA boards have a low bulk density in combination with good strength. They belong to the group of medium weight calcium silicates. The above factors in combination with excellent insulating properties mean that they are optimally suited for thermal separation in the field of machines, apparatuses and dryers.

Machining

The elements can be machined using woodworking machines. As a result of the high strength values, tools with carbide cutting elements should be used. An appropriate dust extraction system should be provided. We will be pleased to produce the particular parts you require on our computer-controlled machines.

Surface treatment

The SILCAPAN boards are used primarily in dryers. Since here a high level of humidity arises as a rule, vapour brakes can be applied in addition. In addition the boards can be provided with decorative finishes. Attention should be paid to the fact that the vapour pressure downward gradient from inside to outside is maintained. In case of doubt you should contact our Technical Department.

SILCAPAN 400

SILCAPAN 45MA

SPECIAL FEATURES

- large-size
- self-supporting
- high strength

SILCAPAN		Unit	400	45MA
Classification temperature		°C	400	900
Bulk density		kg/m³	870	450
Compression strength		MPa	9.3	6.2
Flexural strength	Longitudinal	MPa	7.6	3.8
Elastic modulus	direction	MPa	4,200	-
Fire behaviour to DIN 4102	Building material class		A1	-
Thermal conductivity λ at t_m	100 °C	W/(m K)	0.19	0.09
	200 °C		0.21	0.10
	300 °C		0.23	0.11
Dimensions				
Standard sizes	Length	mm	2,500*/3,000	2,440
	Width	mm	1,250	1,220
	Thickness	mm	6*/8/10/12/15/20/25	12.7/19.1/25.4/38.1/50.8
*6 mm thickness only with a length of 2,500 mm available.				

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

SILCAPAN 845

SILCAPAN 850

Dense calcium silicate boards

SILCAPAN 845, 850

SILCAPAN are technical ceramics on the basis of calcium silicate. **SILCAPAN 845** and **SILCAPAN 850** have bulk densities of 900 and 1,050 kg/m³, respectively and are usable up to temperatures of 1,000 °C.

SILCAPAN products are used in the mechanical engineering and apparatus construction sector as structural components when high temperature resistance as well as thermal and electrical insulation are required. These products are used, for example, as spacers, flanges, insulation housings for electronic components or for hot press insulation.

Machining
SILCAPAN can be precisely machined to close tolerances. With our 5-axis processing machines we can produce the most complicated geometries.

SPECIAL FEATURES

- good insulation
- high strength
- dimensionally stable
- self-supporting
- good machinability

SILCAPAN		Method	Unit	845		850	
Upper application limit temperature		EN 1094-6	°C	1,000		1,000	
Bulk density (± 10 %)		EN 1602	kg/m³	1,050		900	
Open porosity (in acc. with standard)		EN 993-1	%	60		68	
Compression strength		EN 826	MPa	26		17	
Flexural strength		EN 12089	MPa	13		8	
Hardness		DIN 53505	Shore D	60		55	
Shrinkage after 12 h		EN 1094-6					
Length and width	750 °C		%	0.2		0.05	
Thickness	750 °C			0.60		0.20	
Thermal conductivity λ at t_m	200 °C	EN 12667	W/(m K)	0.27		0.24	
	400 °C			0.28		0.26	
	600 °C			0.31		0.29	
	800 °C			0.35		0.32	
Specific thermal capacity			kJ/kg K	0.8 - 1.2		0.8 - 1.2	
Thermal conductivity	RT-750 °C	DIN 51045-5		⊥	//	⊥	//
⊥ perpendicular to board plane							
// parallel to board plane			$K^{-1} \times 10^{-6}$	4.3	5.3	7.2	6.2
Chemical composition							
Calcium silicate			%	91		-	
(CaO-; MgO-; Al_2O_3-) silicate				-		94	
R_xO_x (R=Fe, Ti, K, Na)				1		1	
Annealing loss				8		5	
Dimensions							
Standard sizes		Tolerances					
	Length	±2; *0/+50	mm	1,000/1,500/3,000*			
	Width	0/+20	mm	1,250			
	Thickness	0/+0.8	mm	10/12/15/20/25/50/75			
	Surfaces ground on both sides, without trimming.						
Other dimensions are available on request.							

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SILCATEC 1000E

Thermally and electrically insulating calcium silicates

SILCATEC 1000E, 1000HD

SILCATEC 1000E and **SILCATEC 1000HD** are technical ceramics on the basis of calcium silicates. They have densities of 1,050 to 1,300 kg/m³ and are temperature resistant up to 1,000 °C.

SILCATEC has excellent thermal and electrical insulating properties and is used in mechanical engineering and apparatus construction for thermal and electrical insulating components at elevated temperatures. Typical are induction furnace casings, arc chutes, jigs for brazing, welding.

Machining
SILCATEC can be precisely machined to close tolerances. With our 5-axis processing machines we can produce the most complicated geometries.

SILCATEC 1000HD

SPECIAL FEATURES

- high mechanical strength
- high edge stability
- dimensionally stable
- good electrical insulation
- good thermal insulation
- precisely machinable

SILCATEC		Method	Unit	1000E		1000HD	
Upper application limit temperature		EN 1094-6	°C	1,000		1,000	
Bulk density (± 10 %)		EN 1602	kg/m³	1,050		1,300	
Open porosity (in acc. with standard)		EN 993-1	%	60		52	
Compression strength		EN 826	MPa	28		43	
Flexural strength		EN 12089	MPa	15		17	
Hardness		DIN 53505	Shore D	> 70		75	
Shrinkage after 12 h		EN 1094-6					
Length and width	750 °C		%	0.30		0.15	
Thickness	750 °C			2.00		0.90	
Length and width	1,000 °C			0.35		0.20	
Thickness	1,000 °C			2.50		1.50	
Thermal conductivity λ at t_m	200 °C	EN 12667	W/(m K)	0.27		0.31	
	400 °C			0.29		0.33	
	600 °C			0.31		0.35	
	800 °C			0.35		0.38	
Specific thermal capacity			kJ/(kg K)	0.9-1.1		1.0-1.2	
Coefficient of expansion	RT-750 °C	DIN 51045-5		⊥	//	⊥	//
⊥ perpendicular to board plane							
// parallel to board plane			$K^{-1} \times 10^{-6}$	4.3	5.3	5.6	5.8
Chemical composition							
Calcium silicate			%	91		94	
R_xO_x (R=Fe, Ti, K, Na)				1		1	
Annealing loss				8		5	
Electrical properties							
Breakdown voltage and dielectric strength		EN 60243-1	kV/mm	3.9		4.5	
High voltage arc resistance		EN 61621-1	s	345 (step 30; 30 mA)		> 420 (step 40; 40 mA)	
Comparative tracking index (CTI)		EN 60112		> 600		> 500	
Dimensions							
Standard sizes		Tolerances					
	Length	±2; *0/+50	mm	1,000/1,500/3,000*			
	Width	0/+20	mm	1,250			
	Thickness	0/+0.8	mm	10/12/15/20/25/30/40/50/75/100			
	Surfaces ground on both sides, without trimming.						
Other dimensions are available on request.							

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Density calcium silicate boards (annealed)

CALCAST® CC 100, CC 150, CC 350, CC 450

CALCAST® is a high-temperature insulating ceramic based on calcium silicate. It has bulk densities of 860 to 1,040 kg/m³. The temperature limit is 1,000 °C. The material is not wetted by liquid NF-metals and is therefore an ideal material in casting applications with direct contact to liquid metal. **CALCAST®** insulates and is used to control the distribution of the metal.

Typical applications of **CALCAST®** are components for the production of billets and ingots in horizontal and vertical casting units, e.g. nozzles, spouts, floats, stoppers and hot top rings.

Furthermore, our **CALCAST®** grades are standard materials used in foundry casting processes such as LPDC, HPDC, CPC and gravity casting. They are used e.g. as bushings, nozzles, connecting launders and casting boxes.

Different **CALCAST®** materials are available for various processes and applications. The properties of the different grades are customized to particular applications.

Machining
CALCAST® can be precisely machined to close tolerances. With our 5-axis processing machines we can produce the most complicated geometries.

SPECIAL FEATURES

- good insulation
- low thermal capacity
- dimensionally stable
- excellent edge stability
- no wetting with liquid non-ferrous metals
- precise machinable in close tolerances

CALCAST®		Method	Unit	CC 100	CC 150	CC 350	CC 450
Upper application limit temperature		EN 1094-6	°C	1,000	1,000	1,000	1,000
Bulk density (± 10 %)		EN 1602	kg/m³	860	1,040	1,040	1,000
Open porosity (in acc. with standard)		EN 993-1	%	68	60	58	63
Compression strength		EN 826	MPa	19	28	28	27
Flexural strength		EN 12089	MPa	7	10	13	15
Hardness		DIN 53505	Shore D	55	66	70	65
Shrinkage after 12 h		EN 1094-6					
Length and width	750 °C		%	0.20	0.05	0.25	0.10
Thickness	750 °C			0.60	0.20	0.80	0.60
Length and width	1,000 °C			0.30	0.12	0.30	0.15
Thickness	1,000 °C			1.10	0.70	1.50	1.80
Thermal conductivity λ at t_m	200 °C	EN 12667	W/(m K)	0.24	0.27	0.27	0.27
	400 °C			0.26	0.28	0.28	0.28
	600 °C			0.29	0.31	0.31	0.31
	800 °C			0.32	0.35	0.35	0.35
Specific thermal capacity			kJ/(kg K)	0.8-1.2	0.8-1.2	0.8-1.2	0.8-1.2
Coefficient of expansion	RT-750 °C	DIN 51045-5	$K^{-1} \times 10^{-6}$	⊥ //	⊥ //	⊥ //	⊥ //
⊥ perpendicular to board plane							
// parallel to board plane				7.2 6.0	5.1 6.0	4.7 6.3	4.4 5.3
Chemical composition							
Calcium silicate			%	-	-	95-97	96
(CaO-; MgO-; Al_2O_3-) silicate				97.5-98	97.5-98	-	-
R_xO_x (R=Fe, Ti, K, Na)				1	1	1	1
Annealing loss			%	2.0-2.5	1.0-1.5	3.0-3.5	3.0-4.0
Dimensions							
Standard sizes		Tolerances					
	Length	±2; *0/+50	mm	1,000/1,500/3,000*			
	Width	0/+20	mm	1,250			
	Thickness	0/+0.8	mm	12.7/19.1/25.4/31.8/38.1/50.8/76.2/101.6			
	Surfaces ground on both sides, without trimming.						
Other dimensions are available on request.							

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Density calcium silicate boards (annealed)

CALCAST® CC 500

CALCAST® CC 500 is a ceramical insulation material based on calcium silicate with a bulk density of 1,200 kg/m³.

The temperature limit for application is 1,200 °C . The limit is 200 °C higher in comparison to the other **CALCAST®** grades.

CALCAST® CC 500 has a high thermal shock resistance and alternating thermal stress load. This is generated by the low shrinkage of the material at elevated temperatures.

The material is not wetted by liquid aluminium. Ideal is the use as cover for launders during preheating and transport of metal. Further areas of application are e. g. the insulation of furnace lids, walls of continuous furnaces etc.

Machining
CALCAST® CC 500 can be precisely machined to close tolerances. With our 5-axis processing machines we can produce the most complicated geometrics.

SPECIAL FEATURES

- thermal fatigue resitance
- temperature limit of 1200 °C
- dimensionally stable
- no wetting with liquid non-ferrous metals
- machinable in close tolerances

CALCAST® CC 500		Method	Unit		
Upper application limit temperature		EN 1094-6	°C	1,200	
Bulk density (± 10 %)		EN 1602	kg/m³	1,200	
Open porosity (in acc. with standard)		EN 993-1	%	60	
Compression strength		EN 826	MPa	11	
Flexural strength		EN 12089	MPa	7	
Hardness		DIN 53505	Shore D	50	
Shrinkage after 12 h		EN 1094-6			
Length and width	750 °C		%	0.05	
Thickness	750 °C			0.40	
Length and width	1,000 °C			0.10	
Thickness	1,000 °C			0.70	
Thermal conductivity λ at t_m	200 °C	EN 12667	W/(m K)	0.22	
	400 °C			0.24	
	600 °C			0.26	
	800 °C			0.30	
Specific thermal capacity			kJ/(kg K)	0.8-1.2	
Coefficient of expansion	RT-750 °C	DIN 51045-5		⊥	//
⊥ perpendicular to board plane					
// parallel to board plane			$K^{-1} \times 10^{-6}$	3.7	5.9
Chemical composition					
Calcium silicate			%	96-97	
(CaO-; MgO-; Al_2O_3-) silicate				-	
R_xO_x (R=Fe, Ti, K, Na)				0.5	
Annealing loss			%	3	
Dimensions					
Standard sizes		Tolerances			
	Length	±2; *0/+50	mm	1,000/1,500/3,000*	
	Width	0/+20	mm	1,250	
	Thickness	0/+0.8	mm	12.7/19.1/25.4/31.8/38.1/50.8/76.2/101.6	
	Surfaces ground on both sides, without trimming.				
Other dimensions are available on request.					

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CALCAST®
CC 155 G4

CALCAST®
CC 155 G8

CALCAST®
CC 155 G16

Calcium silicate / graphite composites

CALCAST® CC 155 G4, G8, G16

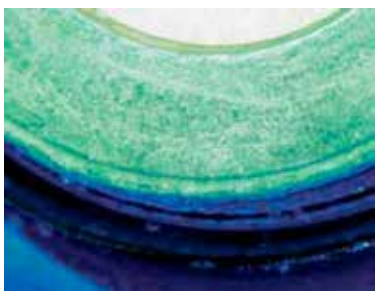
CALCAST® CC155 G4, G8 and **G16** are calcium silicate/graphite composites, which combine the mechanical and physical properties of graphite and calcium silicate. The results are materials with tailored and improved properties in regard to several high temperature applications, especially when used in casting processes with liquid aluminium. **CALCAST ® CC 155 G4, G8** and **G16** reduces dramatically the wetting with molten metal. After contact with the metal nearly zero attachments of metal residuals are present. This reduces the transport of oxides into the casted part as well as the overall consumption of metal alloy.

Thermal conductivity
The amount of graphite in the calcium silicate determines the properties of the material. Especially thermophysical properties like thermal conductivity and reversible thermal expansion are influenced by the anisotropic graphite crystals.

The thermal conductivity increases with increasing amount of graphite. Higher conductivities can result in faster casting processes. The conductivity is anisotropic, following the graphite lattice which has a parallel orientation to the board plane. With increasing oxidation of the graphite component the thermal conductivity decreases.

The reversible thermal expansion is reduced by the graphite. The amount of reduction is determined by the amount of graphite in the composite. It also depends on the amount of oxidation of the graphite component.

Oxidation characteristics
A significant oxidation of the graphite in air starts at 600 °C. Used in liquid aluminium however also after longer periods no significant oxidation of the components are observable.



Hot Face after > 100 drops

Wetting in liquid Aluminium

SPECIAL FEATURES

- no wetting with liquid non-ferrous metals
- increased thermal conductivity
- reduced thermal expansion
- low oil absorption
- precisely machineable

Oil absorption & Self lubrication
The material stays not wettable, self lubricating and resistant against oil absorption. The oil absorption is reduced with increasing amount of graphite in comparison to standard calcium silicates. Coatings like boron nitride or graphite suspensions minimizes the oil uptake additionally.

Typical applications of **CALCAST CC 155 G4, G8, G16** are transfer- and transport-launders, ladles, bushings, hot top rings, transition plates and many more.

Oil traces on the surface after 144 h at room temperature

CALCAST®		Method	Unit	CC 155 G4		CC 155 G8		CC 155 G16	
Upper application limit temperature		EN 1094-6	°C	1,000		1,000		1,000	
Bulk density (± 10%)		EN 1602	kg/m³	1,150		1,100		1,050	
Open porosity (in acc. with standard)		EN 993-1	%	55		55		60	
Compression strength		EN 826	MPa	24		22		18	
Flexural strength		EN 12089	MPa	11		10		9	
Hardness		DIN 53505	Shore D	70		65		60	
Shrinkage after 12 h		EN 1094-6							
Length and width	750 °C		%	0.30		0.25		0.27	
Thickness	750 °C			0.80		0.80		0.75	
Thermal conductivity λ at t_m		EN 993-15	W/(m K)	⊥	//	⊥	//	⊥	//
	400 °C			0.64	0.62	1.22	2.59	1.80	4.55
⊥ perpendicular to board plane	600 °C			0.52	0.59	0.93	2.06	1.34	3.52
// parallel to board plane	800 °C			0.37	0.39	0.62	0.87	0.86	1.35
Coefficient of expansion	RT-750 °C	EN 13471		⊥	//	⊥	//	⊥	//
⊥ perpendicular to board plane									
// parallel to board plane			$K^{-1} \times 10^{-6}$	6.7	6.2	5.9	4.7	6.5	6.2
Chemical composition									
Calcium silicate			%	95		91		83	
Graphite				4		8		16	
R_xO_x (R=Fe, Ti, K, Na)				1		1		1	
Annealing loss			%	10		12		22	
Dimensions									
Standard sizes		Tolerances							
	Length	±2; *0/+50	mm	1,000/1,500/3,000*					
	Width	0/+20	mm	1,250					
	Thickness	0/+0.8	mm	12.7/19.1/25.4/31.8/38.1/50.8/76.2/101.6					
	Surfaces ground on both sides, without trimming.								
Other dimensions are available on request.									

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Calcium silicate, carbon fibre reinforced

CALCAST® CC 60

CALCAST® CC 60 is a carbon fibre reinforced calcium silicate, containing about 2 % carbon fibres with a maximum length of 12 mm. The material is suitable up to temperatures of 1,000 °C, is not wettable by liquid aluminium and well insulating.

CALCAST® CC 60 is characterized by a high work of fracture. This property is based on the lack of a form fit and a force lock of the carbon fibres with the calcium silicate matrix. As a result, cracks lose their fracture energy and do not lead to complete fracture. This is demonstrated by a significant fibre-pull-out in the fractured areas. The physically brittle ceramic material behaves quasi pseudoplastic when it fails.

Due to the non problematic fracture behaviour of **CALCAST® CC 60** it is an ideal material for applications where high tensile and torsion forces are present. Cracks do not lead to complete failure of the component.

Typical components are hot top rings, transition plates, header plates, spouts, casting boxes and many more parts.

SPECIAL FEATURES

- nonproblematic pseudoplastic fracture behavior
- no wetting with liquid non-ferrous metals
- dimensionally stable
- precisely machinable
- thermoshock resistant

CALCAST® CC 60		Method	Unit		
Upper application limit temperature		EN 1094-6	°C	1,000	
Bulk density (± 10%)		EN 1602	kg/m³	850	
Open porosity (in acc. with standard)		EN 993-1	%	62	
Compression strength		EN 826	MPa	10	
Flexural strength		EN 12089	MPa	6	
Hardness		DIN 53505	Shore D	50	
Shrinkage after 12 h		EN 1094-6			
Length and width	750 °C		%	0.25	
Thickness	750 °C			0.90	
Length and width	1,000 °C			0.27	
Thickness	1,000 °C			1.30	
Thermal conductivity λ at t_m	200 °C	EN 12667	W/(m K)	0.18	
	400 °C			0.20	
	600 °C			0.22	
	800 °C			0.30	
Specific thermal capacity			kJ/kg K	0.8-1.2	
Coefficient of thermal expansion	RT–750°C	DIN 51045-5		⊥	//
⊥ perpendicular to board plane					
// parallel to board plane			$K^{-1} \times 10^{-6}$	6.4	6.4
Chemical composition					
Calcium silicate			%	97-98	
Carbon				1-3	
R_xO_x (R=Fe, Ti, K, Na)				1	
Annealing loss			%	5	
Dimensions					
Standard sizes		Tolerances			
	Length	±2; *0/+50	mm	1,000/1,500/3,000*	
	Width	0/+20	mm	1,250	
	Thickness	0/+0.8	mm	12.7/19.1/25.4/31.8/38.1/50.8/76.2/101.6	
	Surfaces ground on both sides, without trimming.				
Other dimensions are available on request.					

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Pressure-resistant calcium silicate for the steel industry

SILCASTEEL

SILCASTEEL is a technical ceramic on the basis of calcium silicate. The bulk density is 1,050 kg/m³, maximum application temperature 1,000 °C. **SILCASTEEL** has a good compression strength, low thermal conductivity and is dimensionally stable. The material is insensitive to moisture. **SILCASTEEL** is an ideal material for the insulating of steel ladles.

SPECIAL FEATURES

- high compression strength
- large board sizes
- good machinability

Machining
SILCASTEEL can be precisely machined to close tolerances. With our 5-axis processing machines we can produce the most complicated geometries.

SILCASTEEL		Method	Unit		
Upper temperature limit of application		EN 1094-6	°C	1,000	
Bulk density (± 10 %)		EN 1602	kg/m³	1,050	
Open porosity (in acc. with standard)		EN 993-1	%	68	
Compression strength		EN 826	MPa	26	
Flexural strength		EN 12089	MPa	13	
Hardness		DIN 53505	Shore D	64	
Shrinkage after 12 h		EN 1094-6			
Length and width	750 °C		%	0.2	
Thickness	750 °C			1.0	
Length and width	1,000 °C			0.4	
Thickness	1,000 °C			2.5	
Thermal conductivity λ at t_m	200 °C	EN 12667	W/(m K)	0.27	
	400 °C			0.28	
	600 °C			0.31	
	800 °C			0.35	
Specific heat capacity			kJ /(kg K)	0.8 – 1.2	
Thermal expansion coefficient	RT-750 °C	DIN 51045-5	$K^{-1} \times 10^{-6}$	⊥	//
⊥ transverse to the panel direction					
// parallel to the panel direction				4.4	5.3
Chemical composition					
(CaO-, MgO-, Al_2O_3-) silicate			%	90	
R_xO_y (R = Fe, Ti, K, Na)				1	
Annealing loss				9	
Dimensions					
Standard sizes		Tolerances			
	Length	±2; *0/+50	mm	1,000/1,500/3,000*	
	Width	0/+20	mm	1,250	
	Thickness	0/+0.8	mm	10/12/15/20/25/50/75	
	Surfaces ground on both sides, without trimming.				
Other dimensions are available on request.					

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Fire protection boards

SILCA® fire protection boards

170SB, 200, 250SB, T300, T500, SILCAPROTECT®

SILCA® fire protection boards are homogeneous insulation boards based on porous, lightweight calcium silicate. They are available in large sizes, are dimensionally stable and self-supporting.

SILCA® fire protection boards have obtained declarations of performance according to Annex III of the Construction Products' Regulations (EU) No. 305/2011 and bear the CE-marking.

SILCA® fire protection boards are physiologically safe and have been classified as environmentally compliant construction material by the Arbeitsgemeinschaft Umweltverträgliches Bauprodukt e.V. The boards are disposed of as construction waste.

SILCA® 200, SILCA® 170SB, SILCA® 250SB, SILCA® T300 and SILCA® T500 are fire protection boards approved for the use in shipbuilding. Furthermore, these boards have proven their effectiveness in a large variety of applications as fire protection doors, fire protection gates, safety cabinets and fire protection containers.

SILCAPROTECT® is a medium weight fire protection board based on calcium silica hydrate with additives from aluminium hydroxide and cellulose.

SILCAPROTECT® in combination with a precursor material of calcium silicate is pressed to highly pressure resistant boards and subsequently hydrothermally hardened.

Since **SILCAPROTECT®** has good edge stability, exactly machined parts can be prepared with simple woodworking machines.
An uncoated board of 50 mm **SILCAPROTECT®** has a fire resistance according to UTTC of >= 90 minutes.

SILCAPROTECT® in combination with PU, PVAc or similar adhesives and highly compressed laminates, thin layer metal plates or metal foils will result in highly efficient fire protection constructions.
Possible fire protection applications include ventilation ducts, gas flue shafts, fire dampers, wall ducts, doors, gates, walls, ceilings, IT safety cabinets and safes.

Processing
The material can be processed with standard woodworking machines. For machining we recommend the use of a dust extraction system. On request we can deliver blanks finished to your specifications.

SPECIAL FEATURES

- large-size up to 3.000 x 1.250 mm
- environmentally compliant construction material
- easy processing with screws, clamps or adhesive

Fire gate with SILCA® fire protection boards

SILCA® fire protection boards		Method	Unit	SILCA® 170SB	SILCA® 200	SILCA® 250SB
Certificate				Shipbuilding		
Certificate office				BG Verkehr - Ship Safety Division		
European notified body				Identification number 0736		
Manufacturer (applicant)				Calsitherm Silikatbaustoffe GmbH		
Address				Hermann-Löns-Straße 170 D - 33104 Paderborn		
EC-Type Examination (Module B) Certificate						
Certificate No.				107.082	107.063	107.055
As per Marine Equipment Directive (MED)				Directive 2014/90/EU, as last amended by Commission Implementing Regulation (EU) 2017/306		
Equipment (Number & Item designation)				MED/3.13 Non-combustible materials		
Specified standard				IMO Resolution MSC.307(88)-(FTP-Code 2010) Annex 1, Part 1		
Date of issue				13.03.2018		
Expiry date				12.03.2023		
Quality Assurance System Certificate (in conformity with Module D)						
Certificate No.				SEE18008		
As per Marine Equipment Directive (MED)				Directive 2014/90/EU		
Date of issue				08.03.2018		
Expiry date				16.01.2021		
CE-label according		EN 14306				
Inspection body				MPA NRW	MPA NRW	MPA NRW
Test report number				420002242 10-1-1	420002242 10-1-2	420002242 10-2-4
Bulk density (±10%)		EN 1094-4	kg/m³	180	210	250
Reaction to fire		EN 13501		A1		
Porosity		EN 1094-4	%	93	93	90
Compression strength		EN 826	MPa	1.6	1.8	1.8
Flexural strength		EN 12089	MPa	0.4	0.4	0.5
Thermal conductivity λ at t_m	200 °C	EN 12667	W/(m K)	0.07	0.07	0.08
	400 °C			0.10	0.10	0.10
	500 °C			0.12	0.12	0.12
	800 °C			0.25	0.25	0.18
Dimensions						
Standard sizes	Length x width		mm	1,250 x 1,000 / 1,500 x 1,250 / 3,000 x 1,250		
	Thickness		mm	25/30/40/50/60/65/70/75/80/90/100		
Tolerances (unpolished)	Length		mm	0/+30; *±2	500/1,000*/3,000	
	Width		mm	0/+10	1,250	
	Thickness		mm	≤50 ±2; >50 -3/+2		
Other dimensions are available on request (maximal 3,000 x 1,250).						

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

SILCA® fire protection boards		Method	Unit	SILCA® T300	SILCA® T500	SILCAPROTECT®
Certificate				Shipbuilding		
Certificate office				BG Verkehr - Ship Safety Division		
European notified body				Identification number 0736		
Manufacturer (applicant)				Calsitherm Silikatbaustoffe GmbH		
Address				Hermann-Löns-Straße 170 D - 33104 Paderborn		
EC-Type Examination (Module B) Certificate						
Certificate No.				107.048	107.094	
As per Marine Equipment Directive (MED)				Directive 2014/90/EU, as last amended by Commission Implementing Regulation (EU) 2017/306		
Equipment (Number & Item designation)				MED/3.13 Non-combustible materials		
Specified standard				IMO Resolution MSC.307(88)- (FTP-Code 2010) Annex 1, Part 1		
Date of issue				13.03.2018		
Expiry date				12.03.2023		
Quality Assurance System Certificate (in conformity with Module D)						
Certificate No.				SEE18008		
As per Marine Equipment Directive (MED)				Directive 2014/90/EU		
Date of issue				08.03.2018		
Expiry date				16.01.2021		
CE-label according		EN 14306				
Inspection body				MPA NRW	MPA NRW	MPA NRW
Test report number				420002242 10-4-1	420002465 14-1-1	420002465 14-2-1a
Bulk density (±10%)		EN 1094-4	kg/m³	340	500	600
Reaction to fire		EN 13501		A1		
Porosity		EN 1094-4	%	87	85	85
Compression strength		EN 826	MPa	2.8	5.0	5.0
Flexural strength		EN 12089	MPa	1.2	2.0	2.0
Thermal conductivity λ at t_m	200 °C	EN 12667	W/(m K)	0.09	0.15	0.14
	400 °C			0.10	0.18	0.17
	500 °C			0.13	0.18	0.20
	800 °C			0.19	0.32	0.32
Dimensions						
Standard sizes	Length x width		mm	1,250 x 1,000 / 1,500 x 1,250 / 3,000 x 1,250		
	Thickness		mm	25/30/40/50/60/65/70/75/80/90/100		
Tolerances (unpolished)	Length		mm	0/+30; *±2	500/1,000*/3,000	
	Width		mm	0 / +10	1,250	
	Thickness		mm	≤50 ±2; >50 -3/+2		
Other dimensions are available on request (maximal 3,000 x 1,250).						

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Mineral wool insulation boards

SILCAMIN

75-10, 75-12, 75-15, 75-18

SILCAMIN is classified as being harmless and fulfils all the legal requirements of the German Hazardous Materials Order in the version valid from October, 2000. The product's bio-solubility has been confirmed by the German Institute for Toxicology and Aerosol Research. Accordingly SILCAMIN is not subject to specific labelling requirements and the notification requirement at processing is not required.

SILCAMIN insulation boards are manufactured in accordance with the quality guide-line (Arbeitsblatt AGI Q132) by the Arbeitsgemeinschaft Industriebau e.V. and are externally monitored by recognized testing institutes in respect of quality assurance.

SILCAMIN insulation boards contain only a small amount of organic binders but this can escape at temperatures in excess of approx. 200 °C. Temporarily this can lead to a bad smell. Before using the product in closed systems and at operating temperatures in excess of 550 °C please consult our Technical Department.

The areas of application lie in the field of high-temperature thermal insulation in industrial furnaces, technical operating plant / systems, in the construction of dryers and apparatuses and in preventive fire protection.

SPECIAL FEATURES

- low binder component
- good temperature resistance
- good mechanical strength
- good homogeneity
- simple to process
- manufactured without silicone oil additives
- good insulating properties
- non-combustible A1

SILCAMIN		Method	Unit	75-10	75-12	75-15	75-18
Upper application limit temperature			°C	660	680	700	700
Melting point of the fibres		DIN 4102-17	°C	1,000	1,000	1,000	1,000
Nominal bulk density		EN1602	kg/m³	100	120	150	180
Fire behaviour		EN 13501-1		A1			
Thermal conductivity λ at t_m	50 °C	EN 12667	W/(m K)	0.040	0.040	0.040	0.041
	100 °C			0.045	0.045	0.045	0.046
	200 °C			0.061	0.059	0.057	0.059
	300 °C			0.083	0.078	0.075	0.073
	400 °C			0.110	0.105	0.095	0.092
	500 °C			0.143	0.134	0.117	0.113
	600 °C			0.185	0.167	0.145	0.140
	650 °C			0.205	-	-	0.165
	700 °C			-	0.188	0.180	-
Specific thermal capacity			kJ/(kg K)	1.03			
Chemical reference analysis	SiO_2		%	33 - 43			
	Al_2O_3			15 - 23			
	CaO+MgO			28 - 34			
	Fe_2O_3			4 - 8			
Organic binder / annealing loss		EN 13820	%	approx. 2			
Silicone oil additives				none			
Hydrophobizing		EN 1609		hydrophobic			
Dimensions							
Standard sizes	Length x width		mm	1,200 x 600			
	Thickness		mm	30/40/50/60 (on enquiry up to 100)			
Loose mineral wool in sacks à 10 kg, special sizes and special thicknesses on enquiry.							

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Microporous insulation boards

SILCAPOR

Ultra 950, Shape 950, High 1050, FP 1050

SILCAPOR is a lightweigth microporous insulation material for back-up insulation with extremely good thermal insulation properties. **SILCAPOR** are inorganic boards on the basis of highly dispersed amorphous silica with special infrared opacifiers. **SILCAPOR** is non-flammable and available with different laminations of aluminium foil or glass fibre fleece.

SILCAPOR Shape 950 is a microporous insulation material with an extremely low coefficient of thermal conductivity, i. e. with very good insulation properties.

SILCAPOR Ultra 950 and **SILCAPOR High 1050** are rigid boards. For the protection of the microporous structure these are available with different coatings (PE foil, aluminium foil, glass fibre fleece). Besides the dust-free handling depending on the variant there is an additional protection against humidity.

SILCAPOR-FP 1050 is a thin, flexible board. The coating with bio-soluble felt (thickness of approx. 0,5 mm) on both sides as well as the standard cover with PE foil ensure an easy and dust-free handling.

SPECIAL FEATURES

- microporous
- extremely good thermal insulation properties
- light
- low thermal shrinkage
- availability of different surface laminations
- dimensionally stable
- flexible (SILCAPOR-FP 1050)
- easy to process
- resistant against thermal and cold shocks

The fibres used for mechanical strengthening are not respirable according to the definition of the WHO. **SILCAPOR** is not a hazardous material according to Regulation (EC) No. 1907/2006, it does not release any hazardous decomposition products and does not represent a health risk for human beings according to current knowledge.

Wetting with liquids e.g. water, oil, petrol etc. irreversibly destroys the microporous structure of the material and has a negative impact on the thermal conductivity. Suitable surface treatment or lamination with aluminium foil prevents or clearly reduces the penetration of liquids. However, vapour diffusions do not produce any negative impacts since the insulation material is diffusion-stable.

SILCAPOR is to be stored and processed in dry surroundings and has an unlimited shelf life.

Processing
The boards can be processed with standard woodworking tools, preferably with cutters with smooth polish. We recommend an adequate dust extraction system.
On modern, computer-operated machines we manufacture tailor-made parts according to your specifications.

SILCAPOR		Method	Unit	Ultra 950	Shape 950	High 1050	FP 1050
Upper temperature limit of application			°C	950	950	1,000	1,000
Colour				Grey	White	White	White
Bulk density			kg/m³	200-250	300-350	250-310	280-350
Flammability properties		DIN EN 13501-1		A1			
Cold compression strength		ASTM C165	MPa	0.417	0.342	0.939	-
Hot compression strength		ASTM C165	MPa	0.71 (600 °C)	0.56 (600 °C)	1.3 (600 °C)	-
Linear shrinkage after 12 h (unilateral temperature loading)			%	0.6 (1,000 °C)	0.4 (1,000 °C)	0.6 (1,000°C)	0.6 (1,000 °C)
Linear shrinkage after 24 h (temperature loading from all sides)			%	1.1 (900 °C) 1.4 (950 °C)	1.1 (950 °C) 2.0 (1,000 °C)	1.6 (950 °C) 3.5 (1,000 °C)	1.7 (950 °C) 3.6 (1,000 °C)
Thermal conductivity λ at t_m	23 °C 100 °C 200 °C 400 °C 600 °C 800 °C	ASTM C177	W/(m K)	< 0.022 - 0.022 0.027 0.034 0.044	< 0.022 0.022 0.025 0.031 0.037 0.042	< 0.022 - 0.022 0.030 0.043 0.060	0.022 - 0.023 0.027 0.034 0.046
Typical chemical analysis	SiO_2 SiC $ZrSiO_4$ other		%	80 15 - 5	50 - 45 5	65 - 30 5	50 - 45 5
Dimensions							
Standard sizes	Length x width		mm	1,000x650		1,000x600	500x600 1,000x600
	Thickness		mm	10/15/20/25/30/35/40/45/50			5/10
Other dimensions are available on request.							

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

SILCAL 900

SILCAL 1000

SILCAL 1100

Lightweight calcium silicate boards

SILCAL 900, 1000, 1100

SILCAL is an environmentally friendly, lightweight, pressure-resistant and high-temperature-resistant insulating material based on lightweight calcium silicate.

SILCAL has proved itself in the most different areas of industry as backup insulation. In particular for the construction of industrial furnaces, dryers and apparatuses but also in the cement and petrochemicals industries, **SILCAL** is the classical cost-favourable insulating material.

In addition to its outstanding thermophysical properties, SILCAL is resistant to the reducing protective gases, H_2, CO, CH_4, NH_3, N_2.

SILCAL boards are surface-active and absorb water. For work in combination with refractory concretes, a hydrophobic sealing primer, which can be applied during production of the boards, is recommended. In this way time-consuming work with barrier film can be dispensed.

SILCAL is physiologically harmless and is classified by the Institut Bauen und Umwelt e.V. as an environmentally friendly construction product. In addition the product has been issued the internationally harmonized ecological label type III in accordance with ISO 14025 and EN 15804. The product is disposed of as construction rubble.

Machining
The elements can be machined using conventional woodworking machines. An appropriate dust extraction system should be provided. As breathing protection we recommend that a dust mask is worn. We will be pleased to produce the particular parts you require on our modern computer-controlled machining and grinding machines.

SPECIAL FEATURES

- environmentally friendly product
- good insulating properties
- easy to machine
- resistant to protective gases
- low bulk density
- low accumulation of heat
- large-size

Institut Bauen
und Umwelt e.V.

SILCAL		Method	Unit	900	1000	1100
Upper application limit temperature		EN 1094-6	°C	900	1,000	1,050
Bulk density (± 10 %)		EN 1602	kg/m³	260	255	255
Open porosity (in acc. with standard)		EN 993-1	%	90	90	90
Compression strength		EN 826	MPa	1.5	1.6	1.6
Flexural strength		EN 12089	MPa	0.5	0.5	0.5
pH-value		EN 13468		approx. 9		
Shrinkage after 12 h by upper application limit temperature Length and width		EN 1094-6	 %	 0.9	 1.0	 1.0
Thermal conductivity λ at t_m	200 °C 400 °C 600 °C 800 °C	EN 12667	W/(m K)	0.08 0.10 0.14 0.18		
Specific thermal capacity			kJ/(kg K)	0.8 – 1.2		
Coefficient of thermal expansion ⊥ perpendicular to board plane // parallel to board plane	RT-750°C	DIN 51045-5	$K^{-1} \times 10^{-6}$	 ⊥ 6.4 // 6.4		
Chemical composition Calcium silicate R_xO_x (R=Fe, Ti, K, Na) Annealing loss			 %	 91 1 8		
Dimensions						
Standard sizes	Length x width		mm	500 (±2) x 1,250 (0/+10) 1,000 (±2) x 1,250 (0/+10) 1,500 (±2) x 1,250 (0/+10) 1,000 (±2) x 625 (±2)		
	Thickness		mm	20/25/30/40/50/60/65/70/75/80/90/100		
Tolerances standard board						
unpolished	Thickness		mm	≤ 50 ± 2; > 50 -3/+2		
ground on one side				±0.6		
ground on both sides				±0.4		

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Lightweight calcium silicate boards

MICROCAL® 1100

MICROCAL® 1100 is a lightweight, pressure-resistant calcium silicate of the new generation. Through the addition of special opacifying infra-red agents, the amount of thermal radiation is reduced and the thermal conductivity in the high temperature range significantly reduced.

MICROCAL®is physiologically harmless and represents the trend-setting back-up insulation for modern furnace concepts.

MICROCAL® boards are large in size and have a good thermal stability and low thermal conductivity.

In addition to its outstanding thermophysical properties, **MICROCAL®** is resistant to reducing protective gases like H_2, CO, CH_4, NH_3, N_2.

MICROCAL® boards are surface-active and absorb water but release this again extremely rapidly. For work in combination with refractory concretes, a hydrophobic sealing primer, which can be applied during production of the boards, is recommended. In this way time-consuming work with barrier film can be dispensed with.

Machining
The elements can be machined using conventional woodworking machines. An appropriate dust extraction system should be provided. As breathing protection we recommend that a dust mask is worn. We will be pleased to produce the particular parts you require on our modern computer-controlled machining and grinding machines.

SPECIAL FEATURES

- environmentally friendly
- good insulating properties
- easy to machine
- resistant to protective gases
- low bulk density
- low accumulation of heat
- large-size

MICROCAL® 1100		Method	Unit	
Upper application limit temperature		EN 1094-6	°C	1,100
Bulk density (± 10 %)		EN 1602	kg/m³	260
Open porosity (in acc. with standard)		EN 993-1	%	90
Compression strength		EN 826	MPa	1.2
Flexural strength		EN 12089	MPa	0.4
pH-value		EN 13468		approx. 9
Shrinkage after 12 h		EN 1094-6		
Length and width	750 °C		%	0.25
Thickness	750 °C			0.90
Length and width	1,000 °C			0.30
Thickness	1,000 °C			1.30
Thermal conductivity λ at t_m	200 °C	EN 12667	W/(m K)	0.08
	400 °C			0.09
	600 °C			0.12
	800 °C			0.15
Specific thermal capacity			kJ/(kg K)	0.8 – 1.2
Coefficient of thermal expansion	RT-750°C	DIN 51045-5	$K^{-1} \times 10^{-6}$	⊥ 6.4
⊥ perpendicular to board plane				
// parallel to board plane				// 6.4
Chemical composition				
Calcium silicate			%	82-87
Zircon				5-10
R_xO_x (R=Fe, Ti, K, Na)				1
Annealing loss				7
Dimensions				
Standard sizes	Length x width		mm	500 (±2) x 1,250 (0/+10) 1,000 (±2) x 1,250 (0/+10) 1,500 (±2) x 1,250 (0/+10) 1,000 (±2) x 625 (±2)
	Thickness		mm	25/30/40/50/60/65/70/75/80/90/100
Tolerances standard board				
unpolished	Thickness		mm	≤ 50 ± 2; > 50 -3/+2
ground on one side				± 0.6
ground on both sides				± 0.4

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Blankets and papers based on aluminium silicate and polycrystalline wool

SILCAFLEX

126-10, 126-13, 126-16, 140-13, 143-13, 143-16, 160-10, 160-13, 140D, 160D, EXP paper

SILCAFLEX products are based on long-fibre aluminium silicate and polycrystalline wool for the highest demands. The fibres can be processed into various products, such as blankets, cords, paper, etc.

SILCAFLEX blankets are offered with a range of classification temperatures. They are flexible, especially low in shot content or, as the case may be, have zero shot content (**SILCAFLEX 160**) and are needled on both sides. They are characterized by high tear strength, low thermal conductivity and very high resilience.

SILCAFLEX products have excellent resistance to temperature changes and are resistant to most chemicals. Exceptions are represented by hydrofluoric acid, phosphoric acid and alkaline compounds. With severe thermal loading we recommend our mullite fibre **SILCAFLEX 160** with increased Al_2O_3 content.

SILCAFLEX paper is produced from aluminium silicate or polycrystalline wool and contains additional organic binders. This product is used in particular for thin thermal insulation applications (up to 3 mm).

Further forms of delivery such as **SILCAFLEX loose wool** are available on request.

Note:
Our EC safety data sheet will inform you about the protective measures to be taken when handling and using aluminium silicate wool as well as the health risks.

SILCAFLEX EXP is an expanding paper based on aluminium silicate fibres, vermiculite and binders and serves for the sealing of gaps since it expands at temperatures in excess of 330 °C and closes the gaps.

SPECIAL FEATURES

- resistant to high temperatures
- outstanding resistance to temperature changes
- low accumulation of heat
- high flexibility
- good tear strength
- good thermal insulation properties
- high chemical resistance

SILCAFLEX EXP paper	Unit	
Upper application limit temperature	°C	750
Bulk density (± 10 %)	kg/m³	630
Annealing loss at 900 °C	%	max. 15
Aluminium silicate fibre	%	30 – 40
Vermiculite		50 – 60
Organic binder		5 – 9
Dimensions		
Standard size	mm	10,000 x 762 x 4

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

SILCAFLEX blankets			Unit	126-10	126-13	126-16	140-13	143-13	143-16	160-10	160-13
Classification temperature			°C	1,260			1,400	1,430		1,600	
Bulk density			kg/m³	96	128	160	128	128	160	100	130
Shrinkage after 24 h			°C	1,100			1,300	1,300		1,500	
			%	2.2			3.0	2.0		0.7	
Thermal conductivity λ		200 °C	W/(m K)	0.06	0.06	-	-	0.06	-	-	-
at t_m		400 °C		0.11	0.10	0.09	0.11	0.10	0.09	-	-
		600 °C		0.16	0.15	0.13	0.15	0.15	0.13	-	-
		800 °C		0.23	0.20	0.18	0.21	0.20	0.18	0.20	0.18
		1,000 °C		0.32	0.27	0.25	0.31	0.27	0.25	-	-
		1,200 °C		-	-	-	0.44	-	-	0.42	0.36
		1,400 °C		-	-	-	0.64	-	-	0.59	0.51
Chemical reference		Al_2O_3	%	42 – 47			54	28 – 35		72	
analysis		SiO_2		53 – 58			46	50 – 56		28	
		ZrO_2		-			-	14 – 18		-	
Dimensions		Content		X = available; loose wool in 20 kg bags							
6 x 610 x 21,960	mm	13.34	m²	-	X	-	X	-	-	-	-
13 x 610 x 14,640	mm	8.93	m²	X	X	X	-	X	X	-	-
13 x 610 x 7,200	mm	4.39	m²	-	-	-	-	-	-	X	X
19 x 610 x 9,760	mm	5.59	m²	-	X	-	-	X	-	-	-
25 x 610 x 7,200	mm	4.39	m²	-	-	-	-	-	-	X	X
25 x 610 x 7,320	mm	4.46	m²	X	X	X	-	X	X	-	-
38 x 610 x 4,880	mm	2.98	m²	X	X	-	-	X	X	-	-
50 x 610 x 3,660	mm	2.23	m²	X	X	X	-	X	X	-	-

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

SILCAFLEX paper		Unit	140D		160D	
Classification temperature		°C	1,400		1,600	
Bulk density		kg/m³	210		150	
Shrinkage after 24 h		°C	1,400		-	
		%	3.0			
Thermal conductivity λ at t_m	100 °C	W/(m K)	0.048		0.040	
	300 °C		0.070		0.060	
	500 °C		0.105		0.090	
Chemical reference analysis	Al_2O_3	%	48-54		88	
	SiO_2		46-52		9	
Organic binder		%	6		6	
Dimensions						
Standard sizes	Length	mm	20,000	10,000	10,000	20,000
	Width	mm	500	500	500	500
	Thickness	mm	1	2/3	1/3	2

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Papers and felts based on aluminium silicate wool

SILCAFELT

130S, 140Z

SILCAFELT 130S is a flexible fibre paper with uniform structure and smooth surface.

SILCAFELT 140Z is a flexible fibre felt with high tensile strength.

SILCAFELT – products are made of aluminium silicate wool and special organic binders. The bonding agents escape at temperatures in excess of approximate 200 °C. These products are characterized by their high resilience, good temperature resistance and low thermal conductivity.

SILCAFELT is easy to work, cut and punch. Typical fields of application include high temperature gaskets, back-up insulations for the transport of liquid metals as well as expansion joints in refractory construction.

Note:
Our EC safety data sheet will inform you about the protective measures to be taken when handling and using aluminium silicate wool as well as the health risks.

SPECIAL FEATURES

- resistant to high temperatures
- low thermal conductivity
- easy to machine
- good insulating properties

SILCAFELT		Unit	130S	140Z
Upper application limit temperature		°C	1,250	1,400
Melting point		°C	1,800	1,740
Colour			white	white, beige
Bulk density		kg/m³	220 - 240	270
Breaking stress		kPa	> 350	> 50
Shrinkage after 24 h	1,250 °C	%	< 4	-
	1,400 °C		-	< 4
Thermal conductivity λ at t_m	600 °C	W/(m K)	0.08	-
	800 °C		0.11	0.15
	1,000 °C		0.17	0.21
	1,200 °C		-	0.29
Chemical reference analysis	SiO_2	%	50 – 54	52 – 56
	Al_2O_3		46 – 50	28 – 32
	ZrO_2		-	14 – 18
	$Fe_2O_3 + TiO_2$		< 0.2	-
	Alkalis		< 0.25	< 0.25
Annealing loss		%	< 12	< 10
Dimensions				
Standard sizes	Delivery form		Rolls	Boards
	Length	mm	10,000	1,250
	Width	mm	610/1,000	1,000
	Thickness	mm	1/2/3/4/5/6/8/10	6/9/12/18/25

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Lightweight construction system of aluminium silicate and polycrystalline wool
Ligthweight construction system of alkaline earth silicate wool

SILCAPACK, SILCABLOCK SILCAWOOL-PACK, SILCAWOOL-BLOCK

SILCAPACK and **SILCABLOCK** are lightweight construction systems of fibre blanket strips based on aluminium silicate and polycrystalline wool, which are laid at right angles to the steel jacket. This produces a brushlike arrangement of the fibres and high resistance to abrasion.

With **SILCAPACK** it is a matter of strips of fibre blankets, in which the fibres are arranged incoherently. The strips are precut to the insulating layer thickness of the refractory lining. At installation the **SILCAPACK** strips are pressed together to the desired bulk density and are glued to expanded metal as lamella strips with **SILCADUR-B90** adhesive.

SILCABLOCK modules are prefabricated fibre modules which are precompressed to bulk densities of 130 to 180 kg/m³ from fibre strips and are enclosed with tapes or cords or with a gauze material.

Thanks to their flexibility the systems can be matched very simply to every geometrical shape of the steel structure, e.g. pipe elbows, flue gas connections, dished boiler heads etc.

In systems with high flow speeds, e.g. with flue gas lines or burning chambers, the lining surface can be protected against erosive removal of the fibres with **SILCADUR** coating. In the case of chemical loading, we recommend that you contact our Technical Department.

The fibre module systems **SILCAWOOL-PACK** and **SILCAWOOL-BLOCK** are manufactured from different **SILCAWOOL** fibre qualities which are not classified as hazardous materials by reason of their reduced bio-persistency.

SPECIAL FEATURES

- low accumulation of heat
- high resistance to heat shock
- very variable in terms of shape
- rapid and economic installation
- low thermal shrinkage
- high resistance to abrasion
- low bulk density

Note:
Our EC safety data sheet will inform you about the protective measures to be taken when handling and using aluminium silicate wool as well as the health risks.

Mounting on sheet metal
For retention and reinforcement of the adhesive, an expanded metal grid is welded to the sheet metal. The installation of the **SILCAPACK** strips or **SILCABLOCK** modules is then carried out with **SILCADUR B90** adhesive.

Gluing to refractory concrete or brickwork
When gluing to refractory concrete or brickwork, care must be taken that the substrate is load-bearing. Refractory concrete must be first fired. Gluing to these substrates is carried out with **SILCADUR B165S** adhesive.

SILCABLOCK		Unit	126	143	160
Classification temperature		°C	1,260	1,430	1,600
Bulk density (± 10 %)		kg/m³	150 – 180	150 – 180	120 – 160
SILCAWOOL-BLOCK			**120**	**120P**	**130**
Classification temperature		°C	1,200	1,200	1,300
Bulk density (± 10 %)		kg/m³	150 – 180	150 – 180	150 – 180
SILCAPACK			**126**	**143**	**160**
Classification temperature		°C	1,260	1,430	1,600
Bulk density (± 10 %)		kg/m³	128	128	100
SILCAWOOL-PACK			**120**	**120P**	**130**
Classification temperature		°C	1,200	1,200	1,300
Bulk density (± 10 %)		kg/m³	128	128	128
Chemical reference analysis		%	Please see product data sheets 40.7 and 51.7 for the chemical reference analysis data of the base material.		
Dimensions**					
SILCABLOCK	Length x width*	mm	300 x 300* or 600 x 150* (standard sizes)		
SILCAWOOL-BLOCK	Thickness	mm	Insulating thickness variable from 75 up to 400		
SILCAPACK	Length x width*	mm	Strips 610 x 25* or 610 x 51* (standard sizes)		
SILCAWOOL-PACK	Thickness	mm	Insulating thickness variable from 50 up to 400		
* The „width“ dimension is equal to the stacking and compression direction of the fibre blanket strips.					
** Please note the order of dimensions when ordering: length x width* x insulation thickness					

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Thermal conductivity (empirical values)		Unit	SILCAPACK, SILCABLOCK, SILCASTACK, SILCAFIX SILCAWOOL-PACK / BLOCK, SILCAWOOL-STACK / FIX							
Material basis			SILCAFLEX (126, 143, 1400) SILCAWOOL (120, 120P, 130)						SILCAFLEX 160	
Classification temperature		°C	1,200 bis 1,430						1,600	
Bulk density		kg/m³	160	170	180	190	200	210	142	160
Thermal conductivity λ at t_m	200 °C	W/(m K)	0.08	0.08	0.07	0.07	0.07	0.07	0.08	0.08
	400 °C		0.10	0.10	0.10	0.10	0.09	0.08	0.09	0.09
	600 °C		0.16	0.15	0.14	0.13	0.12	0.11	0.13	0.13
	800 °C		0.23	0.21	0.19	0.18	0.17	0.16	0.19	0.18
	1,000 °C		0.32	0.29	0.26	0.24	0.22	0.20	0.28	0.26
	1,200 °C		0.42	0.38	0.33	0.31	0.29	0.27	0.41	0.37
	1,400 °C		-	-	-	-	-	-	0.61	0.52

Lightweight construction system of aluminium silicate, polycrystalline and alkaline earth silicate wool

SILCASTACK, SILCAFIX SILCAWOOL-STACK / -FIX

SILCASTACK and **SILCAFIX** are lightweight construction systems of compacted fibre blanket strips based on aluminium silicate and polycrystalline wool including mechanical anchoring for front-side use in industrial furnaces and apparatuses for temperatures up to 1,450 °C. The system consist of prefabricated and perforated fibre modules which are manufactured of different fibre types. Different bulk densities and module dimensions can be specified. If required wedge modules, angled modules etc. can be manufactured.

Strap B-anchor A-anchor

SILCASTACK and **SILCAFIX** systems are manufactured of special homogeneous, flexible fibre blankets with high resilience and classification temperatures of 1,260 – 1,600 °C. Able to be supplied in addition to gauze and tape modules are forms of execution with cords as well as also **combination modules**. At levels of compaction upwards of 200 kg/m³ the modules are manufactured as tape modules with plywood boards.

The lightweight construction systems can be combined with different back-up insulation layers, e.g. to improve the corrosion protection, as a vapour barrier or to optimize the insulating properties.

The heat-resistant mechanical anchoring systems are selected in accordance with the wall structure as well as in accordance with the particular thermal and chemical loading expected.

The systems have proved themselves under extreme conditions of use, e.g. for forging furnaces, ceramic kilns, ladle heaters, refuse incineration plants, exhaust gas cleaning and bogie hearth furnaces. When there will be chemical loading, we recommend that you contact our Technical Department.

In plants/systems with high flow speeds, e.g. in exhaust gas lines or combustion chambers, the lining surface can be protected with **SILCADUR** Coating to reduce erosion of the fibres.

The fibre module systems **SILCAWOOL-STACK** and **SILCAWOOL-FIX** are manufactured from different **SILCAWOOL** fibre qualities which are not classified as hazardous materials by reason of their reduced bio-persistency.

SPECIAL FEATURES

- lightweight, low accumulation of heat
- resistant to thermal shock
- can be shaped very variably
- reliable anchoring system
- low thermal shrinkage
- high mechanical strength
- rapid and economic to install
- high resistance to abrasion
- high chemical loadability

Note:
Our EC safety data sheet will inform you about the protective measures to be taken when handling and using aluminium silicate wool as well as the health risks.

SILCASTACK / FIX		Unit	126	143	160
Classification temperature		°C	1,260	1,430	1,600
Bulk density (±10%)		kg/m³	150 – 220	150 – 220	120 - 160
SILCAWOOL-STACK /-FIX			**120**	**120P**	**130**
Classification temperature		°C	1,200	1,200	1,300
Bulk density (±10%)		kg/m³	150 – 180	150 – 180	150 – 180
Chemical reference analysis		%	Please see product data sheets 40.7 and 51.7 for the chemical reference analysis data of the base material.		
Standard anchor			Material 1.4828		
Threaded bolts			Material 1.4301 (standard), optional 1.4841		
Hexagon nut			Material 1.4301 (standard), optional 1.4845		
Dimensions**					
SILCASTACK / FIX	Length	mm	600 and 300 (standard sizes), special dimensions on request		
SILCAWOOL-STACK / FIX	Width*	mm	300* and 150* (standard sizes), special dimensions on request		
	Thickness	mm	Insulating thickness variable from 100 up to 350		
* The „width“ dimension is equal to the stacking and compression direction of the fibre blanket strips					
** Please note the order of dimensions when ordering: length x width* x insulation thickness					

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Mounting

SILCASTACK modules have mechanical anchoring systems. As a rule with **SILCASTACK** threaded bolts are secured to the furnace and the **SILCASTACK** anchors are screwed on. The modules are supplied with prepunched holes and are simply pushed over the **SILCASTACK** spears. The tip of the spear is pushed into the tab of the previous anchor at the start of the module row.

Thermal conductivity (empirical values)		Unit	SILCAPACK, SILCABLOCK, SILCASTACK, SILCAFIX SILCAWOOL-PACK / BLOCK, SILCAWOOL-STACK / FIX							
Material basis			SILCAFLEX (126, 143, 1400) SILCAWOOL (120, 120P, 130)						SILCAFLEX 160	
Classification temperature		°C	1,200 bis 1,430						1,600	
Bulk density		kg/m³	160	170	180	190	200	210	142	160
Thermal conductivity λ at t_m	200 °C	W/(m K)	0.08	0.08	0.07	0.07	0.07	0.07	0.08	0.08
	400 °C		0.10	0.10	0.10	0.10	0.09	0.08	0.09	0.09
	600 °C		0.16	0.15	0.14	0.13	0.12	0.11	0.13	0.13
	800 °C		0.23	0.21	0.19	0.18	0.17	0.16	0.19	0.18
	1,000 °C		0.32	0.29	0.26	0.24	0.22	0.20	0.28	0.26
	1,200 °C		0.42	0.38	0.33	0.31	0.29	0.27	0.41	0.37
	1,400 °C		-	-	-	-	-	-	0.61	0.52

Combination modules based on aluminium silicate and polycrystalline wool

SILCASTACK combination modules

SILCASTACK combination modules are an economical alternative to full-fibre modules made of **SILCAFLEX 160**, because part of the high quality fibre is replaced by **SILCAFLEX 143**.

SILCASTACK combination modules are strip modules and consist of a combination of two different fibre types. The lining thickness and bulk densities of the modules are selected in accordance with the thermal and chemical requirements to be satisfied in the system to be lined. Fibres with a classification temperature of 1,600 °C are used on the hot side and fibres with 1,430 °C in the colder area.

The combination of the two fibre types is brought about by means of an intermeshing of the individual strips with one another. In this way a reliable and durable bond is produced.

SILCASTACK combination modules are used primarily in the high temperature range at up to 1,450 °C. These are the ideal solution for problems in the high temperature range and are used for example in the ceramic industry and in forging furnaces in which high demands in respect of thermal and/or chemical resistance are placed.

SILCASTACK combination modules are suitable not only for side walls but also for the doors and ceiling.

Through the use of **SILCASTACK combination modules** in these areas of application longer service lives are achieved and the susceptibility of the systems for repair work is reduced. Laying is carried out direct on to the surface of the furnace or with back-up insulation materials such as fibre blankets, boards etc.

Securing of the combination modules is carried out with our well-known heat-resistant anchoring system.

Please see data sheet "**SILCASTACK**, **SILCAFIX**" and the product data sheets of the particular fibre types used for further details on the chemical and physical properties.

Bogie hearth furnace 1,350 °C with SILCASTACK combination modules

Modules based on aluminium silicate and polycrystalline wool
Modules based on alkaline earth silicate wool

SILCAFIX modules
SILCAWOOL-FIX modules

In contrast to **SILCASTACK**, the **SILCAFIX modules** are secured in the middle. This has the advantage that the modules can also be used in areas that are difficult to access, for example as a final module, where it is no longer possible to work from the side. The actual anchoring devices (strap and spears) are integrated in the module as it is being produced.

For securing the **SILCAFIX modules** require only one threaded bolt that is located in the centre of the module. The threaded bolt is welded on to the housing with a stud welding machine (drawn arc) or manual welding (electrode) and the module can then be pushed over the bolt. After this the anchoring on the inside is screwed up with a collar nut. This is carried out through the centrally placed tube. The tube is removed after the module has been secured and the opening is closed. This mode of securing makes it possible to remove or repair individual modules easily.

SILCAFIX modules are made of **SILCAFLEX 126** to **160** fibre blankets. **SILCAWOOL-FIX modules** are manufactured from the fibre blankets of the various **SILCAWOOL** qualities.

Please see data sheet "**SILCASTACK**, **SILCAFIX**" and the product data sheets of the particular fibre types used for further details on the chemical and physical properties.

Boards based on aluminium silicate and alkaline earth silicate wool

SILCABOARD, SILCASAL

110-50, 126-26, 126-35, 140Z, 85-97B, 110-96B

SILCABOARD boards are vacuum-shaped high temperature insulating boards of special mixtures of aluminium silicate fibres. The different bulk densities and classification temperatures in which the product is available make it possible for the boards to be used in very different areas in the construction of furnaces, machines and apparatuses as well as also in the aluminium industry.

SILCABOARD boards have a good level of homogeneity and a high level of dimensional stability. Qualities **126-35** and **140Z** are characterized by good strength and have proved themselves for front-side use. The maximum application temperature depends on the particular construction and in cases of doubt should be discussed with our Technical Department.

Note:
Our EC safety data sheet will inform you about the protective measures to be taken when handling and using aluminium silicate wool as well as the health risks.

SILCASAL boards are bound with organic binders. They are manufactured by pressing and thereby possess high bulk density in combination with good mechanical strength. They are very well suited for thin intermediate layers for reducing thermal bridges.

SILCASAL 85-97B is manufactured of bio-degradable mineral wool and fillers. The synthetic mineral fibres used are not classified as hazardous material in accordance with GHS/CLP CE N°1272/2008.

SILCASAL 110-96B is a board based on wollastonite and contains no synthetic mineral fibres.

SILCABOARD 110-50 is an inorganic, double-hardened aluminium silicate fibre board. By reason of its special mechanical strength, this board is used, for example, for the lightweight lining of launder systems in the aluminium industry.

Machining
SILCABOARD and **SILCASAL** boards can be machined using woodworking machines. An appropriate dust extraction system should be provided.

SILCASAL boards can be matched to curved shapes by moistening them. After they have dried out again, the boards regain their initial strength.

Please see data sheet **SILCAVAC / SILCABOARD** for further qualities.

SPECIAL FEATURES

- low thermal conductivity
- resistant to high temperatures
- good resistance to temperature changes
- good machinability

SILCABOARD SILCASAL		Unit	SILCASAL 85-97B	SILCASAL 110-96B	SILCABOARD 126-26	SILCABOARD 126-35	SILCABOARD 140Z
Classification temperature		°C	850	1,100	1,200	1,200	1,400
Bulk density		kg/m³	910	950	300	390	340
Flexural strength		MPa	–	–	>0.7	>0.8	>0.8
Shrinkage after 24 h		°C	850	1,000	1,200	1,200	1,400
		%	< 2	< 1	< 4	< 4	< 4
Thermal conductivity λ at t_m	400 °C	W/(m K)	0.10	0.12	–	–	–
	600 °C		0.11	0.13	0.09	0.13	–
	800 °C		0.13	0.16	0.13	0.16	0.16
	1,000 °C		–	0.20	0.17	0.19	0.20
	1,200 °C		–	–	–	–	0.26
Chemical reference analysis	Al_2O_3	%	20.6	17.9	42.0 – 50.0	42.0 – 50.0	28.0 – 32.0
	SiO_2		53.3	44.5	50.0 – 58.0	50.0 – 58.0	52.0 – 56.0
	ZrO_2		–	–	–	–	14.0 – 18.0
	$Fe_2O_3 + TiO_2$		3.9	1.2	< 0.2	< 0.2	< 0.2
	CaO + MgO		3.7	20.2	–	–	–
	Alkalis		1.9	0.9	< 0.25	< 0.25	< 0.25
Organic binder		%	10.0	12.8	–	–	–
Annealing loss		%	17.0	16.0	< 7.0	< 9.0	< 9.0
Dimensions							
Standard sizes	Thickness	mm	2 – 10	1 – 10	5 – 50*	5 – 50*	5 – 50*
	Length x width	mm	1,000 x 1,000	1,000 x 1,000	1,000 x 610 1,250 x 1,000	1,000 x 610 1,250 x 1,000	1,000 x 610 1,250 x 1,000

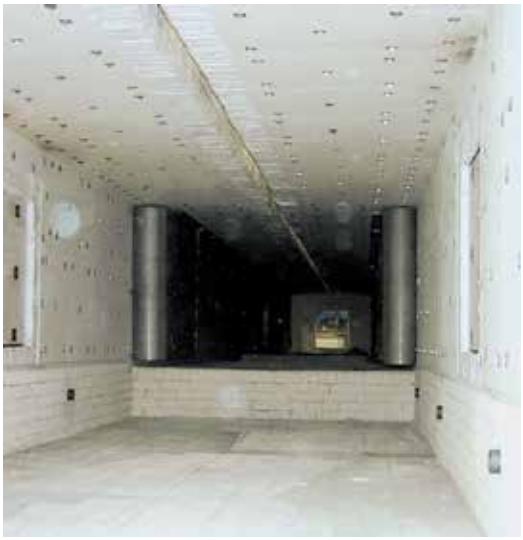
*Special thicknesses or hardened boards are available on request.

In addition to the specified boards, other SILCABOARD qualities for temperature ranges up to 1,800 °C can be supplied.

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

SILCABOARD 110-50		Unit	
Classification temperature		°C	1,100
Bulk density		kg/m³	approx. 500 - 600
Shrinkage after 24 h	1,000 °C	%	1.5
Thermal conductivity λ at t_m	400 °C	W/(m K)	0.10
	600 °C		0.12
	800 °C		0.15
Chemical reference analysis	Al_2O_3	%	25
	SiO_2		72
Organic binder		%	3
Dimensions			
Standard sizes	Thickness	mm	25 – 50
	Length x width	mm	1,000 x 610

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.



SILCABOARD boards for the construction of furnaces as ceiling and side lining.

Moulded parts and boards based on aluminium silicate and polycrystalline wool

SILCAVAC / SILCABOARD

126-27N, 143-28N, 160-25N, 170-40N, 180-40N

SILCAVAC – shaped parts and **SILCABOARD boards** are vacuum formed fibre products. This manufacturing process represents the most economical solution for bigger quantities in the most different geometries.

SILCAVAC / SILCABOARD 126-27N and **143-28N** consist of aluminium silicate fibres as well organic and inorganic binders. For **SILCAVAC** / **SILCABOARD 160-25N** part of the aluminium silicate fibres is replaced by polycrystalline fibres.

SILCAVAC / SILCABOARD 170-40N and **180-40N** are made of polycrystalline fibres as well as organic and inorganic binders. Higher bulk densities are obtained through the use of inorganic fillers.

Spezial mixtures are available for the production of **SILCAVAC / SILCABOARD** shaped parts / boards suitable for temperatures up to 1.800 °C.

Further treatment of **SILCAVAC / SILCABOARD** is possible if required. Thus, the shaped parts and boards may be pre-fired at temperatures between 800 °C and 1.100 °C in order to remove the organic components. Depending on the application and requirements the surface may be hardened or coated. Our application engineers will be pleased to give advise on the advantages and disadvantages of the different further treatments.

Note:
Our EC safety data sheet will inform you about the protective measures to be taken when handling and using aluminium silicate wool as well as the health risks.

SPECIAL FEATURES

- High temperature resistance
- Good thermal shock resistance
- Low thermal conductivity
- Thermally pre-fired on demand
- Good workability

SILCAVAC / SILCABOARD		Unit	126-27N	143-28N	160-25N	170-40N	180-40N
Classification temperature		°C	1,200	1,400	1,600	1,700	1,800
Bulk density		kg/m³	< 350	< 350	< 350	350 – 500	350 – 500
Shrinkage after 24 h	1.000 °C	%	2.1	1.5	–	–	–
	1,100 °C		2.7	1.9	–	–	–
	1,200 °C		3.2	2.3	–	–	–
	1,300 °C		–	3.8	1.0	–	–
	1,400 °C		–	–	1.2	–	–
	1,500 °C		–	–	1.5	0.2	–
	1,600 °C		–	–	2.8	0.2	0.1
	1,700 °C		–	–	–	0.5	0.15
Thermal conductivity λ at t_m	400 °C	W/(m K)	0.08	0.09	–	–	–
	600 °C		0.12	0.12	0.15	–	–
	800 °C		0.15	0.16	0.18	0.21	0.22
	1,000 °C		0.20	0.22	0.25	0.24	0.25
	1,200 °C		–	–	0.32	0.28	0.29
	1,400 °C		–	–	–	0.35	0.35
Chemical reference analysis	Al_2O_3	%	45	–	66	79	85
	$Al_2O_3 + ZrO_2$		–	52	–	–	–
	SiO_2		55	48	34	21	15
Annealing loss		Wt-%	< 6.0	< 6.0	< 6.0	< 6.0	< 6.0
Dimensions SILCABOARD							
Standard sizes	Thickness	mm	10 – 50*	10 – 50*	10 – 50*	10 – 50*	10 – 50*
	Length x width	mm	1,000 x 610	1,000 x 610	900 x 600	900 x 600	900 x 600
			1,200 x 1,000	1,200 x 1,000			
*Special thicknesses up to 100 mm, hardened, coated or pre-fired boards are available on demand							

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Textiles based on aluminium silicate wool

SILCAFLEX textiles

110-30K, 126K

SILCAFLEX textiles are produced from long-fibre aluminium silicate wool which is processed into the following products:

- SILCAFLEX ropes
- SILCAFLEX braided packings
- SILCAFLEX tapes
- SILCAFLEX woven material
- SILCAFLEX sealing cords

In the manufacturing process organic supporting material, e.g. cotton, is added. In addition to this supporting material which escapes when the temperature is raised, a fine chromium-nickel wire or a fine glass core filament is used for reinforcement.

SILCAFLEX textiles are light in weight, flexible and have good thermal insulation properties. They are resistant to most chemicals. Exceptions are hydrofluoric acid and phosphoric acid as well as concentrated alkalis.

Note:
Our EC safety data sheet will inform you about the protective measures to be taken when handling and using aluminium silicate wool as well as the health risks.

All **SILCAFLEX** cords, gaskets and tapes are also available in our organically soluble variant **SILCAWOOL 120**. For the technical details of the base material please see our data sheet No. 51.7.

SPECIAL FEATURES

- resistant to high temperatures
- outstanding resistance to temperature changes
- high flexibility
- good thermal insulation properties
- high chemical resistance
- low shot content

SILCAFLEX textiles	Unit	110-30K 126K
Classification temperature of the base material	°C	1.260
Decomposition of the organic supporting material	°C	from 200
Application temperature for the chromium steel wire	°C	max. 1.050
Application temperature for the glass core filament	°C	max. 650

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

SILCAFLEX 126K ropes
Loosely twisted with chromium wire or glass core filament (round)

Dimensions	Roll length
Ø 3 mm	200 m
Ø 4 mm	150 m
Ø 5 mm	100 m
Ø 6 mm	100 m
Ø 8 mm	100 m
Ø 10 mm	100 m
Ø 12 mm	100 m
Ø 15 mm	50 m
Ø 20 mm	50 m
Ø 25 mm	50 m
Ø 30 mm	25 m
Ø 40 mm	20 m
Ø 50 mm	10 m
Special dimensions and blanks available on request	

SILCAFLEX 126K braided packings
Braided with chromium wire or glass core filament (square)

Dimensions	Roll length
5 x 5 mm	100 m
6 x 6 mm	100 m
8 x 8 mm	100 m
10 x 10 mm	50 m
12 x 12 mm	50 m
15 x 15 mm	50 m
20 x 20 mm	30 m
25 x 25 mm	30 m
30 x 30 mm	10 m
35 x 35 mm	10 m
40 x 40 mm	10 m
50 x 50 mm	10 m
60 x 60 mm	10 m
Special dimensions and blanks available on request	

SILCAFLEX 126K braided packings
Braided with chromium wire or glass core filament (round)

Dimensions	Roll length
Ø 5 mm	100 m
Ø 6 mm	100 m
Ø 8 mm	100 m
Ø 10 mm	50 m
Ø 12 mm	50 m
Ø 15 mm	50 m
Ø 20 mm	30 m
Ø 25 mm	30 m
Ø 30 mm	10 m
Ø 40 mm	10 m
Ø 50 mm	10 m
Ø 60 mm	10 m
Special dimensions and blanks available on request	

SILCAFLEX 126K tapes
Woven tapes with two firm selvedges and chromium wire or glass core filament

Nominal thickness	Width	Roll length
2 mm	10/15/20/25/30/40 50/60/75/80/100 120/150/200 mm	25 m
3 mm	10/15/20/25/30/40 50/60/75/80/100 120/150/200 mm	25 m
5 mm	15/20/25/30/40/50 60/75/80/100/120 150/200 mm	25 m
Special dimensions and blanks available on request		

SILCAFLEX 126K woven material
Woven material with chromium wire or glass core filament

Nominal thickness	Width	Roll length
2 mm	1 m	30 m
3 mm	1 m	30 m
Special dimensions and blanks available on request		

SILCAFLEX 110-30K ropes
Ropes with chromium wire or glass core filament, wide-mesh or close-mesh braiding with soft filling

Dimensions	Roll length
Ø 15 mm	25 m
Ø 20 mm	25 m
Ø 25 mm	25 m
Ø 30 mm	25 m
Ø 35 mm	25 m
Ø 40 mm	25 m
Ø 50 mm	25 m
Ø 60 mm	25 m

Blankets, papers and boards based on alkaline earth silicate wool

SILCAWOOL

120P, 130 blankets, 120, 120P, 130 paper, 110, 115, 130 boards

SILCAWOOL 120, 120P and **130** are alkaline earth silicate wool products based on calcium magnesium silicate. They have increased bio-solubility and in this way represent an alternative to the previously known aluminium silicate wool. Thanks to their high bio-solubility the products do not require to be labelled as hazardous material.

SILCAWOOL has excellent thermal stability in normal oxidizing atmospheres. However, by reason of its increased bio-solubility, the product is subject to chemical attack, in particular in moist atmospheres in combination with acids / alkalis.

SILCAWOOL 120 fibres can also be supplied as loose fibres and possess lubricants which outgas when heated. Paper produced from **SILCAWOOL 120** fibres contains binders which escape when heated.

SILCAWOOL 120P and **130** blankets are needled on both sides and possess high tensile strength. These blankets contain no lubricants or binders which could be emitted on being heated.

SILCAWOOL 120P and **130** fibres are converted to boards and paper. These products contain binders which are released when the product is heated.

SILCAWOOL 120P or **130** blankets can also be used for the **SILCABLOCK**, **SILCASTACK**, **SILCAFIX** and **SILCAPACK** lightweight construction systems. However attention should be paid to the fact that technical parameters arise with the use of these alkaline earth silicate wool other than those listed in the data sheets for the use of aluminium silicate wool.

SPECIAL FEATURES

- resistant to high temperatures, low shrinkage
- excellent resistance to thermal shock
- good thermal insulation properties
- lightweight, flexible and easy to process
- low accumulation of heat
- high bio-solubility
- high tensile strength

SILCAWOOL blankets			Unit	120P-96	120P-128	120P-160	130-10	130-13
Classification temperature			°C	1,200			1,300	
Bulk density			kg/m³	96	128	160	96	128
Shrinkage after 24 h			°C	1,200			1,300	
EN 1094-1			%	≤ 1.0			≤ 4.0	
Thermal conductivity λ at t_m		200 °C	W/(m K)	0.05	0.05	0.04	0.05	0.04
		400 °C		0.09	0.08	0.07	0.10	0.08
		600 °C		0.14	0.12	0.11	0.19	0.14
		800 °C		0.21	0.18	0.16	0.32	0.23
		1,000 °C		0.29	0.25	0.23	0.48	0.34
ASTM C-201		1,200 °C		–	–	–	0.69	0.48
Chemical reference analysis		SiO_2	%	62 – 68			70 – 80	
		CaO+MgO		29 – 39			18 – 25	
		other		< 1			< 3	
Dimensions		Content		X = available				
6 x 610 x 5,500 (4x)	mm	13.42	m²	-	X	-	-	X
13 x 610 x 14,640	mm	8.93	m²	X	X	X	X	X
19 x 610 x 9,760	mm	5.95	m²	X	X	X	-	-
25 x 610 x 7,320	mm	4.46	m²	X	X	X	X	X
38 x 610 x 4,880	mm	2.98	m²	X	X	-	-	X
50 x 610 x 3,660	mm	2.23	m²	X	X	-	-	X
Roll width 1,220 mm on special request, available in a quantity-dependent manner.								
Loose wool in 20 kg bags.								

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

SILCAWOOL		Unit	Papers			Boards			
Quality			120	120P	130	110-35A	110-32A	115-36A	130-35A
Classification temperature		°C	1,200	1,200	1,300	1,100	1,100	1,150	1,300
Bulk density (mean value)		kg/m³	ca. 150	190 - 210	210	350	320	360	350
Shrinkage after 24 h		°C	1,200	1,000	1,300	1,100	1,100	1,150	1,300
ASTM C-201		%	<4.0	<2	<2	<1.0	<1.2	<1.3	<1.5
Compression strength (at 10 % compressive strain)		MPa	-	-	-	0.3	0.3	0.3	0.3
Flexural strength		MPa	-	-	-	1.5	0.8	1.2	1.4
Thermal conductivity	200°C	W/(m K)	0.05	0.05	0.04	–	0.05	0.06	0.05
λ at t_m	400 °C		0.08	0.07	0.07	0.09	0.07	0.09	0.08
	600 °C		0.11	0.11	0.10	0.12	0.09	0.12	0.11
	800 °C		0.15	0.16	0.14	0.15	0.12	0.15	0.15
	1,000 °C		0.20	0.23	0.19	–	0.16	–	0.20
ASTM C-201	1,200 °C		–	–	0.25	–	–	–	0.26
Chemical reference analysis	SiO_2	%	61-67*	62 - 68*	70 – 80*	67	59	73	78
	CaO+MgO		30-40*	29 - 39*	18 – 25*	27	28	17	20
	other		< 2*	< 1*	< 3*	< 6	< 13	< 10	< 2
* Chemical composition of the fibres									
Dimensions SILCAWOOL papers									
Length x width			Thickness						
40,000 x 500/1,000**		mm	1	1	1				
20,000 x 500/1,000**		mm	2	2	2				
15,000 x 500		mm	-	3	3				
10,000 x 500/1,000**		mm	3/4/5/6	4/5/6/8/10	4/5/6/8/10				
** SILCAWOOL 120									
610 or 1,000 width on demand									
Dimensions SILCAWOOL boards									
Length x width						Thickness			
1,200 x 1,000		mm				6/7,5 10/13 15		10/13 20/25 40/50	25 40 50
1,000 x 600		mm					25/30 40/50		

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Ropes, tapes and woven products based on glass filaments

SILCAVER 55
FIBREGLASS TEXTILES

SILCAVER fibres are **glass filaments**.

SILCAVER products are outstandingly soft and ductile, do not cause any irritation of the skin and are harmless in respect of health.

SILCAVER fibres are converted to:
- Ropes
- Packings
- Tapes
- Woven products

SILCAVER products are non-combustible and have good thermal insulating properties as well as chemical stability to a large extent.

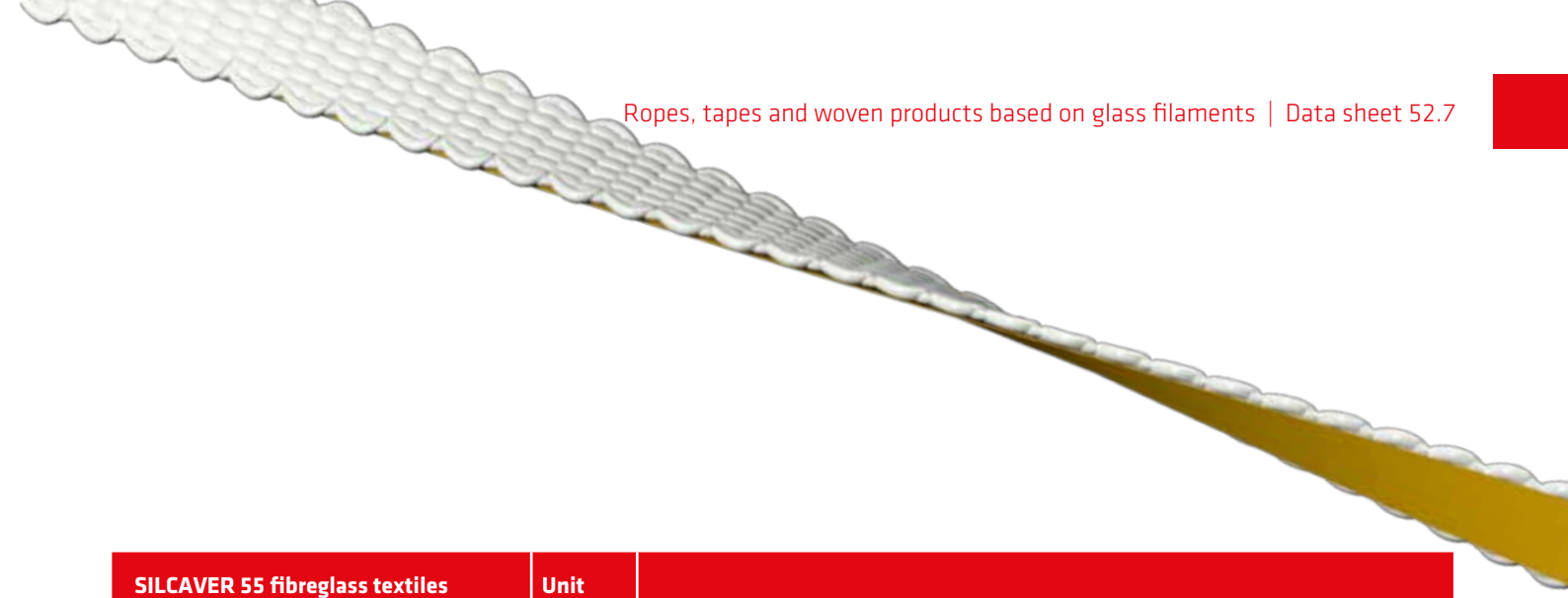
These properties open up a wide spectrum of opportunities for use including:
- Sealing of inspection hatches
- Sealing of boilers and furnace doors

Our Technical Department will be pleased to advise you on the selection of the best material. For high-temperature applications our **SILCAFLEX textiles** are also available to you as an alternative.

As an option **SILCAVER 55** tapes can be fitted with self-adhesive foil. In this way time-saving and simple installation is achieved.

SPECIAL FEATURES

- good insulating properties
- high thermal stability
- harmless in respect of health
- flexible and tearproof



SILCAVER 55 fibreglass textiles		Unit	
Application limit temperature		°C	450
Application limit temperature for short times up to		°C	550
Fibre type			E-glass
Filament diameter		µm	6 – 15
Combustibility			Non-combustible in the sense of EN 13501-1.
Chemical resistance			Resistant to oils, greases, solvents and organic acids; hydrologically to resistant DIN 1211, class 1.
Toxicity			Contains no toxic substances or heavy metals.
Forms of delivery			
Rope, twisted (round)	Diameter	mm	Ø 3/4/5/6/8/10/12/15/20/25/30/40/50
	Length (at Ø)	m	200 (Ø 3), 150 (Ø 4), 100 (Ø 5 - 12), 50 (Ø 15 - 25), 25 (Ø 30), 20 (Ø 40), 10 (Ø 50)
Packing, braided (round)	Diameter	mm	Ø 5/6/8/10/12/15/20/25/30/40/50/60
	Length (at Ø)	m	100 (Ø 5 - 8), 50 (Ø 10 - 15), 30 (Ø 20 - 25), 10 (Ø 30 - 60)
Packing, braided (square)	Cross section	mm	□ 5/6/8/10/12/15/20/25/30/40/50/60
	Length (at □)	m	100 (□ 5 - 8), 50 (□ 10 - 15), 30 (□ 20 - 25), 10 (□ 30 - 60)
Tapes	Thickness	mm	2/3
	Width	mm	10/15/20/25/30/40/50/60/75/80/100/120/150/200
	Length	m	50
Tapes	Thickness	mm	5
	Width	mm	15/20/25/30/40/50/60/75/80/100/120/150/200
	Length	m	25
Woven material	Thickness	mm	3
	Width	mm	1000
	Length	m	50

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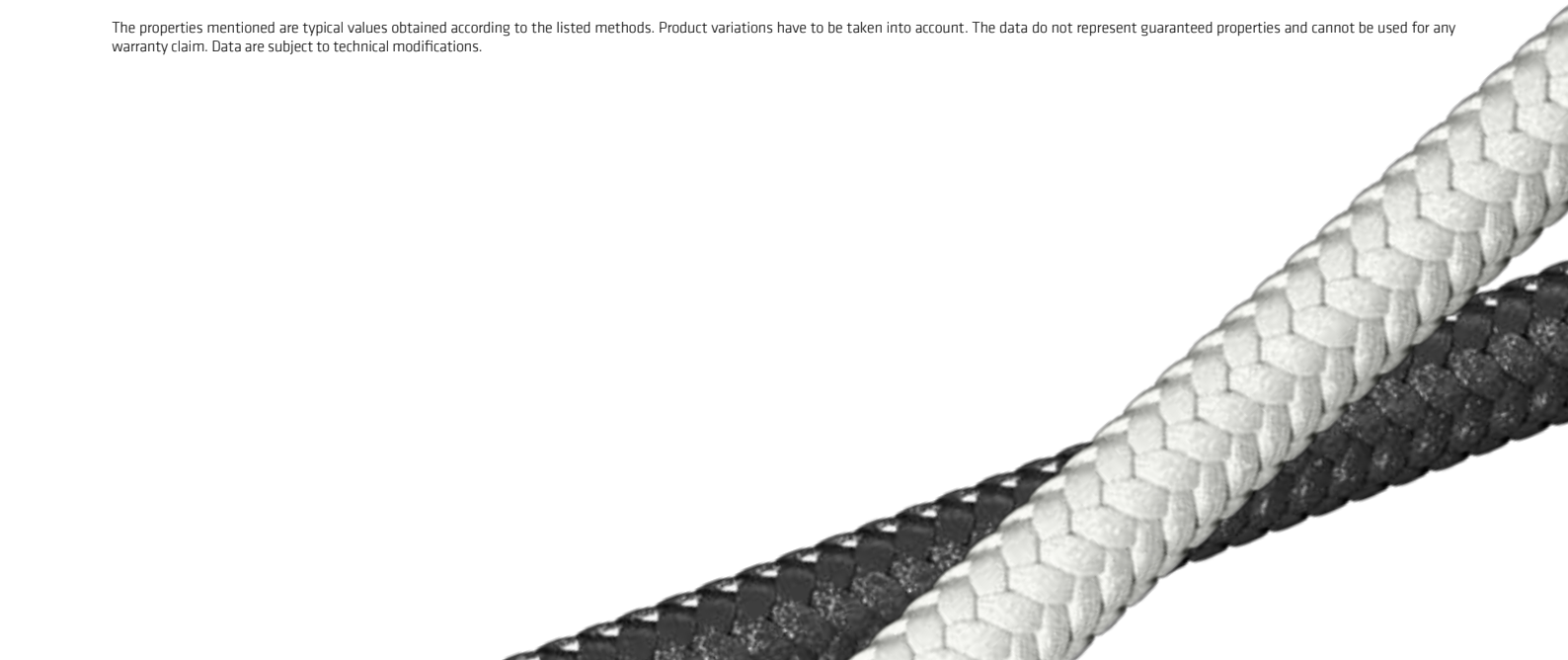


Lightweight refractory bricks

SILCAREF 1300-780, 1400-860

SILCAREF lightweight refractory bricks are produced by extrusion. These have a low proportion of ferrous oxide and are resistant to atmospheres containing carbon monoxide.

They are suitable for application in furnaces and thermotechnical systems, especially in continuously operating plants. The lightweight refractory bricks can be used for back-up and front insulation. In case of application in the front corrosive stress should be avoided and the mechanical load should be low.

Apart from the standard dimensions we can also produce blanks from these standard sizes (e.g. arch bricks). The production of blanks is not oriented on the standard dimensions. Therefore, any desired diameter can be produced from one brick size. This facilitates assembly and minimizes waste.

SILCAREF 1300-780

SILCAREF 1400-860

SPECIAL FEATURES

- low thermal conductivity
- good compressive strength
- low thermal shrinkage
- low bulk density
- easy to work

SILCAREF		Method	Unit	1300-780	1400-860
Classification temperature			°C	1,300	1,400
Standard group		EN 1094-2		130	140
Bulk density		EN 1094-4	kg/m³	780	860
Cold compression strength		EN ISO 8895	MPa	1.7	2.4
Permanent linear change		EN 1094-6	°C 12 h	1,300 -0.8 %	1,400 -1.0 %
CO resistant		ASTM C 288		Class A	Class A
Thermal conductivity λ at t_m	400 °C 600 °C 800 °C 1,000 °C	ASTM C 182-88	W/(m K)	0.25 0.28 0.31 -	0.28 0.31 0.35 0.39
Chemical reference analysis	Al_2O_3 SiO_2 Fe_2O_3	EN ISO 21587-2	%	43 52 1.4	45 51 1.2
Dimensions					
Standard sizes			mm	230 x 114 x 64 (NF1) 230 x 114 x 76 (NF1-76) 250 x 124 x 64 (NF2)	230 x 114 x 64 (NF1) 230 x 114 x 76 (NF1-76) 250 x 124 x 64 (NF2)
Special dimensions on request		Cuts are only available from standard dimensions..			
Other qualities		Special qualities are available on request.			

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Roller hearth furnace 1050 °C with SILCAREF

Adhesives, hardeners, coatings, high-temperature silicone

SILCADUR / SILCASIL adhesives

B 90, U 95, 126 hardener, 130 coating, 130 adhesive, B 165S, CSMH, 320

SILCADUR products are specifically adapted to the wide range of our insulating materials in respect of temperature resistance and the particular application.

The quality of a refractory lining or a technical thermal insulation is crucially determined by the mortars, adhesives, hardeners and other auxiliary agents. High-quality raw materials and appropriate bonding systems are a prerequisite for the thermal stability. Good homogeneity, adhesion and workability are the basis for a cost-effective assembly.

SILCADUR products are to be stored and transported frost-free (min. +5 °C). Unless otherwise stated, the shelf life of unopened packages is six months. Opened packages have to be tested for their suitability before use.

SILCASIL 320 is a high-temperature silicone with excellent adhesive strength and a high temperature-resistance of up to 320 °C. The product is available in resealable tubes of 100 ml or cartridges of 310 ml.

SPECIAL FEATURES

- homogeneous
- ready for use
- high temperature resistance
- good adhesive power
- good chemical resistance

Designation	Type of material	Temperature limit of application	Density	Consumption	Consistency	Packaging unit	Shelf life at 5 – 20 °C
		°C	kg/m³	kg/m²			Months
SILCADUR-B 90 adhesive	Two-component adhesive	1,000	1,900	-	powdery	Bucket 20 kg	6
SILCADUR-U 95 adhesive	Universal construction adhesive	950	1,500	-	pasty	Bucket 15 kg	12
SILCADUR 126 hardener	Surface hardener	1,100	1,280	0.6 – 1.2	liquid	Bucket 6 kg	6
SILCADUR 130 coating	Surface coating	1,300	-	1.5 *) 3 - 4.5 **)	creamy/ pasty	Bucket 5 l Bucket 10 l	12
SILCADUR 130 adhesive	Adhesive	1,300	-	1.5	pasty	Bucket 5 kg Bucket 10 kg	9
SILCADUR-B 165S adhesive	Adhesive mortar filler	1,500	2,200	-	creamy/ pasty	Bucket 25 kg	12
SILCADUR-CSMH adhesive	Adhesive	1,300	1,580	-	creamy/ pasty	Cartridge 310 ml Can 500 ml	12
SILCASIL 320	Silicone grey	320	1,150	-	-	Cartridge 310ml Tube 100 ml	12

*) Vacuum moulds (1 mm); **) fibre modules (2 - 3 mm)

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

SILCADUR-B 90 adhesive
Powder-form two-component adhesive prepared by mixing with water. The product has proven to be suitable for the bonding of **SILCABLOCK** and **SILCA-PACK** on expanded metal grids. It has good adhesive properties and also provides acid resistance for the expanded metal grid. At assembly the consistency of the adhesive can be set to the desired level. After hardening **SILCADUR-B 90** is waterproof.

SILCADUR-U 95 adhesive
Pasty high temperature adhesive ready for use. It can be used as a mounting aid for **SILCAL** and **SILCAMIN** boards but not for overhanging sections. As a result of its composition from inorganic sodium silicate **SILCADUR U95** is soluble in water to a limited extent.

SILCADUR 126 hardener
Inorganic liquid ready for use that can be applied by brush or roller or even be sprayed on. **SILCADUR 126 hardener** serves for the strengthening of fibre surfaces from aluminium silicate and alkaline earth silicate wools. After drying it improves the fibre adhesion to the surface, especially with particle-free exhaust gas at high velocities.

SILCADUR 130 coating
Ready-to-use coating for the surface treatment of products based on aluminium silicate and alkaline earth silicate wool. Its creamy consistency permits it to be applied by brush. A maximum of 5 % water may be added. At room temperature the coating sets on contact with air. When applying to vacuum formed products make sure that only the pores on the surface are sealed. In order to avoid spalling of the coating the maximum layer thickness should not exceed one millimetre.

SILCADUR 130 adhesive
Ready-to-use adhesive for the bonding of products based on aluminium silicate and alkaline earth silicate wool to different surfaces. Its pasty consistency permits it to be applied by trowel or brush. At room temperature it sets on contact with air. Where necessary up to 5 % of water can be added. Porous surfaces have to be prewetted.

SILCADUR-B 165S adhesive / mortar filler
Ready-to-use mortar filler for refractory bricks or light-weight refractory bricks. It must be mixed thoroughly before use.

SILCADUR-CSMH adhesive
Assembly and repair adhesive on inorganic basis for application with maximum temperature of 1,300 °C. For the bonding of dense calcium silicates and other refractory construction materials or as mounting aid for the bonding of metals. The drying time depends on the ambient temperature and humidity and at least 24 hours should be allowed.

SILCASIL 320 high temperature silicone
SILCASIL 320 can be applied to most surfaces, e. g. to metal, ceramics or mineral building materials, provided these are load-bearing, clean and dust-free. The product may not be subjected to temperature loading until it has dried completely.

SILCADUR			B 90 adhesive	U 95 adhesive	130 coating	130 adhesive	B 165S adhesive	CSMH adhesive
Electric mixing			X***)	X	X	X	X	X
Spraying			-	-	X	-	-	-
Processing with brush			-	X	X	X	-	-
Processing with trowel			X	-	-	X	X	X
Bonding of	Fibre mats		-	-	-	X	-	-
	Fibre modules		X	-	-	X	X	-
	Fibre strips		X	-	-	X	X	-
	Fibre felts		-	-	-	X	-	-
	Fibre papers		-	-	-	X	-	-
	Light-weight refractory bricks		-	-	-	-	X	-
	Calcium silicate - light		-	X**)	-	-	-	-
	Calcium silicate - dense		-	-	-	-	-	X
	Mineral wool		-	X**)	-	-	-	-
Suitable surface	Fibre modules		-	-	X	-	-	-
	Vacuum moulds		-	-	X	X	-	-
	Light-weight refractory bricks		-	-	X*)	X*)	X	X
	Refractory walls		-	-	-	X	X	X
	Refractory concrete		-	-	-	X	X	X
	Metal surface		-	X**)	-	X	-	X**)
	Expanded metal grids		X	-	-	-	-	-
Chemical analysis (dry)	SiO_2	%	90	68	< 18	> 55	50	-
	Al_2O_3		3	16	> 75	> 35	42	-
	P_2O_5		2.5	-	-	-	-	-
	$Na_2O + K_2O$		3.1	14	< 8	< 5	2.8	-
	$Fe_2O_3 + TiO_2$		-	<1	-	< 2	3.7	-
	CaO + MgO		-	<1	< 1	-	0.8	-
Remarks	*) porous surface must be pre-moistured **) use as mounting aid ***) trowel or electric mixer							

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

High temperature paste

SILCADUR HTP

SILCADUR HTP (high temperature paste) is SILCA's latest innovation. The paste facilitates the disassembly and assembly of components after a longer production time and prevents the burning in of bolts, hinges and screw connections. Furthermore it is also used for the lubrication of chains as well as movable and sliding parts in non-ferrous die-casting and low pressure moulds.

SILCADUR HTP	
Colour	silver-grey
Solid lubricants	inorganic constituents
Operating temperature	-25 °C up to +1,000 °C
Dropping point DIN ISO 2176	no
NLGI class	1
Transport ADR/SDR	no dangerous good
Packaging unit	Can 1 kg

The properties mentioned are typical values obtained according to the listed methods. Product variations have to be taken into account. The data do not represent guaranteed properties and cannot be used for any warranty claim. Data are subject to technical modifications.

Accessories

Anchoring systems

For the anchoring of insulating materials we offer a wide range of different pins, bolts and anchors.

For lining with mats by the layer installation technique, anchoring with bayonet pins, installation clips and front-side rotating clips has proved itself. Where a solid board, e.g. SILCABOARD, is used as inner insulating layer, threaded bolts and end-clips are used. The end-clip is pushed over the thread and locks in there.

At higher temperatures or where there is high mechanical loading, a thicker threaded anchor plate can be used as closure.

In addition to metal end-plates, ceramic securing devices – so-called cup-locks – are available. These have the advantage that the temperature loading is not transferred completely to the threaded stud since this does not extend into the inside of the furnace. Thus the anchoring of the cup-lock takes place within the thermal insulation.

For the individual areas of application different qualities of steel are available – starting with 1.4301 via 1.4841 to 2.4851.

SPECIAL FEATURES

- resistant to high temperatures
- material quality in accordance with temperature requirements
- rapid installation through stud welding

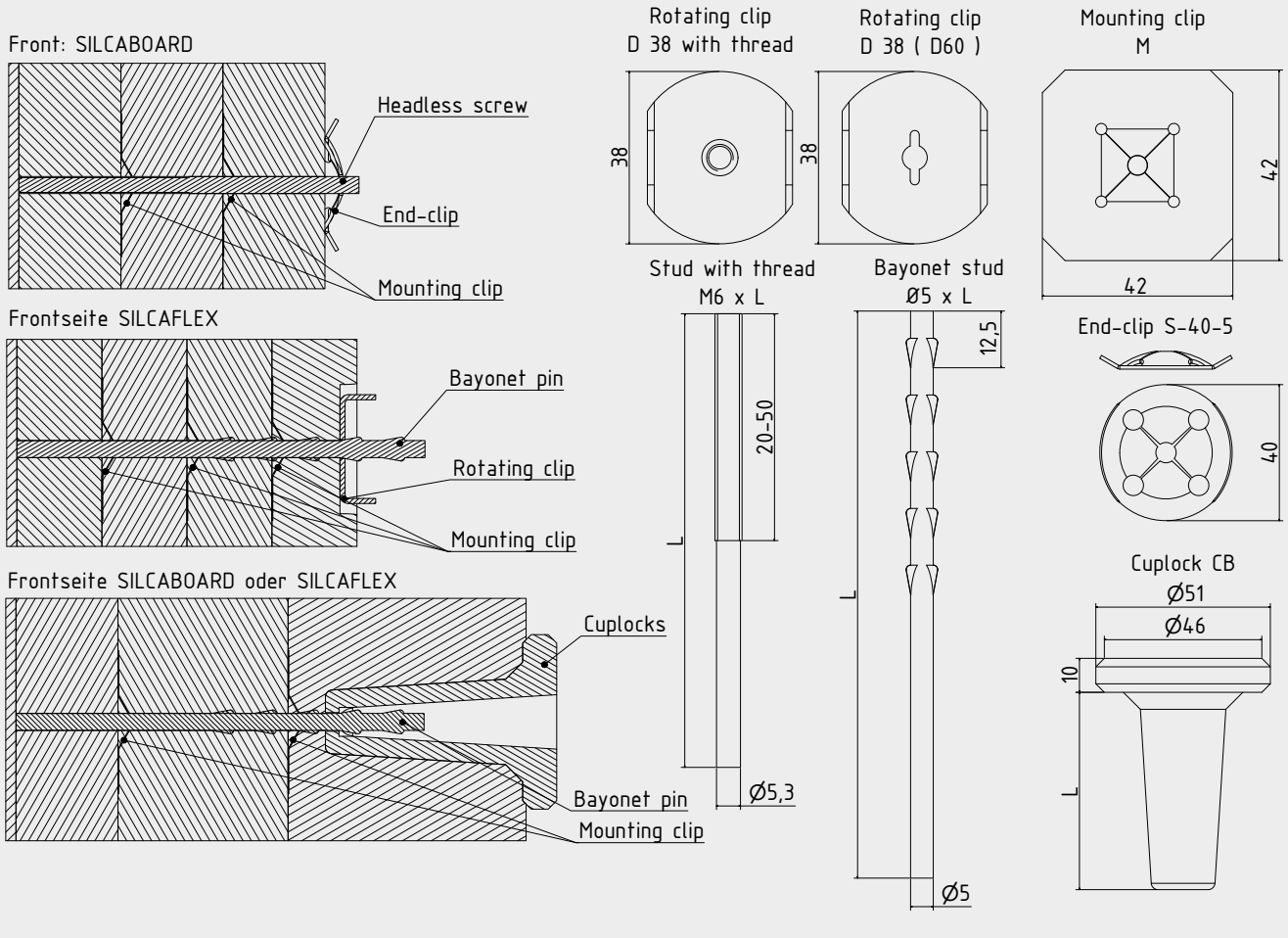
Material designation	Length	Material	Temperature resistance *)
Bayonet pin Ø 5 x length	40 – 400 mm (steps at 5 mm)	1.4301 1.4828 1.4841	500 °C 850 °C 950 °C
Rotating clip D 38 (D 60) for bayonet pin			
Studs M5 x length Studs M6 x length	25 – 400 mm (steps at 5 mm)		
Rotating clip D 38 threaded M6			
End-clip S-40-5 End-clip S-40-6			
Mounting clip M		Mild steel 1.4301	300 °C 500 °C
Cup-lock CB 1“ Cup-lock CB 2“	26 mm 59 mm	Ceramic	1,050 °C (low resistance to temperature change)
Expanded metal grid, width 1,000 mm x L	5,000 mm	Mild steel	300 °C
Expanded metal grid, width 1,000 mm x L	1,000 mm	1.4301 1.4841	500 °C 950 °C
Expanded metal grids are secured with Ø 3 x 35 mm pins. Requirement: approx. 25 pins /m² of material St37.			
*) The scale limit temperatures are 700 °C (1.4301), 1,000 °C (1.4828) and 1,150 °C (1.4841).			
The maximum application temperature of the cup-lock is limited by the maximum application temperature of the metallic anchorage.			

In order to permit installation to be carried out rapidly, the anchorings are designed for stud welding machines. The studs are welded on rapidly and reliably with a drawn-arc welding system with the aid of a ceramic ring.

All bayonet pins and studs can be welded on with commercially available stud welding devices. Ceramic rings for welding on are supplied.

You will find details of the special anchoring systems for the SILCASTACK and SILCAFIX module systems on data sheet No. 44.7.

Securing systems



Cast items for non-ferrous metal melts

SILCAFUSE

110-168, 110-196

SILCAFUSE are cast ceramic components based on fused silica for direct contact with non-ferrous metal melts. They are not wetted by liquid non-ferrous metal melts and are suitable for applications up to 1100 °C. **SILCAFUSE** is ceramic bonded, thermally pre-fired and anhydrous.

SILCAFUSE has a low coefficient of thermal expansion and accordingly possesses very high resistance to temperature changes and temperature shocks.

In particular for launders the low thermal expansion is of advantage as the butt joints can be cast so that there are effectively no joints. In combination with our micro-porous back-up insulation **SILCAPOR** the energy losses of the launders are minimized and the temperature homogeneity of the melt is significantly improved.

SILCAFUSE 110-168 and **110-196** are used for launders, ladles, thimbles, baffle plates, bushings and a variety of casting nozzles. The materials differ in respect of bulk density and therefore also in respect of thermal conductivity.

There is great flexibility in respect of shape and design because the parts are manufactured by casting. The moulds are produced using up to date 3D printing techniques.

SPECIAL FEATURES

- good mechanical strength
- not wetted by non-ferrous metals
- minimal thermal expansion
- good resistance to abrasion
- high resistance to temperature changes
- variable designs

SILCAFUSE		Unit	110-168	110-196
Upper application limit temperature		°C	1,100	1,100
Bulk density (± 10 %)		kg/m³	1,680	1,890
Open porosity		Vol.-%	-	13.50
Cold compression strength		MPa	29	78
Flexural strength		MPa	18	-
Shrinkage	12 h at 750 °C	%	0	0
Thermal conductivity λ at t_m	400 °C	W/(m K)	0.47	-
	500 °C		-	0.55
	600 °C		0.49	-
	700 °C		-	0.75
Thermal expansion	50 °C	$K^{-1} \times 10^{-6}$	-	0.48
	200 °C		-	0.65
	400 °C		-	0.82
	600 °C		-	0.96
	800 °C		-	0.98
	1,000 °C		0.71	0.86
Chemical reference analysis	SiO_2	%	98.5	99.40
	Al_2O_3		<0.1	0.44
	TiO_2		-	<0.01
	Fe_2O_3		-	<0.01
	CaO		1.4	0.02
	MgO		-	<0.01
	Na_2O_3		-	0.02
	K_2O		-	<0.01
	ZrO_2		-	<0.01
Cristobalite content		%	<0.6	<1.0

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silca
refractory solutions

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