WRPF Silicon Carbide Inlay

PROPERTY		Units	Test	SiC
Density		gm/cc	ASTM-C20	3,10
Crystal Size	Average	MICRONS	THIN-SECTION	12
Water Absorption		%	ASTM-373	0
Gas Permeability		–	–	0
Color		–	–	BLACK
Flexural Strength (MOR)	20° C	MPa (psi x 103)	ASTM-F417	462 (67)
Elastic Modulus	20° C	GPa (psi x 106)	ASTM-C848	393 (57)
Poisson's Ratio	20° C	–	ASTM-C848	0,20
Compressive Strength	20° C	MPa (psi x 103)	ASTM-C773	2700 (363)
Hardness		GPa (kg/mm2)	KNOOP 1000 gm	26 (2500)
		R45N	ROCKWELL 45 N	–
Tensile Strength	25° C	MPa (psi x 103)	ACMA TEST #4	307 (44.5)
Fracture Toughness	K(I c)	Mpa m1/2	NOTCHED BEAM	4
Thermal Conductivity	20° C	W/m °K	ASTM-C408	125,0
Coefficient of Thermal Expansion	25-1000° C	1X 10-6/°C	ASTM-C372	4,3
Specific Heat	100° C	J/kg*K	ASTM-E1269	800
Thermal Shock Resistance	$^{\Delta}$Tc	°C	NOTE 3	400
Maximum Use Temperature		°C	NO-LOAD COND.	1000
Dielectric Strength		ac-kV/mm (ac V/mil)	ASTM-D116	–
Dielectric Constant	1 MHz	25° C	ASTM-D150	–
Dielectric Loss (tan delta)	1 MHz	25° C	ASTM-D150	–
Volume Resistivity	25° C	ohm-cm	ASTM-D1829	$< 10^3$
	500° C	ohm-cm	ASTM-D1829	$< 10^3$
	1000° C	ohm-cm	ASTM-D1829	$< 10^3$
Impingement		–	NOTE 4	0,14
Rubbing		–	NOTE 4	–

Notes:

1. Data Measurements – All data measurements are typical and made at room temperature unless otherwise noted.

2. Composition Control – all ceramic compositions are controlled using modern chemical, spectrographic, and X-ray fluorescent methods.

3. Thermal Shock Resistance – Tests are run by quenching samples into water from various elevated temperatures. The change in temperature where a sharp decrease in flexural strength is observed is listed as DTc.

4. Wear Resistance – Impingement tests are run using a dry fused alumina abrasive. Rubbing tests are run using a dry 240 grit fused alumina abrasive. The indices in the chart are calculated by dividing the material volume loss by the volume loss of an AD-85 alumina control. The lower in the index, the better the wear resistance.

5. Dielectric Strength numbers represent measurements on samples that were 0.25" thick.

*Ceramic property values vary somewhat with method of manufacture, size, and shape of part. Close control of values of most properties can be maintained if specified.

Erosion Resistance vs. Hardness

Material, in Increasing Order of Erosion Resistance	Knoop Hardness (kg/mm^2)
MgO	370
SiO_2	820
ZrO_2	1160
Al_2O_3	2000
Si_3N_4	2200
SiC	2700
B_4C	3500
Diamond	7000–8000