



## 先进的硅酸盐陶瓷 解决方案

## Innovative Solutions using Silicate Ceramics



#### 先进的解决方案

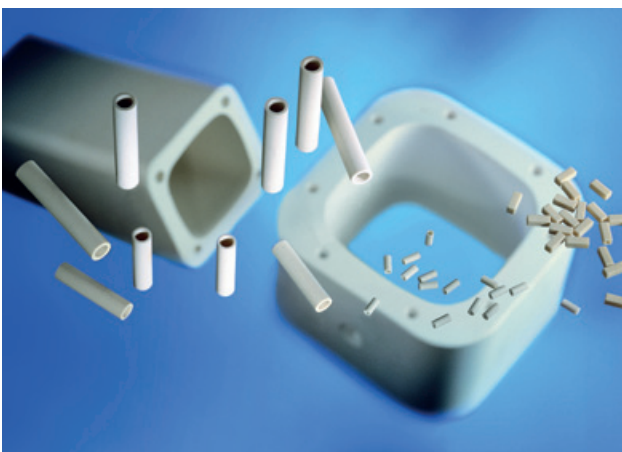
- 可靠的电绝缘性
- 低热导率
- 极低且可微调的热膨胀系数
- 高强度
- 复杂的几何构型
- 相比其他陶瓷材料可达到的更严格的公差
- 出色的性价比

#### INNOVATIVE SOLUTIONS

- reliable electrical insulation
- low thermal conductivity
- minimized and tunable coefficient of thermal expansion
- high strength
- challenging geometries
- tighter tolerances compared to other ceramic materials
- excellent value for money

## 应用领域/产品

## Applications/Products:



#### 电子保险丝和断路器

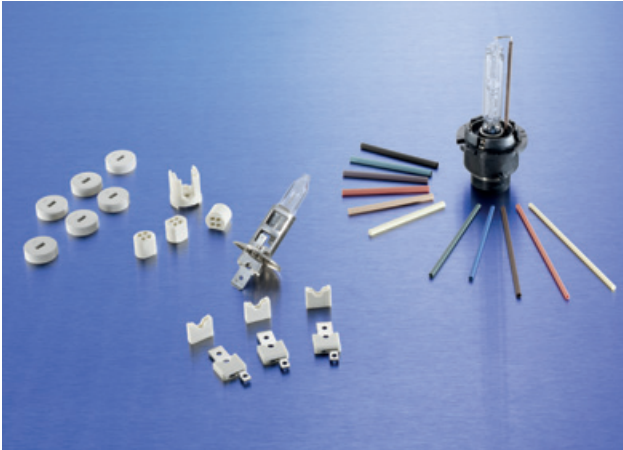
- 管状和贴片型保险丝管体
- 高性能低压型保险丝的绝缘体
- 高性能高压型保险丝的载体
- 塑料封壳中抵挡电弧放电的绝缘弧板

#### Electronic Fuses and Circuit Breaker

- Tubes and SMT fuse bodies
- Insulator bodies for low-voltage high-performance fuses
- Fuse carriers for high-voltage high-performance fuses
- Arc plates for the insulation of plastic enclosures against arc discharge

## 应用领域/产品

## Applications/Products:



### 汽车工业

- 卤素灯的壳体和基体部分
- 汽车氙气灯的绝缘管和基体部分
- 辅助供热系统中温度传感器的绝缘部分
- 瓷盘、绝缘端子以及其他基体部分

### Automotive

- Sockets and system parts for halogen lamps
- Insulation tubes and system parts for automotive HID-lamps
- Insulation parts for temperature sensors for auxiliary heating systems
- Discs, insulators, and other system parts



### 绝缘和温控科技

- 恒温调节器的限幅器管
- 恒温器的基座 (外壳)
- 电气 (电子) 开关的绝缘零件
- 端子基座
- 用于高频电场的绝缘端子

### Insulating and Temperature Control Technology

- Limiter tubes for thermostats
- Thermostat bases ( housings)
- Insulating components for electrical switches
- Terminal bases
- Insulators in high frequency electric fields



### 射频技术的支座绝缘

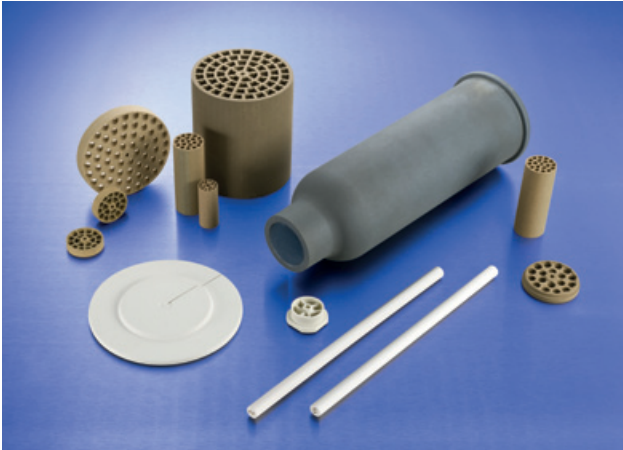
- 陶瓷支座绝缘端子的一个显著优势是其在射频领域中的低功率损耗。Frequenta材料的高强度 (弹性模量为 120,000N/mm) 在一些格外要求精度的领域中被广泛认可。它的电学参数, 尤其是高绝缘能力, 赋予了陶瓷支座绝缘端子绝佳的性能。

### Standoff Insulators for Radio Frequency

- A distinguish feature of ceramic standoff Insulators is the low power loss in the radio frequency field. The high strength of the material Frequentia (E-module 120,000N/mm) is highly recognized in many applications where precision is of particular interest. The electrical values, in particular the high insulating capacity give the ceramic standoff insulators excellent properties.

# 应用领域/产品

## Applications/Products:

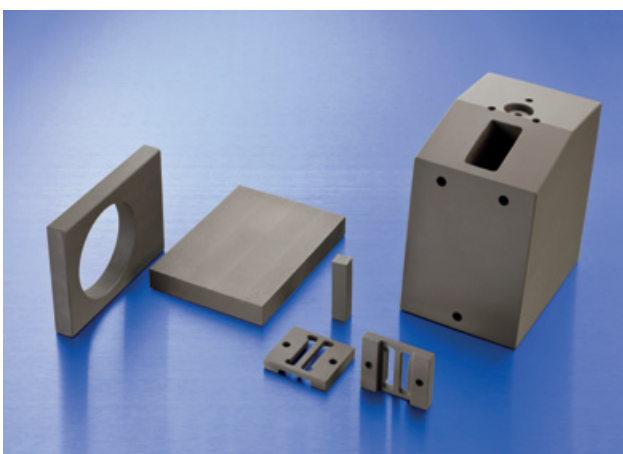


### 供热和热能工程

- 工业热风扇的核心加热元件
- 高温应用领域的电学绝缘
- 高性能火炉、热风机、烘干机等的核心加热元件
- 燃气供暖器的点火器喷嘴
- 煤气灶中用于减少氮氧化物的火焰冷却杆
- 用于点燃气料混合物的点火管
- 用于香气和杀虫剂排放实验的挥发芯
- 用于化学实验室样本测试的陶瓷芯

### Heating and Thermal Engineering

- Heating element cores for industrial hot-air fans
- Electrical insulators for high temperature applications
- Heating element cores for high-performance furnaces, fan heaters, tumble dryers, etc.
- Pilot jets for flame guidance in gas heaters
- Flame cooling rods for NOX reduction in gas burners
- Ignitor tubes for igniting air/fuel mixtures
- Evaporation wicks for fragrances and insecticide emission testing
- Rods for chemical lab specimen tests



### 精密工程

- 高精度壳体 and 引导部件
  - 基座
  - 传感臂
  - 测量探针支架
  - 导轨/滑轨
  - 轴套
- 支撑零件 (高温应用中的垫片)

### Precision Engineering

- High precision housings and guide components
  - Bases
  - Sensing arms
  - Holders for measuring probes
  - Guideways / sliding rails
  - Spindle sleeves
- Support elements (spacers for high-temperature applications)

# 硅酸盐陶瓷材料参数

## Materials Silicate Ceramics

	单位 Unit	化合物 Element	Frequenta®	Sikor® S	Sikor® E <sup>1)</sup>	Sipa®	Sipalox®	Alphastea®	A12	A14	FAW <sup>3)</sup>	Ziralit
标准名称 (可比较) Standard designation [comparable]			C 221	C 410	C 410	C 520	C 530	C 140	C 610	[C 620/ C 780]	C 230	-
颜色 Color <sup>6)</sup>			乳白色 ivory	灰色 grey	灰色 grey	棕色 brown	奶油色 cream	白色 white	白色 white	白色 white	白色 white	白色 white
材料成分 Material composition	%	SiO <sub>2</sub> MgO Al <sub>2</sub> O <sub>3</sub> ZrO <sub>2</sub> <sup>3)</sup> SiC Div.	59 31 3 - - 7	47 11 38 - - 4	48 11 37 - - 4	48 10 32 - - 10	29 - 65 - - 6	71 - 18 - - 11	35 - 60 - - 5	20 - 76 - - 4	62 29 4 - - 5	- - 75 25 - -
密度/Density	g/cm <sup>3</sup>		2,7	2,2	2,2	2	2	2,2	2,8	3,2	<sup>5)</sup>	3,8
吸水率 Water absorption	%		0,0	0,0	< 0,1	> 5	> 8	0,0	0,0	0,0	15-41 <sup>4)</sup>	0,0
弯曲强度 Flexural strength	N/mm <sup>2</sup> (MPa)		160	110	100	65	80	80	180	250	<sup>5)</sup>	335
弹性模量/Elasticity (Young's modulus)	10 <sup>3</sup> N/mm <sup>2</sup> (GPa)		120	70	70	40	70	80	120	200	<sup>5)</sup>	200
热膨胀系数 Thermal coefficient of expansion												
20 °C-100 °C	10 <sup>-6</sup> K <sup>-1</sup>		6-8	1	0,6 <sup>2)</sup>	1-3	3-5	0,4	5-6	5-7	-	-
20 °C-300 °C	10 <sup>-6</sup> K <sup>-1</sup>		7-9	1-2	0,8 <sup>2)</sup>	1-3	3-5	0,7	5-6	5-7	-	7,6
20 °C-600 °C	10 <sup>-6</sup> K <sup>-1</sup>		7-9	2-3	0,9 <sup>2)</sup>	2-4	4-6	1,2	5-7	6-8	-	8,2
20 °C-1000 °C	10 <sup>-6</sup> K <sup>-1</sup>		8-9	2-4	2-4 <sup>2)</sup>	3-5	4-7	1,8	5-7	7-8	-	-
比热容 Specific heat capacity	20-100 °C J/kg K		850	900	500	800	850	-	950	950	-	800
热导率 Thermal conductivity	20-100 °C W/m x K		2,5	2,2	2	2	2	2	5	12	-	13
抗热冲击特性 Thermal shock resistance	K		160	250	250	370	560	610	160	160	-	130
介电强度 Dielectric strength	kV/mm		20	10	10	-	-	-	17	15	-	30
最小耐压值 Withstand voltage min.	kV		34	15	15	-	-	-	30	20	-	15
介电常数 Dielectric constant	48-62 Hz		6	5	5	-	-	-	8	8	-	-
20 °C环境下介电 损耗因数 Dielectric loss factor at 20 °C (10 <sup>-3</sup> )												
48-62 Hz			1,5	25	25	-	-	-	-	-	-	-
最大1 MHz 1 MHz max.			1,2	7	7	-	-	-	-	-	-	-
体积电阻率 Volume resistivity												
在/at 20 °C	[Ωm]		10 <sup>11</sup>	10 <sup>10</sup>	10 <sup>10</sup>	10 <sup>10</sup>	-	-	10 <sup>12</sup>	10 <sup>10</sup>	-	10 <sup>13</sup>
在/at 200 °C	[Ωm]		10 <sup>9</sup>	10 <sup>6</sup>	10 <sup>6</sup>	10 <sup>7</sup>	10 <sup>8</sup>	10 <sup>6</sup>	10 <sup>5</sup>	10 <sup>6</sup>	-	10 <sup>11</sup>
在/at 600 °C	[Ωm]		10 <sup>6</sup>	10 <sup>3</sup>	10 <sup>1</sup>	10 <sup>3</sup>	10 <sup>4</sup>	10 <sup>1</sup>	10 <sup>2</sup>	10 <sup>2</sup>	-	10 <sup>5</sup>

以上参数值根据DIN-EN 60672行业标准确定。它们只适用于标准测试样本，不适用于不同形状、不同尺寸或通过不同生产流程所得到的产品。<sup>1)</sup> 散热系数可根据客户需求调整。<sup>2)</sup> 可根据客户需求调整。<sup>3)</sup> 用于基板技术的多孔材料。<sup>4)</sup> 可根据客户需求单独调整。<sup>5)</sup> 与孔隙度（吸水性）相关。<sup>6)</sup> 除G80外，所有材料都有多种颜色可选。

The foregoing parameter values have been determined in accordance with DIN - EN 60672. They apply to standard specimens only and are not transferable to specimens of different shape or size or obtained by different manufacturing routes. <sup>1)</sup> emission coefficient can be adapted to customer specifications <sup>2)</sup> can be adapted to customer specifications <sup>3)</sup> porous material for use in substrate technology <sup>4)</sup> individually adaptable to customer requirements <sup>5)</sup> depending on porosity (water absorption) <sup>6)</sup> All materials are available in various colors.



The measured values mentioned before were determined for test samples and are applicable as standard values. The values were determined on the basis of DIN-/DIN-VDE standards and if these were not available, on the basis of CeramTec standards. The values indicated must not be transferred to arbitrary formats, components or parts featuring different surface qualities. They do not constitute a guarantee for certain properties. We expressly reserve the right to make technical changes.

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