Burners – Direct Heating
Focal Point: Maximum Output

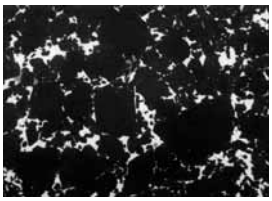
Advantages

- No porosity, therefore excellent oxidation and corrosion resistance
- Very good thermal shock resistance
- Stability of shape up to the maximum operating temperature
- Very good thermal conductivity
- Low mass
- High degree of reliability and economy in service
- Optimum efficiency

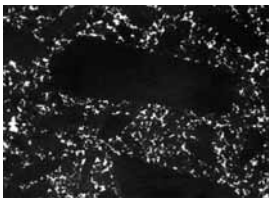
Technical Data

		CarSIK-G	CarSIK-GG
Bulk density	(g/cm³)	3.09	3.15
Apparent porosity	(vol. %)	0	0
Modulus of rupture	(MPa)	280	280
Weibull modulus		10	10
Compressive strengths	(MPa)	1,000	1,000
Modulus of elasticity	(GPa)	360	360
Vickers hardness	(MPa)	SiC 25,000 Si 9,000	SiC 25,000 Si 9,000
Thermal expansion coefficient	20°–1,000 °C (1/°C)	4.9×10^{-6}	4.9×10^{-6}
Thermal conductivity (W/mK)	100 °C	160	160
	1,200 °C	24	24
Specific heat (J/kgK)	RT	600	600
	1,300 °C	1,200	1,200
Limit of application [Melting point silicon (°C)]	(°C)	1,380 [1,380]	1,500 [1,380]
Chemical composition (wt. %)	SiC	88	92
	Free Si	11	7

CarSIK-G



CarSIK-GG

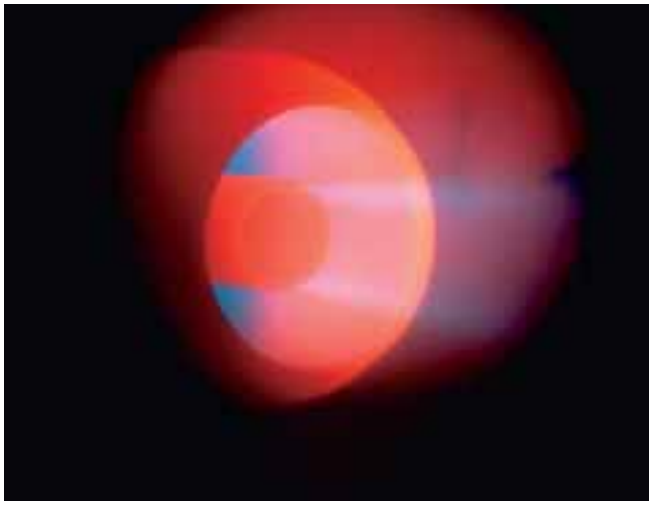


Dark phase = SiC
Light phase = free Si

The values quoted above were determined on test specimens and cannot generally be applied to all shapes.

Process modifications have opened up a wide range of applications for ceramic burners, to such an extent that metals have been substituted in most application areas.
Within this area of ceramics, silicon-infiltrated, reaction-bonded silicon carbide (RBSiC) deserves special mention. Due to its excellent properties, this material ensures that optimum long-term performance, within the specified temperature range, is achieved in comparison with such materials as recrystallized silicon carbide (RSiC) and silicon nitride- bonded silicon carbide (NSiC).

CarSIK-G burner tubes have been used successfully for many years by almost all of the main furnace constructors worldwide in gas- and oil-fired industrial kilns (e.g. pulse-type and recuperative burners) and in household burners. An increasing degree of automation is making greater demands on ceramic burner components. Through direct communication with constructors and end users, Schunk Ingenieurkeramik GmbH can develop solutions specific to each individual customer up to the production stage. Such an example could be in the area of the recuperative-type burner which has made significant technological progress over the last few years. Due to the introduction of new low NO_X firing concepts and a modified RBSiC ceramic, a further highly advanced firing technology is available, for which Schunk Ingenieurkeramik has taken an important market position. A high degree of development and application know-how means that an innovative advantage can be gained as a result of close engineering cooperation with customers from different market segments. The result is the development of **CarSIK-GG**.



Burner (Stordy)

Roof-firing with BIC burners (Kromschröder)

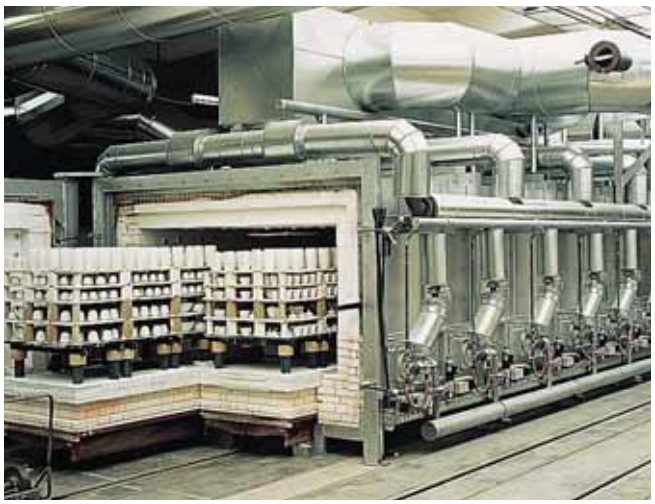
References

Roller kiln (Sacmi)

Burner (Siti)

This material, which, due to the modification in slip composition, has a content of free silicon of only <7% by weight, enables burner operation within the higher temperature range of 1,500°C, depending on individual application conditions, an area in which the other currently commercially available RBSiC products cannot be used.

Various forming processes are available depending on the different shape geometries required. The main process used is slip-casting, which enables production of complex shapes while at the same time keeping tight dimensional tolerances. This type of production can be adopted from prototype up to high-volume manufacture.

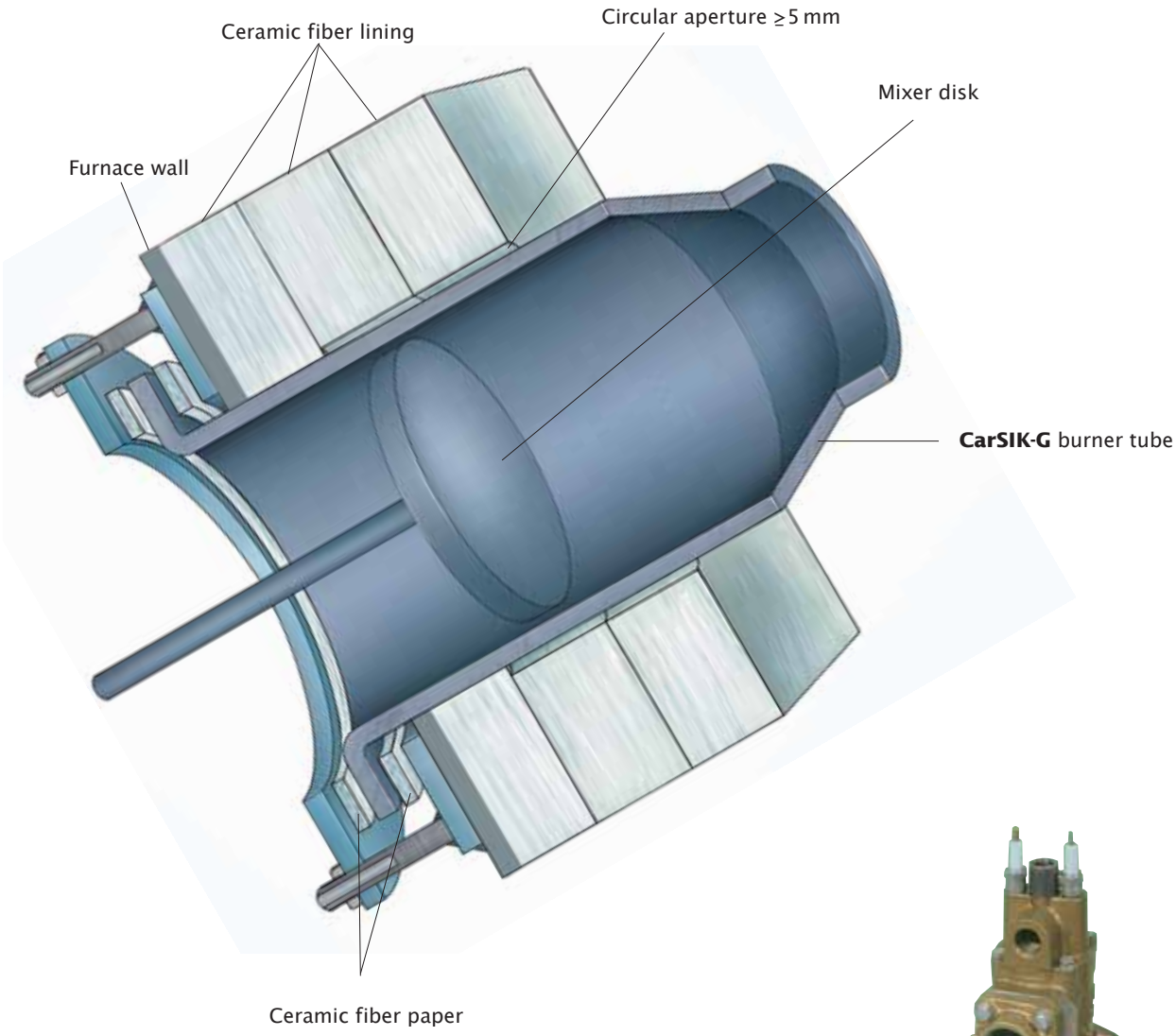


Intermittent kiln (Riedhammer)

Intermittent kiln (Eisenmann)

Example of Installation

Typical installation of CarSIK burner tubes



CarSIK components for heat engineering are designed around the inherent properties of ceramics. An important factor also to be considered if efficient burner operation and long operating life are to be achieved is the method of securing the flame tube to the outer part of the metallic burner.

Burner (Stordy)

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