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_3N_4	SiC	SiC	SiC	B_4C	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/cm³	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 · ㎝ [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 (tanδ)[1MHz]	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0005	0.0005	0.0005
	Dielectric Strength	kV/mm	—	—	—	—	—	—	—	—	—	—	—	—	—	—	15	15	15
Thermal Properties	Max. Useable Temperature	℃	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	Thermal Expansion Coefficient [RT]	×10^{-6}/℃	<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℃]	×10^{-6}/℃	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4.5※2	4.5※2	4.5※2
	[RT-800℃]	×10^{-6}/℃	—	—	—	—	—	—	—	—	—	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 ⊿T	℃	—	—	—	—	—	750	—	700	—	700	350	—	400	—	—	400	—
Remarks	※1 measured at 22℃ ※2 measured at [RT-200℃]																		

		Classification	Machinable Ceramics										Oxide Engineering Ceramics					
		Name	MACERITE series				Porous type		Boron Nitride type			Aluminum Nitride type	ALUMINA			ZIRCONIA		L-TEX
		Code	MACERITE-ET	MACERITE-SP	MACERITE-HSP	MACERITE-CE	MACHINAX	ALMATITE	BN HC	BN N-1	SBN	SHAPAL™ Hi Msoft	A115	A118	AB117	MZR	MZR-K	L-TEX
		Composition	MMET	MMSP	MMHSP	MMCE	M-MI	M-AT	BN HC	BN N-1	SBN/50	SHAHMS	A115	A118	AB117	MZR	MZR-K	L-TEX
			Fluorphlogopite($KMg_3AlSi_3O_{10}F_2$)			$CaSiO_3$/Resin	$CaSiO_3$	Al_2TiO_3	BN 97%	BN 99%	BN-Si_3N_4	AlN	Al_2O_3 99.5%	Al_2O_3 99.7%	Al_2O_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/cm³	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	120	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	62	52	—	18	15	55	177	370	350	390	210	210	—
	Poisson's Ratio	—	0.23	0.23	0.25	0.24	—	—	—	—	—	0.31	0.24	0.23	0.23	0.32	0.32	—
	Hardness	GPa	2.6	2.2	2.2	—	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 · ㎝ [RT]	>10^{14}	>10^{15}	>10^{15}	>10^{12}	>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 (tanδ)[1MHz]	—	0.006	0.008	0.003	0.039	0.012	0.007	0.0008	0.0009	0.0053	0.001	0.006	0.005	—	—	—	—
	Dielectric Strength	kV/mm	10	10	10	14	10	7	20	19	—	65	—	10	—	—	—	10
Thermal Properties	Max. Useable Temperature	℃	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}/℃	—	—	—	—	—	—	—	—	—	—	5.4	—	5.3	—	—	—
	[RT-400℃]	×10^{-6}/℃	6	9.3	9.6	7.1※2	7.0	-2.1	—	—	—	4.8	—	7	—	10	—	3.1
	[RT-800℃]	×10^{-6}/℃	—	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	—	1.6	1.5	36	63	47	92	32	30	24	3	3	3
	Specific Heat [RT]	J/(g · K)	0.8	0.8	0.8	—	0.8	0.8	—	—	—	—	0.78	0.8	0.73	0.5	—	—
	Thermal Shock Resistance ⊿T	℃	350	150	175	150	250	900	—	—	—	400	—	200	—	250	—	350
Remarks									DENKA Co., Ltd.			Tokuyama Corp.						
	※2 measured at [RT-150℃] ※3 oxidative atmosphere/no visual change in appearance, zero-weighted (3mm×3mm×40mm, span 30mm) ※4 non-oxidative atmosphere ※5 measured at [RT-1000℃]																	

Reference Data

Name		Cemented carbide	Carbon steel	SUS	Aluminum	Silicon	Silica
Code		V30	S45C	SUS304	Aluminum alloy	Monocrystal silicon	—
Bulk Density	g/cm³	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	(/℃) [RT-200℃]	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

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