NIHON CERATEC For the next supports,Beyond

Ceramics Characteristics（1）

					Normal Ceramics Material						
					1	2	3	4	5	6	7
					Al2O3	Al2O3	Al2O3	ZrO2	Si3N4	SiC	AlN
	Item			Unit	Testing Method	A9951	A9951LD	A9991	AYZ-3	ASN-2		
	Color			–	–	White	White	White	Milk-white	Black Gray	Black	Gray Beige
	Bulk Density			(X10+3)kg/m3	Water displacement method	3.9	3.9	3.9	6.0	3.2	3.1	3.3
	Water Absorption Rate			%	Water displacement method	0	0	0	0	0	0	0
Mechanical Feature	Hardness	Vickers		Gpa	JIS R 1610	18	18	18	13	16	24	13
	Bending Strength	20℃		Mpa	JIS R 1601	450	350	480	1000	750	500	350
		1000℃		Mpa	JIS R 1601	–	350	–	–	–	–	330
		1200℃		Mpa	JIS R 1601	300	200	300	350	550	600	250
	Fracture Toughne			Mpa√ m	JIS R 1607	4	4	4	6	6	3	3
	Young's			Gpa	JIS R 1602	390	390	400	200	300	410	320
	Poisson's Ratio			K	JIS R 1602	0.24	0.24	0.24	0.32	0.28	0.16	0.29
Thermal Feature	CTE	23±3℃		1/K(X10-6)	laser coefficient of thermal expansion	5.3	–	–	–	1.3	–	–
		25～200℃		1/K(X10-6)	JIS R 1618	5.4	5.6	5.3	7.7	1.5	2.9	2.4
		25～500℃		1/K(X10-6)	JIS R 1618	7.3	7.5	7.5	10.0	3.1	4.6	4.0
		25～1000℃		1/K(X10-6)	JIS R 1618	8.5	8.5	8.6	11.0	3.7	5.0	5.2
	Thermal Conductivity (20℃)			W/m･K	JIS R 1611	30	30	33	3	13	150	160
	Specific Heat			J/kg･K	JIS R 1611	800	800	800	470	680	660	740
	Thermal Fatigue (△T)			K	Water-Quenching	200	200	200	280	650	450	400
Corrosion Resistance	Chemical Resistance	Hydrochloric Acid		μm	Boiling-72hr	-0.3	-1.3	-0.3	0.00	-2.8	0.00	Erosion
					Room temperature-24hr	0.00	0.00	0.00	0.00	0.00	0.00	-0.6
		Sulfuric Acid (20%)		μm	Boiling-72hr	-0.3	-1.3	-0.3	0.00	-5.3	0.00	Erosion
					Room temperature-24hr	0.00	-0.3	0.00	0.00	-0.3	0.00	-0.9
		Nitric Acid (61%)		μm	Boiling-72hr	0.00	-0.5	0.00	0.00	-1.9	0.00	Erosion
					Room temperature-24hr	0.00	0.00	0.00	0.00	0.00	0.00	-0.6
		Phosphoric Acid (85%)		μm	Boiling-72hr	Erosion	Erosion	-0.3	-3.2	-1.3	0.00	Erosion
					Room temperature-24hr	0.00	0.00	0.00	0.00	0.00	0.00	-1.8
		Sodium hydroxide		μm	Boiling-72hr	0.00	-0.5	0.00	0.00	-0.3	0.00	Erosion
					Room temperature-24hr	0.00	0.00	0.00	0.00	0.00	0.00	-1.5
		HF(47%)		μm	20℃-72hr	Erosion	Erosion	-0.5	Erosion	-0.9	0.00	-3.6
Electronic Feature	Insulation Strength			kV/mm	bias voltage applied LB technique	＞30	＞30	＞30	＞10	＞30	–	＞30
	Volume Resistivity (20℃)			Ω･cm	3 probes Method	＞10+14	＞10+14	＞10+14	10+12	＞10+14	10+6	10+14
	Permittivity(25℃)	1MHz		–	Bridge Method	10	10	10	35	8	–	9
		3GHz		–	Dielectric Resonator Method	10	10	10	40	8	–	8
	Dielectric Loss(25℃)	1MHz		X10-4	Voltammeter Method	30	3	7	20	30	–	10
		3GHz		X10-4	Dielectric Resonator Method	4	1	–	10	30	–	130
Abrasion performance		Brast Abrasion loss		μm	30°、5.5kg/cm², 2min	2.1	2.3	1.0	0.5	0.6	1.6	–
Relative Magnetic Permeability				–	–	1.0000	–	–	–	–	1.0002	–
Feature						High Strength, Durability, High Thermal Shock Resistant, Possible for huge size, Cheaper			High Strength, Durability	High Strength, Durability, High Thermal Shock Resistant,	High Strength, High thermal conductivity	High thermal conductivity

NIHON CERATEC For the next supports,Beyond

Ceramics Characteristics (2)

					PF Ceramic Material							Other Nomal Material					
					1	2	3	4	5	6	7	Quartz	Sapphire	Si	Al	SUS	Cemented Carbide
					HPF	AHPF (AJPF)	SHPF (SLPF)	SLEG	CPF (CLPF)	ZPF-N	ZPF-E				(5012)	(304)	(6.5%Co)
	Item		Unit	Testing Method													
	Color		–	–	Black	Milk-white	Gray	Black	Black	Gray	Gray	Transparent	Transparent	–	–	–	–
	Bulk Density		(X10+3)kg/m3	Water displacement method	4.3	4.0	3.3	3.2	3.2	2.5	2.5	2.2	4	2.3	2.7	8.0	–
	Water Absorption Rate		%	Water displacement method	0	0	0	0	0	0	0	0	0	–	–	–	–
Mechanical Feature	Hardness	Vickers	Gpa	JIS R 1610	10	20	16	12	24	7	7	–	23	–	–	2	17
	Bending Strength	20℃	Mpa	JIS R 1601	300	550	1000	–	500	250	250	50	700	–	–	300	2200
		1000℃	Mpa	JIS R 1601	–	550	800	–	–	–	–	–	–	–	–	–	–
		1200℃	Mpa	JIS R 1601	–	400	–	–	600	–	–	–	–	–	–	–	–
	Fracture Toughne:		Mpa√m	JIS R 1607	3	3	6	4	3	3	3	–	–	–	–	–	12
	Young's Modulus		Gpa	JIS R 1602	300	400	310	280	420	150	150	73	470	170	71	200	620
	Poisson's Ratio		K	JIS R 1602	0.28	0.24	0.24	–	0.16	0.28	0.28	0.17	–	–	–	–	0.21
Thermal Feature	CTE	23±3℃	1/K(X10-6)	Laser coefficient of thermal expansion	–	–	1.4	1.3	2.3	0.0	0.0			–	–	–	–
		25～200℃	1/K(X10-6)	JIS R 1618	6.9	5.6	1.7	–	2.8			–	7.2(//C axle)	–	–	–	–
		25～500℃	1/K(X10-6)	JIS R 1618	8.9	7.7	2.4	–	5.0	–	–	0.5	–	–	–	–	–
		25～1000℃	1/K(X10-6)	JIS R 1618	9.3	8.6	2.8	–	5.6	–	–	–	–	–	–	17.3	4.7
	Thermal Conductivity (20℃)		W/m·K	JIS R 1611	10	35	20	–	150	5	5	1	42	140	140	17	96
	Specific Heat		J/kg·K	JIS R 1611	700	800	650	–	660	1000	1000	1050	–	690	–	880	–
	Thermal Fatigue (△T)		K	Water-Quenching	110	200	800	–	450	–	–	–	–	–	–	–	400
Corrosion Resistance	Chemical Resistance	Hydrochloric Acid (20%)	μm	Boiling-72hr	-0.2	0.00	Erosion	–	0.00	–	–	–	–	–	–	–	–
				Room temperature-24hr	0.00	0.00	-0.3	–	0.00	–	–	–	–	–	–	–	–
		Sulfuric Acid (20%)	μm	Boiling-72hr	0.00	0.00	-9.4	–	0.00	–	–	–	–	–	–	–	–
				Room temperature-24hr	0.00	0.00	0.00	–	0.00	–	–	–	–	–	–	–	–
		Nitric Acid (61%)	μm	Boiling-72hr	-0.2	0.00	-7.6	–	0.00	–	–	–	–	–	–	–	–
				Room temperature-24hr	0.00	0.00	-0.6	–	0.00	–	–	–	–	–	–	–	–
		Phosphoric Acid (85%)	μm	Boiling-72hr	-0.2	0.00	-2.1	–	0.00	–	–	–	–	–	–	–	–
				Room temperature-24hr	0.00	0.00	0.00	–	0.00	–	–	–	–	–	–	–	–
		Sodium hydroxide (20%)	μm	Boiling-72hr	0.00	0.00	0.00	–	0.00	–	–	–	–	–	–	–	–
				Room temperature-24hr	0.00	0.00	0.00	–	0.00	–	–	–	–	–	–	–	–
		HF(47%)	μm	20℃-72hr	-0.5	0.00	-2.4	–	0.00	–	–	–	–	–	–	–	–
Electronic Feature	Insulation Strength		kV/mm	bias voltage applied LB technique	–	＞30	＞30	–	–	–	–	＞10	＞10	–	–	–	–
	Volume Resistivity (20℃)		Ω·cm	3 probes Method	10+1	＞10+14	＞10+14	–	10+6	10+12	10+7	＞10+14	＞10+14	–	–	–	–
	Permittivity(25℃)	1MHz	–	Bridge Method	–	10	8	–	–	–	–	4	11.5(//C axle)	–	–	–	–
		3GHz	–	Dielectric Resonator Method	–	10	8	–	–	–	–	–	–	–	–	–	–
	Dielectric Loss(25℃)	1MHz	X10-4	Voltammeter Method	–	1	10	–	–	–	–	1	–	–	–	–	–
		3GHz	X10-4	Dielectric Resonator Method	–	＜1	10	–	–	–	–	–	＜1	–	–	–	–
Abrasion performance		Brast Abrasion loss	μm	30°、5.5kg/cm²、2min	4.2	0.8	0.3	–	1.3	1.2	1.2	–	–	–	–	–	–
Relative Magnetic Permeability			–	–	–	–	1.0000	–	1.0000	1.0000	1.0000	–	–	–	–	–	–
Feature					Low Strength, Conductive	High Corrosion Resistance, Insulated, Low Dielectric Loss	Low Expansion, High Stiffness, Abrasion Performance	Low Expansion, Easy to process	High Stiffness, High thermal, conductivity	Insulated	Conductive						
										Zero thermal expansion, High Stiffness							

NIHON CERATEC