



PROFESSIONAL PLASTICS, INC.

Leading Global Supplier of Engineered Plastic Shapes

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SuperTest[®] ZD - Zero Expansion Glass-Ceramic

SuperTest[®] ZD zero expansion glass-ceramic, from Professional Plastics is an inorganic, non-porous glass ceramic and has a completely non-directional, isotropic structure. Due to the perfect balance of glass and crystal phases within the material, the thermal expansion coefficient is nearly zero. As the crystalline and glass phases have chemical characteristics and hardness similar to those of optical glass, SuperTest[®] glass ceramic can be processed using the same machines and tools as optical and technical glass (e.g. cutting, grinding and polishing).

SuperTest[®] ZD glass ceramic has several outstanding properties including:

- High internal quality
- Low Helium permeability provides a longer life span for the components
- Can be polished to a very high accuracy
- Can be coated easily
- Good processing behavior
- Good chemical stability

Key Applications

SuperTest[®] zero expansion glass ceramic is the ideal material for applications, such as IC Probe Test components, astronomy, lithography, measurement technology, mechanics and optical systems.

Forms of Supply

SuperTest[®] ZD glass ceramic can be supplied in the form of:

- Discs
- Rectangular blocks
- Prisms
- Rods
- Cut pieces measuring from a few cm up to approximately 4 m in length

Additionally, modern CNC processing equipment and a variety of grinding technologies allow the generation of complex geometries and filigree structures at the customer's request.

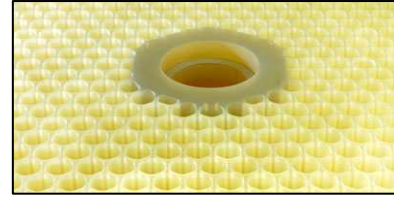
If you are interested in high precision optical components made of SuperTest[®] glass ceramic, please contact us.

Specifications

Thermal Expansion Coefficient:

Individual pieces of SuperTest[®] glass ceramic (discs, plates, rods) can be supplied with a mean coefficient of linear thermal expansion in the temperature range 0° to 50°C in three expansion classes as follows:

- Expansion class 2 $0 \pm 0.10 \times 10^{-6} \text{ K}^{-1}$
- Expansion class 1 $0 \pm 0.05 \times 10^{-6} \text{ K}^{-1}$
- Expansion class 0 $0 \pm 0.02 \times 10^{-6} \text{ K}^{-1}$



SuperTest[®] glass ceramic exhibits excellent homogeneity of the linear thermal expansion coefficient. Typical values are between 0.01 and $0.02 \times 10^{-6} \text{ K}^{-1}$.
On request homogeneities $< 0.01 \times 10^{-6}$ are possible.

Internal Quality:

The following applies for the internal quality of "standard" SuperTest[®] glass ceramic with typical dimensions $< 500 \text{ mm}$:

- Average number of inclusions $5/100 \text{ cm}^3$
- Maximum diameter of single inclusions 3.0 (1.4 within the critical volume)
- Striae (birefringence) $< 60 \text{ nm/striae}$
- Bulk stress (birefringence) $< 6 \text{ nm/cm}$

Further Properties:

- Density 2.53 g/cm^3
- Thermal conductivity at 20°C 1.46 W/(m x K)
- Thermal diffusivity at 20°C $0.72 \times 10^{-6} \text{ m}^2/\text{s}$
- Thermal capacity 0.8 J/(g x K)
- Young's modulus at 20°C 90.3 GPa
- Poisson's ratio 0.243
- Knoop hardness $0.1/20 \text{ 620}$

Quality Assurance

Modern measurement equipment is used to inspect the SuperTest[®] glass ceramic parts during all stages of fabrication and at the final and most stringent inspection.

Thermal expansion coefficient:	Highly accurate dilatometer equipment (with reference standards provided by the PTB)
Geometry and shape:	Mobile and stationary 3D coordinate measurement machines with high accuracy
Surface quality:	Roughness measurement equipment
Internal quality:	Accurate measurement microscopes and stress measurement setups according to the "de Senarmont" method
Optical homogeneity:	Interferometer with aperture up to 500 mm in diameter

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