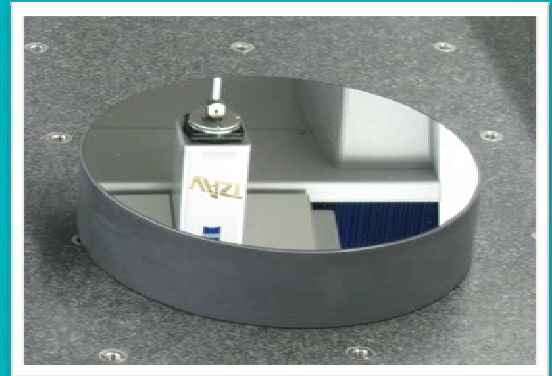


NEXCERA™ Ultra low thermal expansion ceramics

NEXCERA™, a cordierite ($2\text{MgO} \cdot 2\text{Al}_2\text{O}_3 \cdot 5\text{SiO}_2$) based polycrystalline ceramic has been developed as a cutting-edge material having both an extremely low thermal expansion coefficient of $< 0.03 \times 10^{-6}/\text{K}$ and superior mechanical properties.

NEXCERA™ has high dimensional stability for long-term passage and temperature changes as compared to general low thermal expansion glass. NEXCERA™ is used as calibration tools and primary standards in the field of precision metrology which requires high accuracy.



340 X 70 t Mirror
with an aluminum coating

Advantages

Zero Thermal Expansion Coefficient

$0.0 \pm 0.03 \times 10^{-6}/\text{K}$ (at 20°C)

Excellent Dimensional Stability

Long-term passage and heat cycles

Light-weight (Bulk density 2.5 g/cm^3)

Lighter than aluminum alloy

High Stiffness (Stiffness 130 GPa)

High stiffness and high strength,
1.5 times that of general low thermal expansion glass

High Accuracy Mirror Surfaces

Average-roughness of less than 1 nm
due to pore-less properties

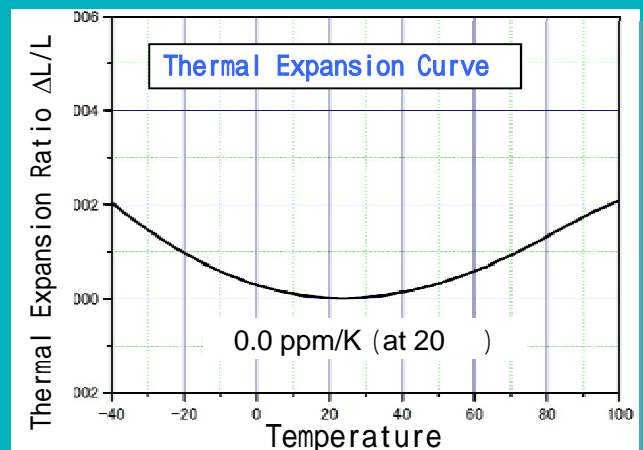
Near-net Shape Sintering

Easy manufacturing of complex shapes
by green-machining before sintering

Others

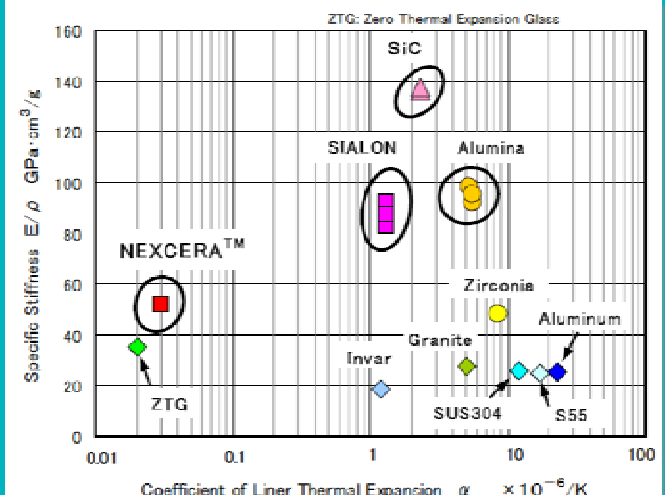
Rust and magnetization free

Thermal expansion ratio



Comparison of Characteristics

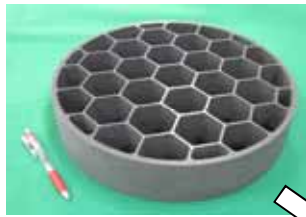
Code	Unit	N113B	N117B
Bulk Density : ρ	g/cm^3	2.5	2.55
Flexural Strength @RT : σ	MPa	210	230
Young's Modulus of Elasticity : E	GPa	130	140
Specific rigidity : E/ρ	$\text{GPa}/(\text{g/cm}^3)$	52	55
Fracture Toughness (SEPB)	$\text{MPa} \cdot \text{m}^{1/2}$	1.2	1.2
Vickers Hardness HV (98N) @RT	GPa	8.0	8.1
Thermal Expansion Coefficient: α @RT	$\times 10^{-6}/\text{K}$	< 0.05	< 0.05
Thermal Conductivity @RT	W/mK	3.7	4.2
Dielectric Constant (1MHz) : ϵ_r	-	4.7	6.0



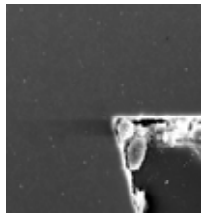
Characteristics

Bonding Technique

- Ultra light-weight mirrors can be attained by bonding together top-plates and ribbed bodies to form boxed structures, free from defects around the bonding layer.



Ribbed structure
3 mm in rib thickness



Bonding
interface



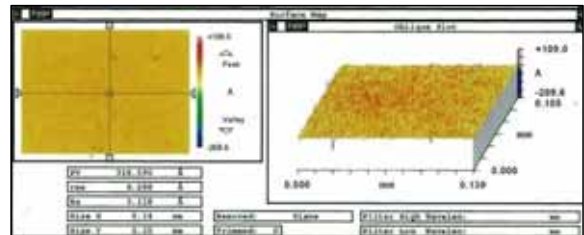
Light-weight boxed structure
φ340 X 70 t

Mirror Polish

By polishing, an extremely smooth surface with an average-roughness of 0.3 nm and flatness of less than $\lambda/10$: 52 nm is achieved.



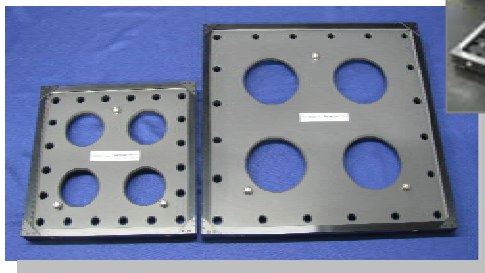
φ340 mm
Flatness: 52nm



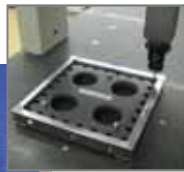
Roughness Ra: 0.3 nm

Applications

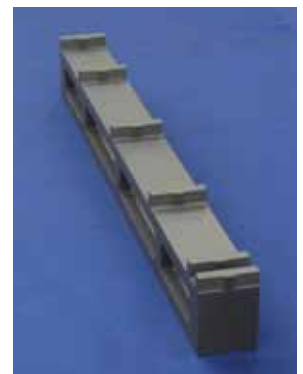
Calibration Tools and Primary Standards



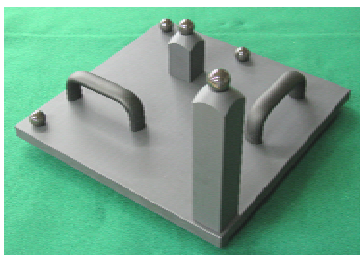
2-D calibration standards for CMM
410x410mm & 610x610mm



Ball bar: calibration standard for CMM
980mm



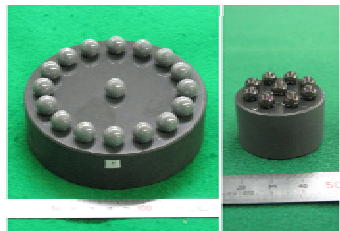
Step Gauge 550mm



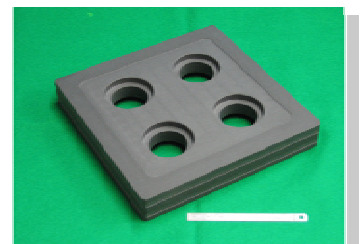
CMM daily checkup standard



Sphere standard



Gear pitch standard



Squareness standard



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♦The values shown in table are representative properties, and may not be guaranteed for your design.