Properties of **ceramic** materials

ADVANCED CERAMICS CERAMDIS

		Non-Oxide Ceramics (Nitride + Carbide)							**Oxide Ceramics**	
Material		**Si_3N_4** CeSinit	**Si_3N_4** CeSinit	**CeSinit** electr. cond.	**AlN** Alu. Nitride	**BN** Boron Nitride	**SSiC** α-SiC	**SSiC** with Graphite	**Al_2O_3** 99.7%	**ZrO_2** Y_2O_3
Type		**CS14**	**CS40**	**CS30**	**CS95**	**CS90**	**CS10**	**CS10G**	**CS20**	**CS15**
Colour		black/grey	black	brown	light grey	whitish	black	black	yellowish	ivory
Microstructure										
Density	[g/cm³]	3.20	3.21	3.90	3.3	1.9	3.13	3.02	3.9	6.05
Porosity	[Vol.%]	<1	<1	<1	<1	15	<2	<3	<1	<1
Gas Permeability	[Vol.%]	0	0	0	0	>5	0	0	0	0
Mechanical Properties										
Compressive Strength	[MPa]	3'000	3'000	3'000	2'000	40	3'000	2'500	3'000	2'300
Flexural Strength σ at 20°C	[MPa]	750	850	700	300	20	400	250	350	900
Flexural Strength σ at 800°C	[MPa]	750	850	700	280	-	400	250	315	360
Weibull Modulus m		>17	>20	>25	10	>19	13	14	12	>15
Fracture Toughness K_{Ic}	[MPa√m]	8	8.5	9	3.2	-	4	3.5	4	10
Young's Modulus E	[GPa]	310	320	340	310	15	400	390	380	200
Vickers Hardness (HV 1)	[GPa]	15	16	14	11	-	25	24	17	12
Thermal Properties										
Maximum Temperature										
· Inert Gas	[°C]	1'200	1'200	1'200	1'200	2'300	1'900	1'900	1'700	1'000
· Air	[°C]	1'100	1'100	550	1'200	1'100	1'650	1'000	1'700	1'000
Thermal Conductivity λ at 20°C	[W/mK]	25	28	45	180	25	125	110	30	2
Thermal Expansion α at 20–100°C	[10^{-6}/K]	2	2	3.5	3.6	0	3	3	6.5	9
Thermal Expansion α at 20–1000°C	[10^{-6}/K]	3.5	3.5	5.5	5.6	- 0.15	5	5	8.5	11
Thermal Shock parameter R_s	[K]	600	700	360	160	>1200	210	130	100	310
Electrical Properties										
Resistivity at 20°C	[Ωcm]	10^{12}	10^{12}	10^{-3}	10^{14}	10^{12}	10^{5}	10^{4}	10^{14}	10^{12}
Resistivity at 800°C	[Ωcm]	10^{7}	10^{7}	-	10^{9}	-	10^{-1}	-	$10^{>8}$	10^{4}
Dielectric constant	1 MHz	6	7	-	9	4	-	-	10	29

Other material qualities available on request

All indicated values are to be considered as mean values for a simple comparison between materials.

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