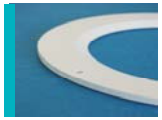





Boron Nitride vs. Glass Bonded Mica

Hexagonal Boron Nitride (hBN) is widely used for the insulators that constrain the electric arc in physical vapour deposition equipment (PVD ARC process). Owing to its superb temperature resistance, thermo shock stability, thermal conductivity and its outstanding dielectric properties, hBN is generally viewed as the ideal material for this application.

Nevertheless, some PVD systems are still being furnished with insulators made of glass bonded mica, a material that has been around for a number of decades[1].

In this leaf-let the properties of two prevalent types of glass bonded mica are compared with those of HeBoSint®, HENZE's sintered hBN ceramic materials. The comparison is based on tests performed by two institutes of Germany's renowned Fraunhofer-Gesellschaft:

IFAM Institut Fertigungstechnik Materialforschung

The IFAM carried out thermogravimetric balance measurements under high vacuum

IKTS Institut Keramische Technologien und Systeme

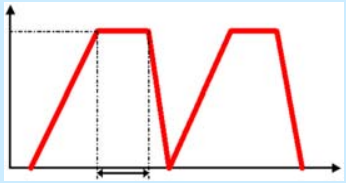
The IKTS investigated the electrical properties.

On the following pages some summary test results are presented. Full details would go beyond the scope of this brochure, but are available from HENZE BNP upon request.

The test results can be summarised as follows:

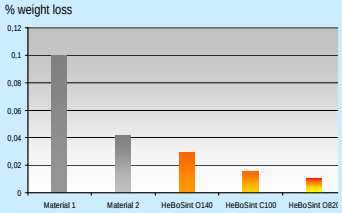
- HeBoSint O 820 is HENZE's material best suited for PVD ARC applications.
- HeBoSint O 820 is clearly superior to glass bonded mica

Heating Cycles



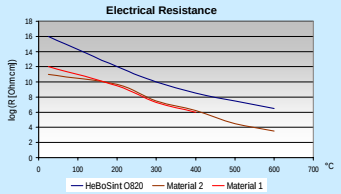
For the thermogravimetric balance measurements the materials were subjected to two heating cycles of one hour each at max. 600°C as shown[2] at left. Weight losses were determined, outgassed substances, however, were not further analysed.

Weight Loss



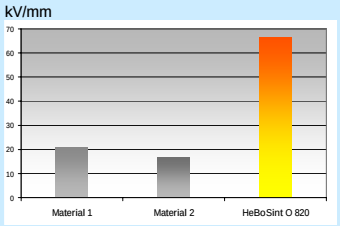
Significant weight loss occurred with glass bonded mica right from the start; Material 1 weight loss actually increased during the following heating cycle. Weight loss of all HeBoSint® brands was with-in the lowest detectable limits. No further weight loss was noted with HeBoSint® O 820 after first heating cycle.

Heating Cycles



Electrical resistance of glass bond-ed mica was shown to be significantly lower over the temperature range examined than that of HeBoSint® O 820. Material 1 ceased to perform at 400°C due to softening.

Dielectric Strength (25°C)



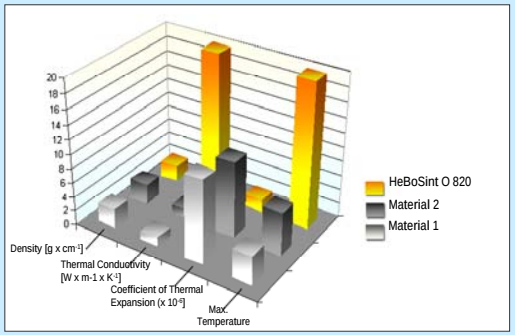
Dielectric strength of HeBoSint® O820 was shown to be far higher than that of both materials tested. This property is very important for insulating components used in high voltage applications such as PVD ARC.

Thermal Shock Resistance

Thermal shock resistance of ceramic materials depends to a great extent on the following parameters:

- density (the lower, the better)
- thermal conductivity (the higher, the better)
- thermal expansion (the lower, the better)
- maximum temperature of use (the higher, the better)

Due to its favorable characteristics HeBoSint® O820 clearly outperformed both types of glass bonded mica. This is summarized in the following graph:



[1] Glass bonded mica is being sold under different trade names such as Mykroy® (Crystex Composites LLC) or Micatherm® (Morgan Matroc Limited)

[2] Equipment: Netzsch Jupiter® 5-9 x 10-5 mbar

HENZE BNP

Physical Vapour Deposition

Boron Nitride by HENZE BNP

Our company, HENZE Boron Nitride Products GmbH (HENZE BNP for short), is dedicated exclusively to hexagonal boron nitride (hBN). In some ways this outstanding ceramic material resembles graphite. Because of this, and since it is white in color, it is often referred to as “white graphite”. What makes this material unique is its unusual combination of properties: hBN …

- can be easily machined
- is neither toxic nor harmful to the environment
- has excellent lubricating and non-stick properties
- is not wetted by most metallic melts
- withstands acids and numerous other chemical agents
- resists very high temperatures
  - in air up to approx. 950°C
  - under inert conditions/vacuum to approx. 2500 °C
- shows outstanding thermal cycling resistance
- is a good heat conductor but, unlike graphite, …
- … is a superb electrical insulator

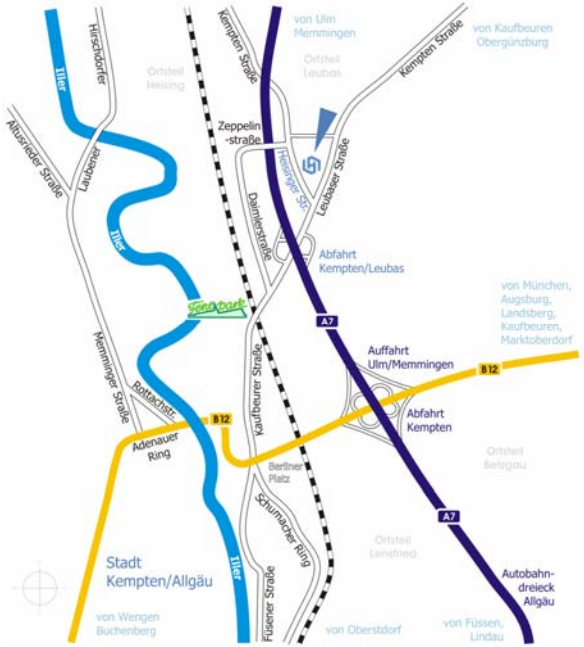
Due to our cooperation with several raw material suppliers, we are able to offer an unusually wide variety of boron nitride products, ranging from an ample range of HeBoFill® powder materials over HeBoCoat® suspensions and sprays to HeBoSint® sintered parts, which we produce in our headquarters in Kempten/ Germany.

These precision parts are available in virtually all grades, either as semi-finished or as finished goods, manufactured on state-of-the-art machining centers – exactly to our customers’ individual requirements.

A substantial part of our production of HeBoSint® components goes into the plasma industry. Most renowned manufacturers of systems for physical vapour deposition (PVD ARC) are likely to furnish their equipment with insulators made by HENZE BNP. Consequently we are shipping these special parts all over the world, either through the OEMs or directly to the end users.

Better Solutions with HENZE Boron Nitride Products

If you have questions related to the use of hexagonal boron nitride in PVD (physical vapour deposition) please feel free to contact us by phone or e-Mail. Our technical experts will try to come up with answers and will gladly give you further information. You are also welcome to visit our headquarters in Kempten. The historical town of Kempten is located in the beautiful Allgäu region in Southern Germany. Just take the “Autobahn” A 7 towards Füssen, and leave it at the exit “Kempten-Leubas”.

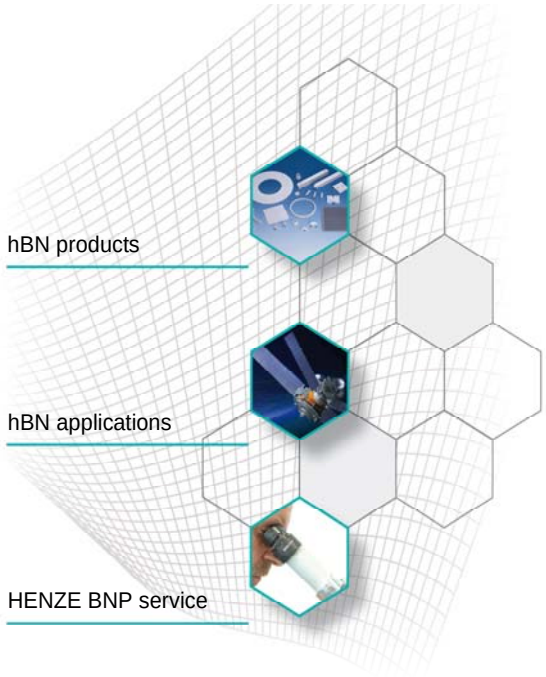


HENZE

Boron Nitride Products GmbH
Heisinger Str. 12
D-87437 Kempten / Allgäu
Germany

Phone: ++49 (0) 831.54 07 4-0
Fax: ++49 (0) 831.54 07 4-29
mailto: info@henze-bnp.de
Website: www.henze-bnp.de

Technical Information
Boron Nitride vs. Glass Bonded Mica in PVD



HENZE Boron Nitride Products
Your Competitive Edge