General Properties

Glass types				Neoceram N-0	Neoceram N-11
Color				Transparent	White
Thermal properties	Thermal expansion coefficient	$\times 10^{-7}/°C$	−50~0°C	−6	0
			0~50°C	−7	2
			30~380°C	−6	8
			30~750°C	−4	12
	Specific heat	J/kg°C	25°C	800	800
	Thermal conductivity	W/m°C	25°C	1.7	1.7
	Max. service temp.	°C	Continuous	750*	800*
			Short term	850*	900*
	Thermal shock resistance	°C	100×100×3mm Plate	800**	600**
Optical properties	Index of refraction (n_D)			1.541	—
	Abbe number (νd)			57	—
	Stress-optical coeff.	$m\mu/cm/kg/cm^2$	25°C	3.0	—
Mechanical properties	Density	g/cm^3		2.51	2.50
	Bending strength	MPa	JIS R-1601	160	170
	Vicker's hardness	Hv (0.2)		710	720
	Young's modulus	GPa		93	87
Chemical properties	Acid resistance (5% HCl)	mg/cm^2	90°C, 24hrs	0.04	0.24
	Alkali resistance (5% Na_2CO_3)	mg/cm^2	90°C, 24hrs	0.32	0.96
Electrical properties	Volume resistivity (Log ρ)	Ω-cm	25°C	13	14
			150°C	8	9
			250°C	7	7
			350°C	6	5
	Dielectric constant (ε)		1MHz, 25°C	7	6
			2.45GHz, 25°C	—	6.6
	Loss tangent (tan δ)	$\times 10^{-3}$	1MHz, 25°C	21	3
			2.45GHz, 25°C	—	5.9

* Maximum service temperature: Determination of the maximum service temperature is based on mechanical deformation, and is the temperature of which 100×300×3.8t mm plate specimens (supported to form a 280-mm span) deform by 1mm after 1,000 hours continuous or 24 hours short term heating.

** These figures are only general values derived by a procedure consisting of heated specimens which are then rapidly cooled by plunging them into water. Thermal shock properties of 100°C signify that specimens have been heated to 110°C and plunged into water at 10°C without exhibiting cracking.

Characteristic Charts of NEOCERAM

Fig. 1 Thermal expansion

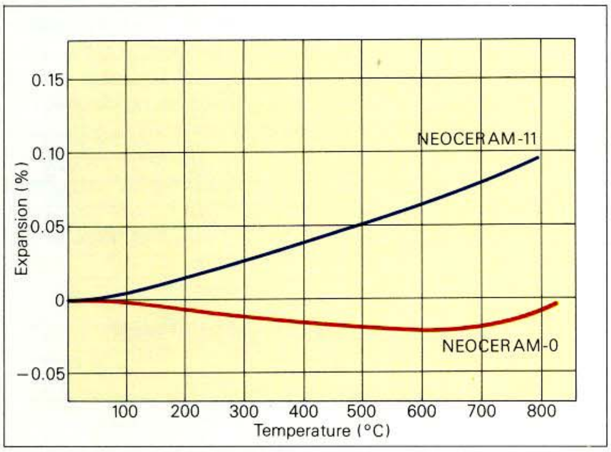


Fig. 2 Thermal conductivity

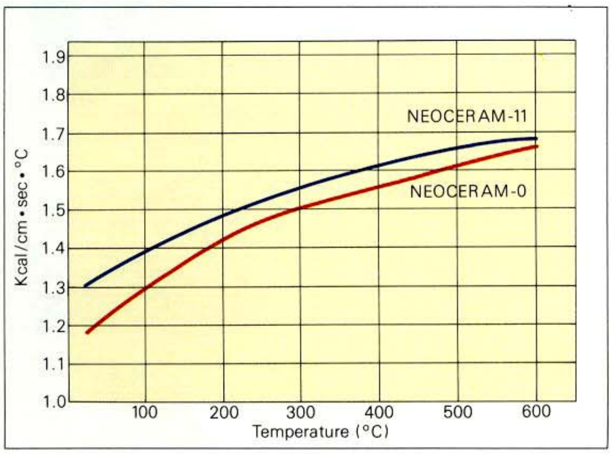


Fig. 3 Specific heat

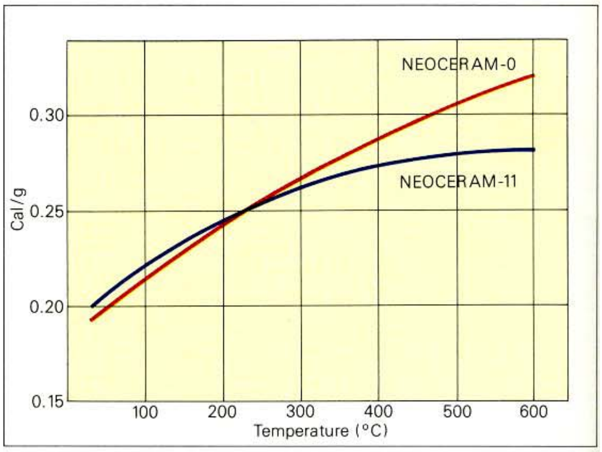
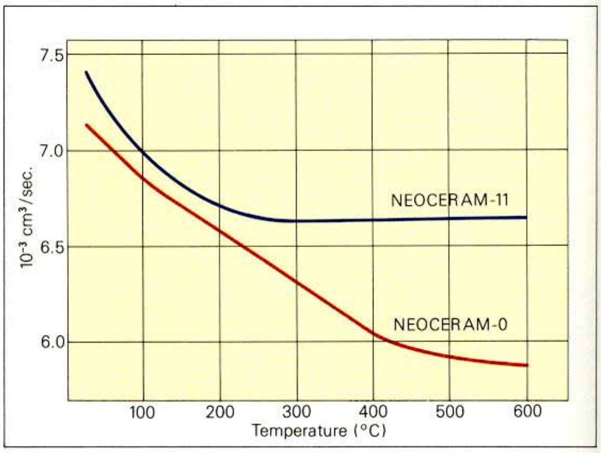


Fig. 4 Thermal diffusivity



NEOCERAM-0 has extremely high thermal shock resistance because its thermal expansion coefficient is virtually zero in the temperature range from room temperature to 800°C (see Fig. 1). Although its maximum service temperature is limited to 740°C for continuous use, NEOCERAM-0 can withstand quenching from 800 to 0°C.

NEOCERAM-0 shows high transmittance for wave lengths covering the visible and infrared region (see Fig. 7), which facilitates the application of NEOCERAM-0 for window panels of heating equipment.

Compared with ordinary heat resistant glass, NEOCERAM-0 has higher hardness, higher bending strength and higher impact strength (see Table on page 3). As seen from Fig. 5, bending strength increases with increasing temperature up to 750°C, which makes this material advantageous for various industrial applications.

Fig. 5 Temperature dependency on bending strength

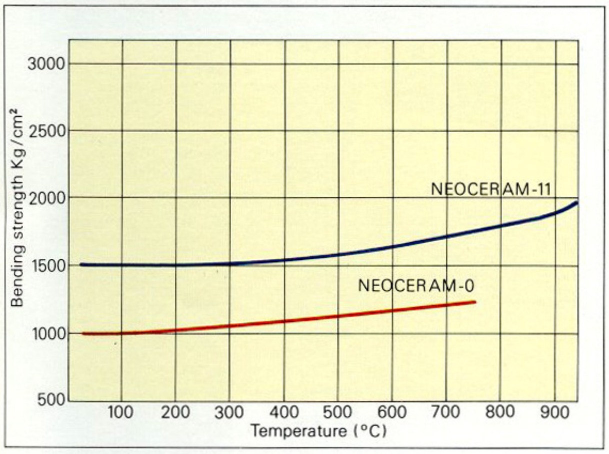


Fig. 7 Transmittance of NEOCERAM-0

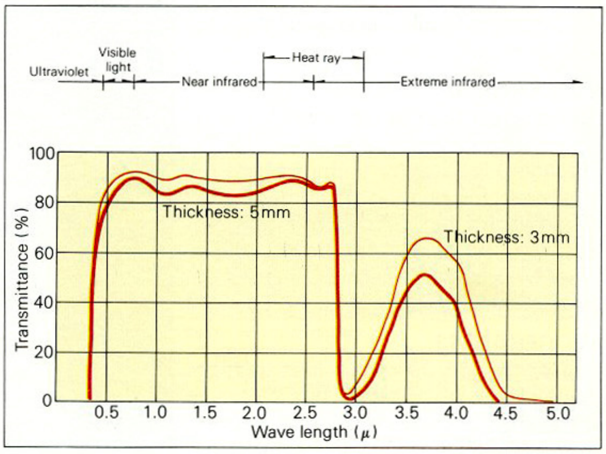


Fig. 6 High frequency loss of NEOCERAM-11 (25°C)

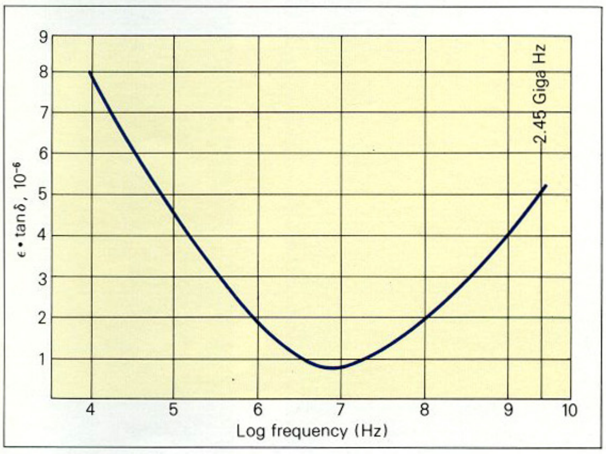
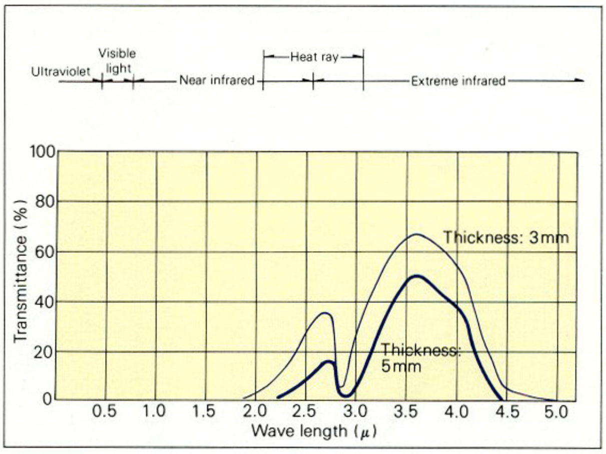


Fig. 8 Transmittance of NEOCERAM-11



NEOCERAM-11 has excellent thermal shock resistance because its thermal expansion coefficient is very low ($11 \times 10^{-7}/°C$) — about one-third the value of ordinary heat resistant glass (see Table on page 3). And the high thermal endurance of NEOCERAM-11 is seen from that the maximum service temperature is 1100°C for continuous use.

NEOCERAM-11 has such mechanical properties as bending strength and impact strength that excel over those of NEOCERAM-0 (see Table on page 3). As shown in Fig. 5, the bending strength of NEOCERAM-11 increases with rising temperature up to 1100°C, which makes it possible to use NEOCERAM-11 for the tube-covered heating coil of the electric oven.

NEOCERAM-11 has a fairly low level of high frequency loss at 2.45 Giga Hz ($10^{9.39}$Hz) specified for the microwave oven (see Fig. 6). Combined with its excellent thermal shock resistance and thermal endurance, NEOCERAM-11 is widely used as trays and shelves for microwave ovens.