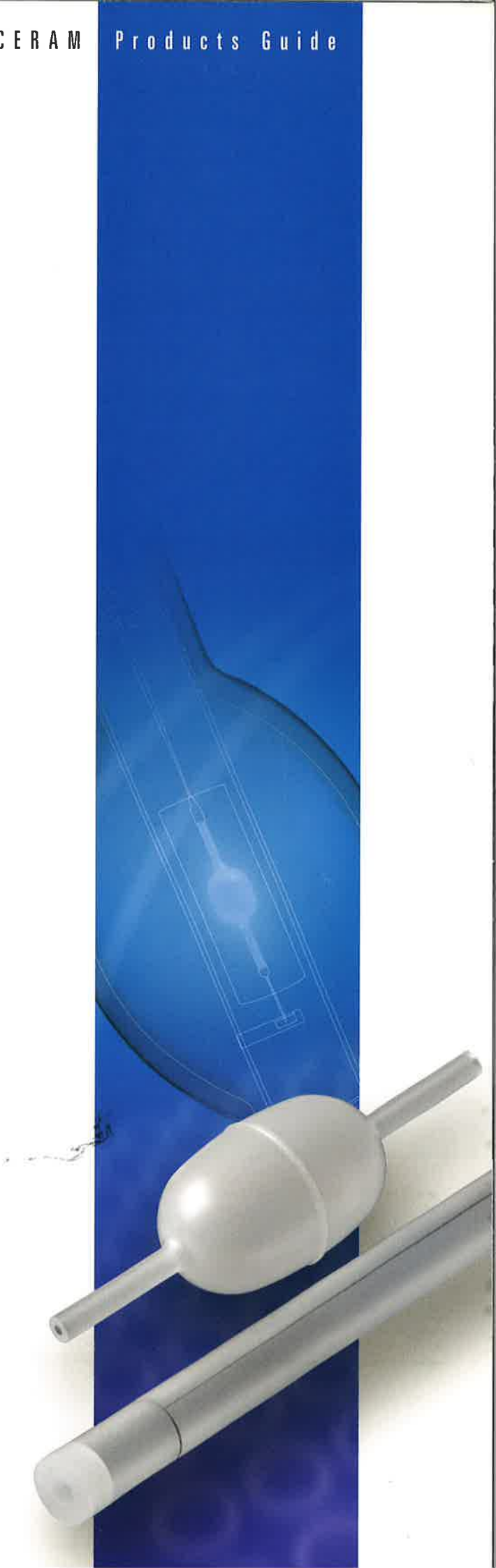
HICERAM Products Guide

Translucent Alumina Ceramics

HICERAM™



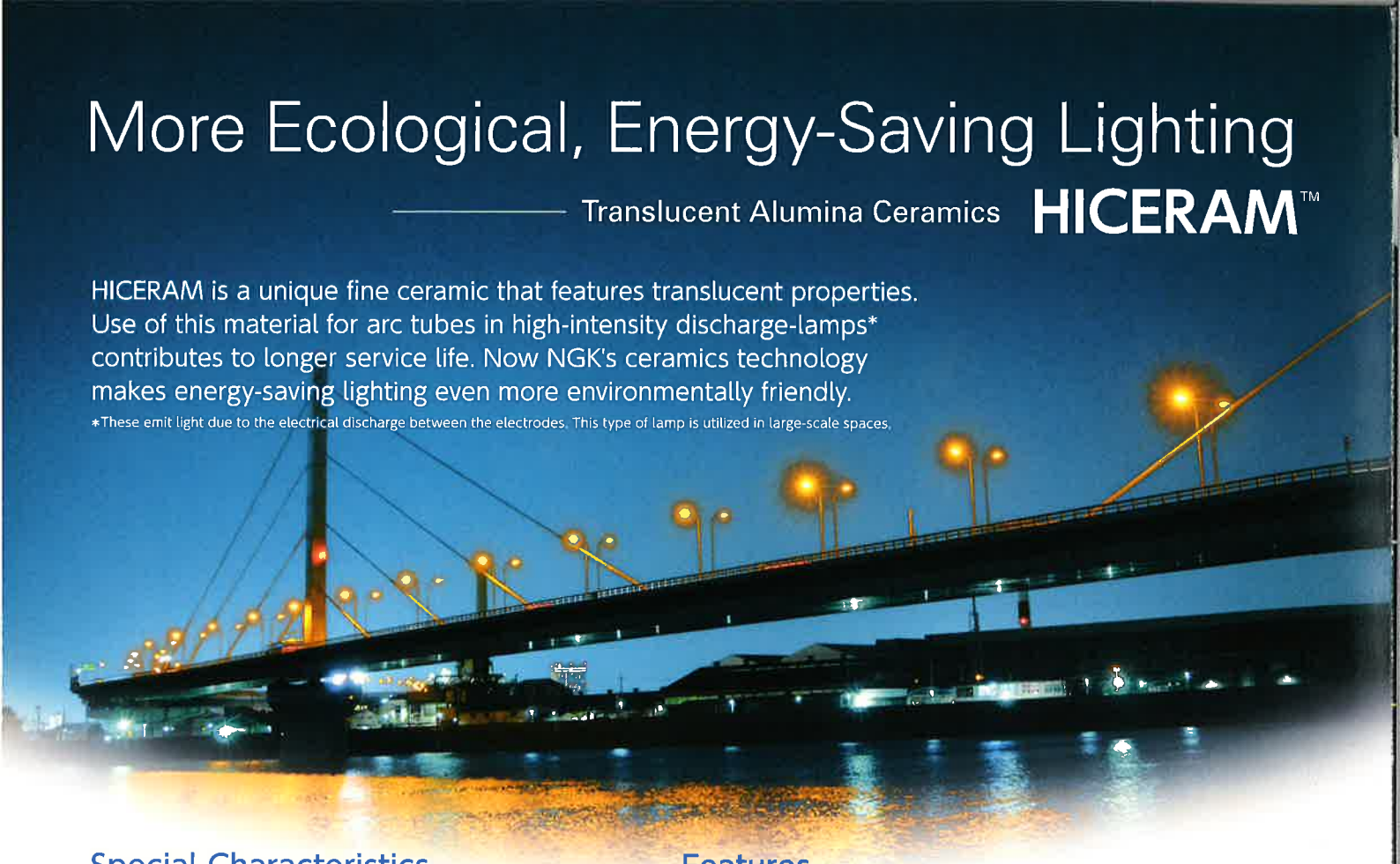
NGK INSULATORS, LTD.

More Ecological, Energy-Saving Lighting

Translucent Alumina Ceramics HICERAM™

HICERAM is a unique fine ceramic that features translucent properties. Use of this material for arc tubes in high-intensity discharge-lamps* contributes to longer service life. Now NGK's ceramics technology makes energy-saving lighting even more environmentally friendly.

*These emit light due to the electrical discharge between the electrodes. This type of lamp is utilized in large-scale spaces.



Special Characteristics

Developed using NGK's wealth of ceramic material and manufacturing technologies, HICERAM combines superior translucence with high mechanical strength.

Translucence

The raw material for HICERAM is highly purified (99.99%) aluminum oxide (Al_2O_3). This material is sintered into a high-density polycrystalline substantially without pores that inhibit transmission of light. Reduction of grain boundary phase material and optimal control of the crystal grain size, achieves excellent translucence without loss of light source efficacy.

High Strength

HICERAM features the particular strengths, including resistance to corrosion, abrasion, and thermal shock that only ceramics of this kind provide. The material exhibits superior stability over extended periods, even in corrosive environments where light emission during arc discharge causes high temperatures over 1000°C.

Features

Wide Flexibility of Designs

The material can be formed in a variety of shapes and is applicable to various end piece configurations. This enables our customers to create new tube and bulb designs.

Stable Quality

NGK's continuing history of supplying HICERAM since the 1970s is genuine proof of our long experience in high-level quality control.

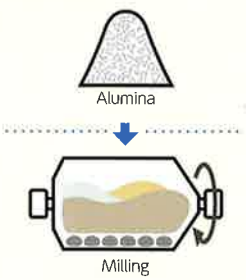
COLOR	Translucent White
CRYSTAL	Polycrystalline
AVERAGE GRAIN SIZE	30μm
PURITY(Al_2O_3)	99.9 %
CRYSTAL STRUCTURE	α-Al_2O_3
SPECIFIC GRAVITY	3.99
WATER ABSORPTION	0.0
HARDNESS (Mohs)	9
FLEXURAL STRENGTH	300 MPa*1

COEFFICIENT OF THERMAL EXPANSION[1/K]	313~ 473K	6.0×10^{-6}				
	313~ 773K	7.5×10^{-6}				
	313~1073K	8.1×10^{-6}				
THERMAL CONDUCTIVITY	33 W/(m·K)					
TOTAL LIGHT TRANSMITTANCE	96% *2					
VOLUME RESISTIVITY [Ω-m]	293K	373K	473K	573K	773K	
	10^{14}	10^{14}	10^{13}	10^{11}	10^{10}	
DIELECTRIC BREAKDOWN VOLTAGE	20 kV/mm					
DIELECTRIC CONSTANT	10					

*1 Method of measurement conforms to JIS R 1601. *2 Inner diameter 8 mm, thickness .75 mm, total length 105 mm.

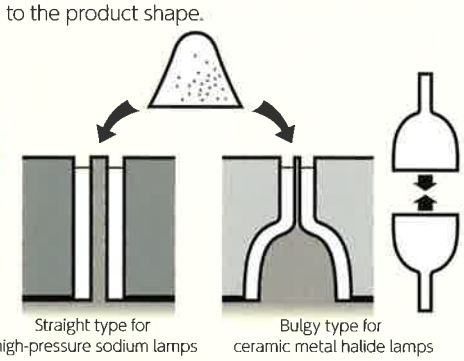
Raw Material Processing

A small amount of sintering additive is mixed in with the high-purity alumina to achieve a uniform mixture.



Forming

The material is formed using method best suited to the product shape.

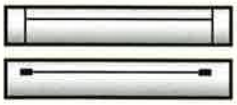


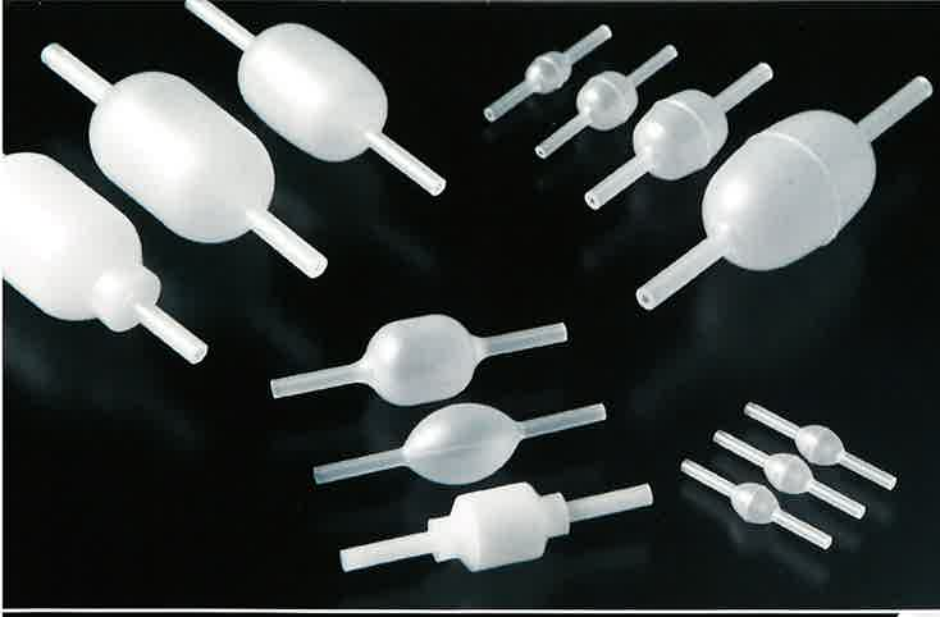
Tubes and caps can be combined suit the customer's wishes.

Calcination/Electrode Printing

Heating in the open air removes organic binders contained in the green bodies.

Upon the customer's request, outer surface electrodes can be printed on the tubes.



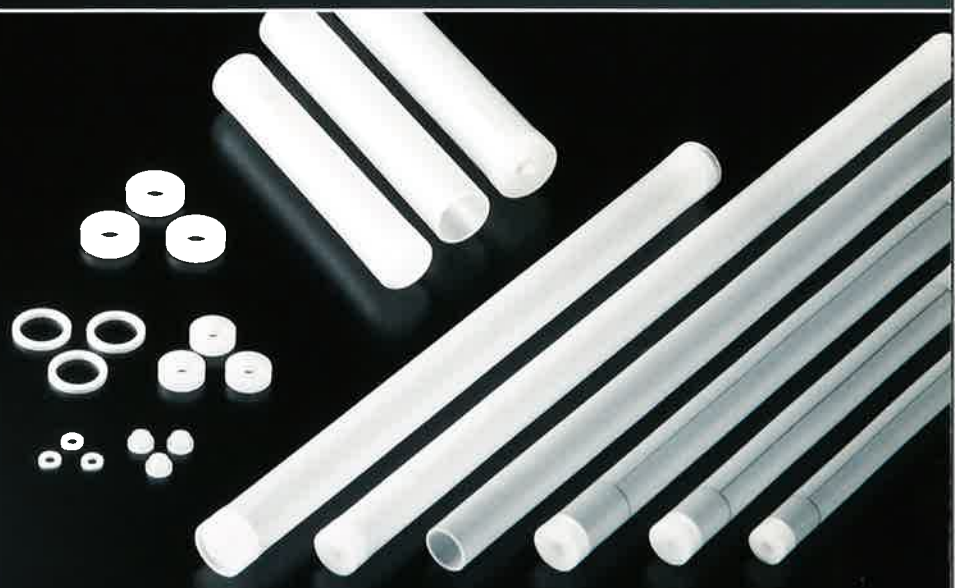


Arc Tubes for Ceramic Metal Halide Lamps

These tubes come in "Bulgy" shapes that are suitable for achieving uniform temperature distribution of the tube, as well as in the traditional cylindrical shapes. These tubes exhibit high durability in metal halide vapor. Due to their special abilities in highlighting the colors of fresh foods and textiles and accessories, ceramic metal halide lamps are used in department stores, commercial establishments and shopping malls.

Arc Tubes for High-Pressure Sodium Lamps (HPS)

In addition to the tube itself, end caps and frits used in sealing the electrodes are also available. We can provide a wide variety of designs combining these components. These tubes exhibit durability in high-temperature sodium vapor. High-pressure sodium lamps are highly efficacy light sources that mainly impart a somewhat yellow hue (golden white), so they are widely used in streetlights, parking lot lighting, high-ceilinged factories, indoor horticulture applications, etc.

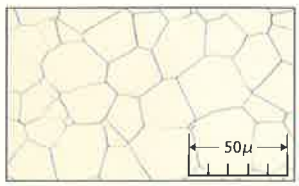


New Applications

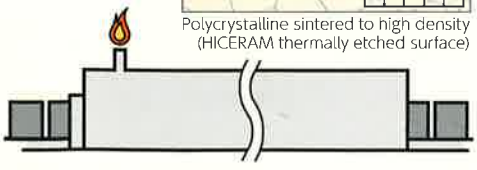
HICERAM is also a highly thermally conductive material. Utilization of this property, along with the material's particular ability to be molded into complex shapes, allows it to be used not only in light-emitting arc tubes, but also in heat-spreading substrates and other new applications. A highly efficient manufacturing process that requires no additional machining means greater flexibility in manufacture design for the customer.

Sintering

The tubes are sintered in a continuous hydrogen furnace for greater productivity and superior energy efficiency.

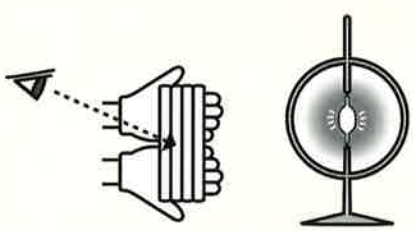


Polycrystalline sintered to high density (HICERAM thermally etched surface)

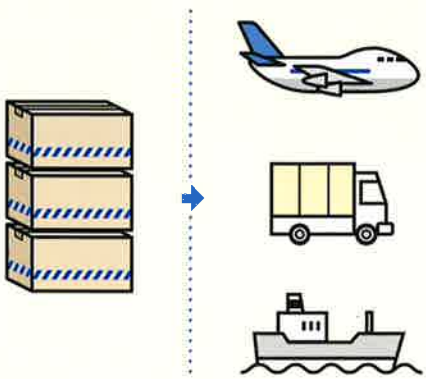


Inspection

The appearance is rigorously inspected. We confirm that the transmittance, other properties and the shape conform to the specifications.



Packing/Shipping



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