

Properties Table

	Classification	Low Thermal Expansion Ceramics							Non-oxide Engineering Ceramics											
		Name	NEXCERA™					SIALON				SILICON NITRIDE	SILICON CARBIDE			BORON CARBIDE	ALUMINUM NITERIDE			
			Code	N113B	N117B	N118C	N119C	CD107	S110	S110H	S120	S140	MSN	C101R	C201	MSC	BC101	MAN-090	MAN-170	MAN-230
			Composition	Cordierite	Cordierite	Cordierite	Cordierite	Cordierite	Sialon	Sialon	Sialon	Sialon	Si ₃ N ₄	SiC	SiC	SiC	B ₄ C	AlN	AlN	AlN
General Properties	Color	black	black	blue-grey	light blue-grey	blue-grey	light grey	light grey	light grey	grey	grey	black	black	black	black	grey	grey	grey		
	Bulk Density	g/cm ³	2.50	2.55	2.58	2.50	2.57	3.24	3.25	3.22	3.20	3.20	3.16	3.17	3.10	2.42	3.20	3.20	3.30	
	Water Adsorption Ratio	%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Mechanical Properties	Flexural Strength	MPa	210	230	220	166	230	880	1180	690	490	880	490	470	490	400	350	350	350	
	Compressive Strength	MPa	—	—	—	—	—	—	—	—	—	2940	—	—	—	—	—	3000	—	
	Young's Modulus	GPa	130	140	140	130	143	290	300	300	280	290	430	430	430	385	—	320	—	
	Poisson's Ratio	—	0.30	0.31	0.31	0.31	0.32	0.27	0.27	0.27	0.27	0.28	0.16	0.16	0.16	0.17	—	0.27	—	
	Hardness	GPa	8.0	8.1	8.1	8.0	—	14.5	14.7	12.7	12.7	16	21.6	20.1	20	20.4	—	14	—	
	Fracture Toughness	MPa · m ^{1/2}	1.2	1.2	1.4	1.3	1.4	6.5	6.5	6.0	4.6	—	3.5	2.4	—	3.1	—	—	—	
Electrical Properties	Electrical Resistivity	Ω · cm [RT]	>10 ¹³	>10 ¹⁴	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ¹⁴	>10 ³	>10 ⁵	>10 ⁶	>10 ⁰	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	
	Dielectric Constant [1MHz]	—	4.7	6.0	4.7	4.4	4.6	—	—	—	—	12	—	—	—	—	8.8	8.8	8.8	
	Dielectric Loss (tan δ) [1MHz]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0005	0.0005	0.0005	
	Dielectric Strength	kV/mm	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15	15	15
Thermal Properties	Max. Useable Temperature	°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
	Thermal Expansion Coefficient [RT]	× 10 ⁻⁶ /°C	<0.03	<0.03	<0.05	<0.05	<0.03*1	1.3	1.3	1.3	1.3	—	2.3	2.3	—	2.3	—	—	—	
	[RT-400°C]	× 10 ⁻⁶ /°C	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4.5*2	4.5*2	4.5*2
	[RT-800°C]	× 10 ⁻⁶ /°C	—	—	—	—	—	—	—	—	—	3.3	—	—	4.5	—	—	—	—	
	Thermal Conductivity [RT]	W/(m · K)	3.7	4.2	4.5	4.3	4.7	21	21	21	21	23	128	186	158	37	90	170	230	
	Specific Heat [RT]	J/(g · K)	0.83	0.78	0.79	0.78	0.78	0.68	—	0.63	—	—	0.63	0.67	—	0.95	—	0.7	—	
Thermal Shock Resistance ΔT	°C	—	—	—	—	—	750	—	700	—	700	350	—	400	—	—	400	—		
Remarks	*1 measured at 22°C *2 measured at [RT-200°C]																			

	Classification	Machinable Ceramics										Oxide Engineering Ceramics							
		Name	MACERITE series				Porous type		Boron Nitride type			Aluminum Nitride type	ALUMINA			ZIRCONIA		L-TEX	
			Code	MMET	MMSP	MMHSP	MMCE	M-MI	M-AT	BN HC	BN N-1	SBN	SHAPAL Hi Msoft	A115	A118	AB117	MZR	MZR-K	L-TEX
			Composition	Fluorophlogopite(KMg ₃ Al Si ₃ O ₁₀ F ₂)	CaSiO ₃ /Resin	CaSiO ₃	Al ₂ TiO ₃	BN 97%	BN 99%	BN-Si ₃ N ₄	AlN	Al ₂ O ₃ 99.5%	Al ₂ O ₃ 99.7%	Al ₂ O ₃	ZrO ₂	ZrO ₂	—		
General Properties	Color	white	ivory	ivory	ivory	white	grey	white	white	light grey	light grey	ivory	ivory	black	white	black	light grey		
	Bulk Density	g/cm ³	2.46	2.50	2.67	2.40	2.10	3.30	2.00	1.80	2.50	2.88	3.85	3.90	3.90	6.00	6.00	2.70	
	Water Adsorption Ratio	%	0	0	0	0	10	1.8	—	—	—	0	0	0	0	0	0	0	
Mechanical Properties	Flexural Strength	MPa	140	110	160	130	50	10	35	30	270	300	330	340	440	1100	1150	150	
	Compressive Strength	MPa	—	430	440	—	250	150	50	20	—	100	—	2900	—	3000	—	—	
	Young's Modulus	GPa	61	64	65	60	52	—	18	15	55	177	370	350	390	210	210	—	
	Poisson's Ratio	—	0.23	0.23	0.25	0.23	—	—	—	—	—	0.31	0.24	0.23	0.23	0.32	0.32	—	
	Hardness	GPa	2.6	2.2	2.2	2.6	2.6	1.5	1.3	0.8	5.5	3.7	15.0	15	15.2	13	12	—	
	Fracture Toughness	MPa · m ^{1/2}	—	—	—	—	—	—	—	—	—	—	4.2	4.7	3.4	5.5	5.9	—	
Electrical Properties	Electrical Resistivity	Ω · cm [RT]	>10 ¹⁴	>10 ¹⁵	>10 ¹⁵	>10 ¹³	>10 ⁹	>10 ¹²	>10 ¹⁵	>10 ¹⁵	>10 ¹⁴	>10 ¹⁵	>10 ¹⁵	>10 ¹⁵	—	—	—	>10 ¹³	
	Dielectric Constant [1MHz]	—	6	6	6.5	5.7	5	13	4	4.5	6.3	6.8	10	10	—	—	—	6.5	
	Dielectric Loss (tan δ) [1MHz]	—	0.006	0.008	0.003	0.013	0.012	0.007	0.0008	0.0009	0.0053	0.001	0.006	0.005	—	—	—	—	
	Dielectric Strength	kV/mm	10	10	10	10	10	7	20	19	—	65	—	10	—	—	—	10	
Thermal Properties	Max. Useable Temperature	°C	600*3	1000*3	700*3	150*3	900*3	900*3	1800*4	2200*4	1700*4	1900*4	—	—	—	—	—	—	
	Thermal Expansion Coefficient [RT]	× 10 ⁻⁶ /°C	—	—	—	—	—	—	—	—	—	—	5.4	—	5.3	—	—	—	
	[RT-400°C]	× 10 ⁻⁶ /°C	6	9.3	9.6	7.9*2	7.0	-2.1	—	—	—	4.8	—	7	—	10	—	3.1	
	[RT-800°C]	× 10 ⁻⁶ /°C	—	10.1	—	—	7.5	-0.9	-0.25*5	-1.4*5	2.6*5	5.0	—	7.9	—	10.3	—	4.0	
	Thermal Conductivity [RT]	W/(m · K)	1.4	1.6	1.6	1.7	1.6	1.5	36	63	47	92	32	30	24	3	3	3	
	Specific Heat [RT]	J/(g · K)	0.8	0.8	0.8	0.6	0.8	0.8	—	—	—	—	0.78	0.8	0.73	0.5	—	—	
Thermal Shock Resistance ΔT	°C	350	150	175	150	250	900	—	—	—	400	—	200	—	250	—	350		
Remarks	*2 measured at [RT-200°C] *3 oxidative atmosphere/no visual change in appearance, zero-weighted (3mm×3mm×40mm, span 30mm) *4 non-oxidative atmosphere *5 measured at [RT-1000°C]																		

Reference Data	Name	Cemented carbide	Carbon steel	SUS	Aluminum	Silicon	Silica
Code	V30	S45C	SUS304	Aluminum alloy	Monocrystal silicon	—	—
Bulk Density	g/cm ³	14.20	7.83	7.93	2.70	2.33	2.20
Young's Modulus	GPa	560	210	193	142	185	71
Thermal Expansion Coefficient	(/°C) [RT-200°C]	5.4 × 10 ⁻⁶	10.7 × 10 ⁻⁶	18.7 × 10 ⁻⁶	23.5 × 10 ⁻⁶	4.2 × 10 ⁻⁶	0.64 × 10 ⁻⁶
Thermal Conductivity	(W/m · K) [RT]	71	44	16.3	138	151	1.1