Ceramic Material Properties Table 2

※Published data is for reference only

Material / Data / Unit				Machinable ceramics					Other materials				
				Macerite	Macerite S	Photoveel	Photoveel Ⅱ	Macor	Glass (fused quartz)	Glass (Tempax)	Glass (Neoceram)	Sapphire	Electrically Conductive (Corseed)
Main component amount [%]				Fluorine phlogopite:		Fluorine phlogopite:			SiO2 : 99.99%				:99.9%
Other component or binder						ZrO_2:							
General properties	Color		-	White	White	White	Grey	White	Transparent		Transparent	Transparent	Dark grey
	Density		[g/cm^3]	3.1	2.6	2.6	2.6	2.5	2.2	2.2	2.5	4.0	4.2
	Water absorption		[%]	0	0	0	0	0	0			0	
Machining properties	Hardness (HV)		[GPa]	1.2	2.2	2.2	2.3	25(HS)	9	5	7	23	10
	Flexural rigidity	20℃	[MPa]	300	120	147	440	130	94		170	700	310
		1000℃	[MPa]					100(600℃)					
		1200℃	[MPa]					50(800℃)					
	Compressive strength		[MPa]	500	440				1130				
	Fracture toughness		[MPam$^{1/2}$]										3.0
	Young's modulus		[GPa]	110	86	66	157	67	74	64	94	470	288
	Poisson's ratio		-	0.11	0.25			0.29	0.17	0.22			0.27
Thermal properties	Max. use temp	Oxidizing atmosphere	[℃]	800	1200 and more	1000		1000	1070(strain point) 1180(annealing point)	522(strain point) 562(transition point) 568(annealing point)			
		Non-oxidizing atmosphere	[℃]				1000		1720(softening point)	652(yield point) 815(softening point)			
	Thermal expansion coefficient	RT～200℃	[*10^{-6}/℃]	4.5	10.6						-0.6(-50℃)	7.2(//C axis)	
		RT～400℃	[*10^{-6}/℃]	5.0	10.5	8.5	1.4	9.3(300℃)	0.64(500℃)		-0.4(50℃)		
		RT～600℃	[*10^{-6}/℃]		10.1	9.0		11.4		3.2	-0.1(380℃)		
		RT～800℃	[*10^{-6}/℃]		10.3			12.6	0.6		0.1(750℃)		8.8
	Thermal conductivity	20℃	[W/(m·K)]	20	1.6	1.7	50	1.7	1		2	42	6
		400℃	[W/(m·K)]	12	1.9								
		800℃	[W/(m·K)]		2.4								
	Specific heat	RT	[J/(kg·K)]	680	800			790	749		800		670
		400℃	[J/(kg·K)]		1000								
		800℃	[J/(kg·K)]		1200								
	Impact resistance (ΔT)		[℃]	650	150	150	600	150			800		
Electrical characteristics	Dielectric strength		[kV/mm]	21	> 10	18	35	40				> 10	
	Volume resistivity	20℃	[Ω·cm]	9.3*10^{14}	1*10^{15}	1.8*10^{15}	2.2*10^{15}	10^{16}	5*10^{16}		13	> 10^{14}	1
		500℃	[Ω·cm]	8.8*10^{7}	6*10^{5}						7(250℃) 5(350℃)		
	Dielectric constant	1MHz	-	9.0	6	6		6	3.9(500MHz)	4.7	8.0	11.5(//C axis)	
		3GHz	-				5.5(1GHz)						
	Dielectric loss	1MHz	[*10^{-4}]	150	70	50	10	50	< 1(500MHz)	55	190		
		3GHz	[*10^{-4}]										
Anti-corrosion properties	Chemical resistance	hydrochloric acid	WT Loss [mg/cm^2/day]					100 (5%-95℃-24hr)					
		hydrochloric acid	WT Loss [mg/cm^2/day]										
		sulfuric acid	WT Loss [mg/cm^2/day]										
		sulfuric acid	WT Loss [mg/cm^2/day]										
		nitric acid	WT Loss [mg/cm^2/day]					0.6 (0.002N-95℃-24hr)					
		nitric acid	WT Loss [mg/cm^2/day]										
		phosphoric acid	WT Loss [mg/cm^2/day]										
		phosphoric acid	WT Loss [mg/cm^2/day]										
		caustic soda (sodium hydroxide)	WT Loss [mg/cm^2/day]					10 (5%-95℃-6hr)					
		caustic soda (sodium hydroxide)	WT Loss [mg/cm^2/day]										
		hydrogen fluoride	WT Loss [mg/cm^2/day]										
	Abrasiveness	Blast abrasion amount	[μm]										
Features & applications						Precision machinability Electric insulation Adiabaticity Short delivery time	High intensity Low thermal expansibility Precision machinability	Free-cutting Insulation Adiabaticity Vacuum properties	High purity Heat-resistive Chemical resistance				Electric conductivity More accurate than normal alumina Use in reducing atmosphere with high temperature
Remarks													