Material Data Sheet for Reaction Bonded Silicon Nitride

1. Material

QSIL Denotation	SN-RB
Material Description	Reaction Bonded Silicon Nitride

2. General Properties

Chemical Composition			Si_3N_4 (wt.-%)	> 99
			Residual Si (wt.-%)	< 1
Bulk Density	ρ	[1]	(g/cm³)	2.4
Residual Porosity			(%)	< 25
Open Porosity			(%)	**under investigation**
Grain Size (Longitudinal Direction)			(µm)	0.5 - 20

3. Mechanical Properties

Hardness		[2]	(GPa)	> 5
Compressive Strength			(MPa)	550
Bendig Strength	σ	[3]	(MPa)	200
Weibull-Modulus	**m**			25
Fracture Toughness	$\mathbf{K_{Ic}}$	[4]	($MPam^{1/2}$)	4.0
Youngs Modulus	**E**		(GPa)	140
Poisson Ratio	ν			0.27

4. Thermal Properties

Max. Working Temperature				
- Inert Atmosphere			(°C)	1600
- Air			(°C)	1400
Specific Heat Capacity			(J/kgK)	**under investigation**
Thermal Conductivity	λ (20°C)		(W/mK)	16
Coeff. of Thermal Expansion	α RT-1000°C		($10^{-6}K^{-1}$)	3.0
Coeff. of Thermal Expansion	α RT ± 20°C		($10^{-6}K^{-1}$)	1.2
Thermal Shock Parameter	$\mathbf{R_1}$	[5]	(K)	350
Thermal Shock Parameter	$\mathbf{R_2}$	[6]	(W/m)	5560

[1] Determination of density and porosity according to DIN 623-2
[2] Hardness according to DIN EN 843-4
[3] Average value of 4-point bending strength at room temperature according to DIN EN 843-1
[4] Calculated from crack length derived from Vickers hardness indentation, according to Niihara
[5] Critical temperature difference for an infinite high heat transfer (quenching)
[6] Thermal shock coefficient at finite constant heat transfer (slowly heating)

The material characterisitics listed above are measured at testing samples. They cannot be transfered to components with different size, shape or surface properties. We reserve the right to alter properties within the scope of technical progress or new developments.