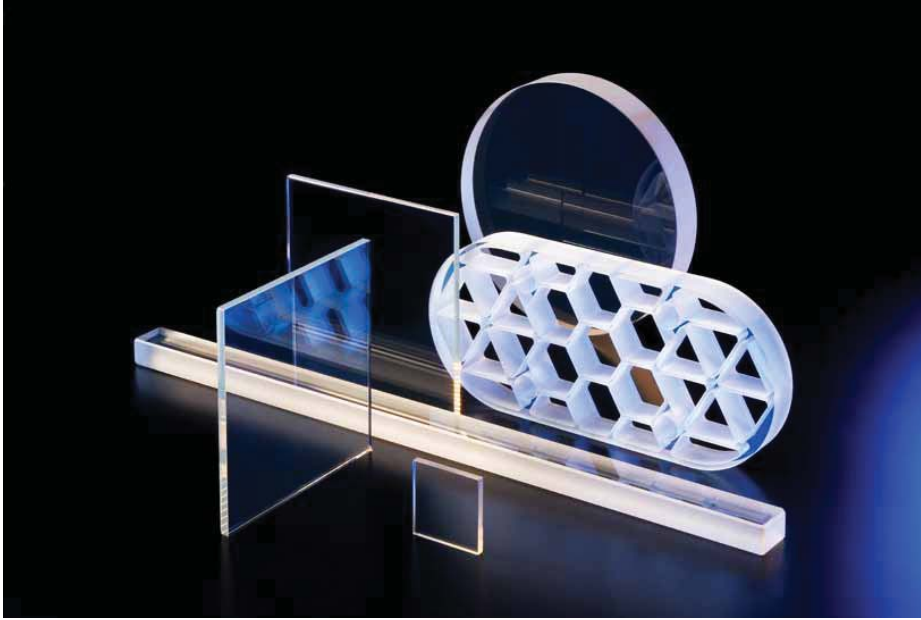


Ultra-Low Expansion Glass-Ceramics

CLEARCERAM[®]-Z



CLEARCERAM[®]-Z series are Glass-Ceramics products with an ultra low thermal expansion, developed by OHARA based on the homogeneous glass melting and precision crystallization technologies. CLEARCERAM[®]-Z series are manufactured under a precisely controlled process and provide advantageous thermal, mechanical and chemical properties.

CLEARCERAM[®]-Z series are classified in 3 product grades by Coefficient of Thermal Expansion product specifications;

CLEARCERAM[®]-Z Regular with $0.0 \pm 1.0 \times 10^{-7}/^{\circ}\text{C}$ (0-50 $^{\circ}\text{C}$)

CLEARCERAM[®]-Z HS with $0.0 \pm 0.2 \times 10^{-7}/^{\circ}\text{C}$ (0-50 $^{\circ}\text{C}$)

CLEARCERAM[®]-Z EX with $0.0 \pm 0.1 \times 10^{-7}/^{\circ}\text{C}$ (0-50 $^{\circ}\text{C}$)

CLEARCERAM is a registered trade mark of OHARA INC. (Countries of Registration: Japan and the United States)

Properties

CLEARCERAM [®] -Z				Regular	HS	EX
Thermal Properties	Coefficient of Thermal Expansion (0 ~ 50 $^{\circ}\text{C}$)	α	($10^{-7}/^{\circ}\text{C}$)	0.0 ± 1.0	0.0 ± 0.2	0.0 ± 0.1
	Thermal Conductivity	k	($\text{W}/\text{m} \cdot ^{\circ}\text{C}$)	1.51	1.54	1.49
Mechanical Properties	Young's Modulus	E	(GPa)	90	92	91
	Rigidity		(GPa)	36	37	36
	Poisson Ratio			0.25	0.25	0.26
	Knoop Hardness *	Hk		600 (6)	590 (6)	620 (6)
	Abrasion *	Aa		62	62	62
	Bending Strength ***		(MPa)	116	122	126
	Specific Gravity	d		2.55	2.55	2.54
Optical Properties	Refractive Index	nd		1.546	1.546	1.544
		1550nm		1.528	1.528	1.526
	Abbe Number	νd		55.5	54.9	55.8
	Internal Transmittance (10mmt)	500nm		> 0.85	> 0.82	> 0.85
		980nm		> 0.98	> 0.98	> 0.98
1550nm		> 0.98	> 0.98	> 0.98		
Chemical Properties	Water Resistance (Powder) *		RW(9P)	2 Class 2	1 Class 1	1 Class 1
	Acid Resistance (Powder) *		RA(P)	1 Class 1	1 Class 1	1 Class 1
	Alkali Resistance (Powder) **		Ralk(P)	0.25%	0.19%	0.18%

* Values are subject to change for improvement.