

## ZPF -Zero Expansion stiffness ceramics

ZPF is revolutionary ceramics that has zero expansion characteristics same as Low-Expansion-Recrystallized glass with high stiffness. As a substitute for recrystallized glass, ZPF meets current severe requests to pursuit state-of-the-art ultra fine technology. For example, semiconductor equipment(Wafer expositon, Reticle making) where

### 【Feature】

- 1 . Low thermal expansion
- 2 . High stiffness
- 3 . Non-magnetism



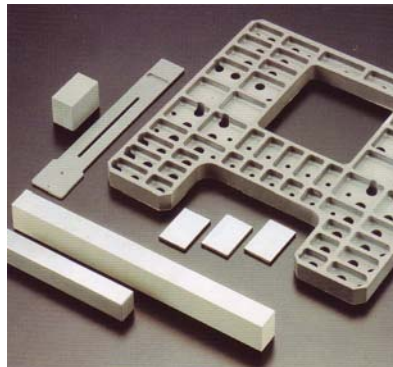
Mirror (25 × 25 × 200L)

	Unit	Test Method	ZPF-N	Conductive ZPF			Ref.Zero Expansion
				ZPF-E00	ZPF-E04	ZPF-ESC	
Specific gravity		Archimedes method	2.5	2.5	2.6	2.5	2.5
young's modulus	Gpa	Resonant method	150	150	170	150	90
CTE	ppm/K at 23°C	JIS-R3251(Laser Interference)	0.0	0.0	0.4	0.0	0.0
Thermal conductivity	W/m·K	JIS-R1611(Laser Flash)	5	5	8	5	2
Specific heat	J/g·K	JIS-R1611(Laser Flash)	0.9	0.9	1.0	1.0	0.8
Hardness	Gpa	JIS-R1610(Vickers HV10)	7	7	7	7	7
Bending strength	MPa	JIS-R1601(4 points)	250	250	300	250	50
Relative magnetic permeability			1.0000	1.0000	1.0000	1.0000	1.0000
Volume resistivity	Ω·cm	3 terminal method	10 <sup>12</sup>	10 <sup>7</sup>	10 <sup>5</sup>	10 <sup>10</sup>	10 <sup>13</sup>
Other			·Zero Expansion ·Non-magnetism ·High stiffness	·Conductive →antistatic ·Zero Expansion ·Non-magnetism	·Conductive →antistatic ·CTE control →Quartz ·Non-magnetism	·Receptivity Control→ Large clamp ·Zero Expansion ·Non-magnetism	

### 【Application】

- Bar mirror, L-shaped mirror
- Electrostatic Chuck
- Parts of XY stage

Exmple : Exposure equipment, Reticle making equipment  
Wafer test machine, Reticle rework equipment



ZPF example

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