Aliaxis

FRIATEC

ACCELERATOR COMPONENTS

FRIALIT®-DEGUSSIT® High-Performance Ceramics

www.friatec.com/ceramics

CREATED FOR TOP PERFORMANCE
FRIALIT®-DEGUSSIT®
HIGH-PERFORMANCE CERAMICS

Metalized Oxide Ceramics is the solution for numerous and demanding physical-technical applications. This makes FRIALIT-DEGUSSIT High-Performance Ceramics equally indispensable in the field of medical technology as it is in research and development.

MEETING ALL REQUIREMENTS

Physical-technical applications place exceptional demands on the materials used: demands that often push metal, glass and plastics to their limits. This is where FRIALIT-DEGUSSIT High-Performance Ceramics comes into play. It is extremely resistant to heat, corrosion and chemical influences while fully retaining its shape stability and resistance to wear-and-tear. Our components made of high-performance ceramic components retain their full functionality, regardless of the demands placed upon them.

INDISPENSABLE IN RESEARCH AND DEVELOPMENT

Thanks to its unbeatable properties FRIALIT-DEGUSSIT High-Performance Ceramics has become a must in virtually all fields of technology.

Our ceramic-to-metal components are implemented especially in the field of electrical and medical technology and are vital components for accelerators and particle sources. Renowned institutes throughout the world rely on our high-performance materials.

Special ceramic components with individual design and state-of-the-art technology are the answer to the problems of researchers and developers.

PRECISE DIAGNOSIS AND **OPTIMAL TREATMENT**

In both X-ray technology and oncological radiation therapy: Ceramic-to-metal components made of FRIALIT-DEGUSSIT High-Performance Ceramics enable clear diagnoses with minimum radiation exposure.

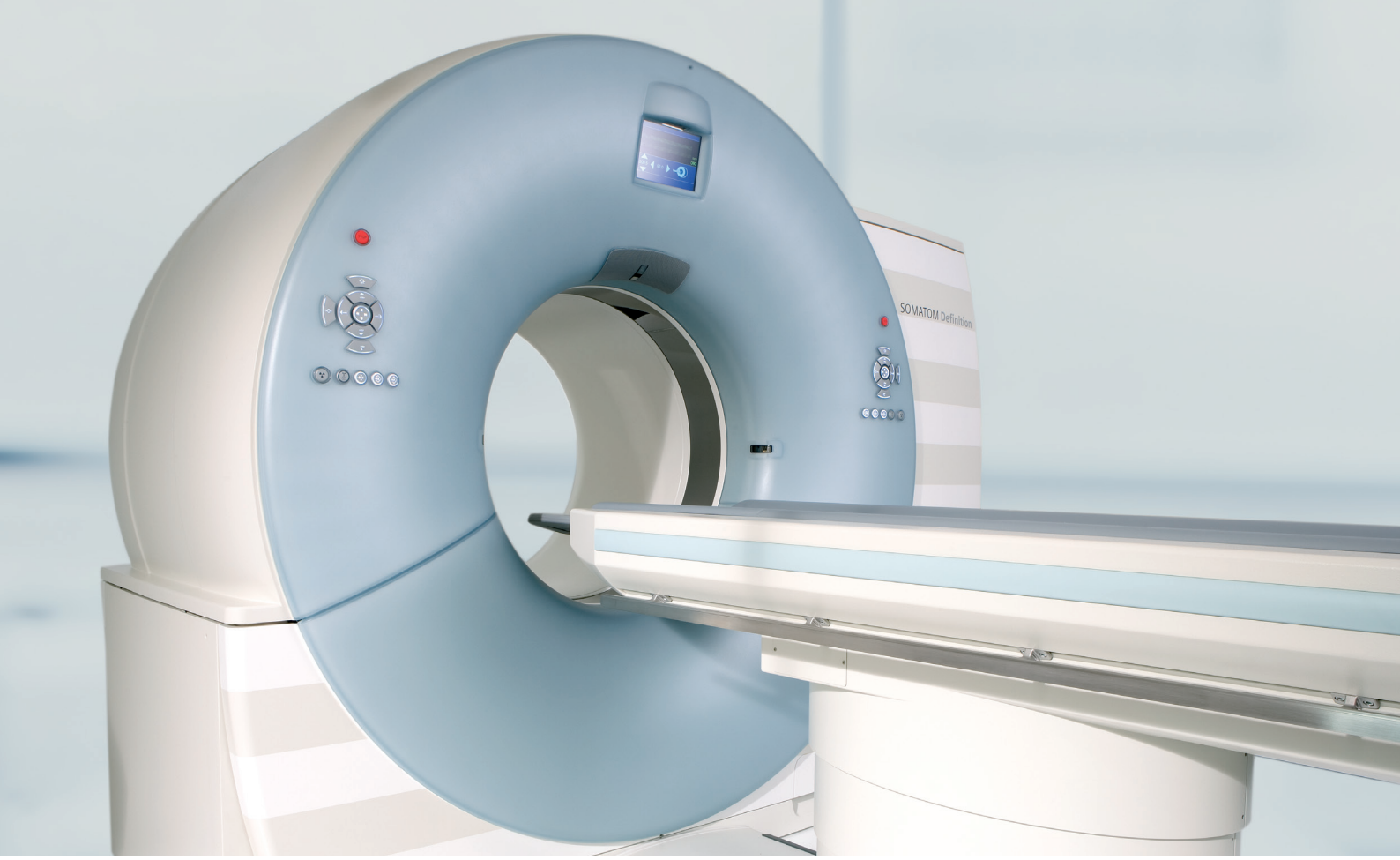
The X-ray tube lies at the very heart of computerised tomography. It enables doctors to reach a precise diagnosis while keeping patient radiation exposure to a minimum.

The key components indispensable for modern X-ray diagnostics are the X-ray tube and X-ray image intensifier – components made of FRIALIT-DEGUSSIT High-Performance Ceramics.

Our products are the result of decades of experience combined with intensive research anddevelopment and customer-focused product implementation. The X-ray image intensifier made by FRIATEC is an outstanding example of successful and sustainable cooperation with our customers. Tried and tested over many years, the product has been well-proven in practice and is now used in the field of radiology throughout the world.

The Heidelberg Ion-Beam Therapy Centre (HIT), designed as the first German institute for clinical radiation therapy, and currently the only therapy unit for heavy ions in Europe, rely on our oxide ceramics.

Kicker chambers made of FRIALIT-DEGUSSIT High-Performance Ceramics are fundamental components of the accelerator. They ensure optimum therapeutic results while at the same time minimizing the radiation dose for the patient.



THE X-RAY TUBE

the heart of computerised tomography. The use of oxide ceramics guarantees a long lifetime and high thermal resistance, thus making CT scanning a standard procedure for quick and reliable diagnostics.

THE X-RAY IMAGE INTENSIFIER

for radiogragphy enables precise diagnoses to be made while at the same time minimizing the radiation dose

THE KICKER CHAMBER

of the particle accelerator ensures optimum therapeutic results with maximum conservation of heal- thy tissue.

HIGH-TECH MATERIALS FOR **PARTICLE RESEARCH**

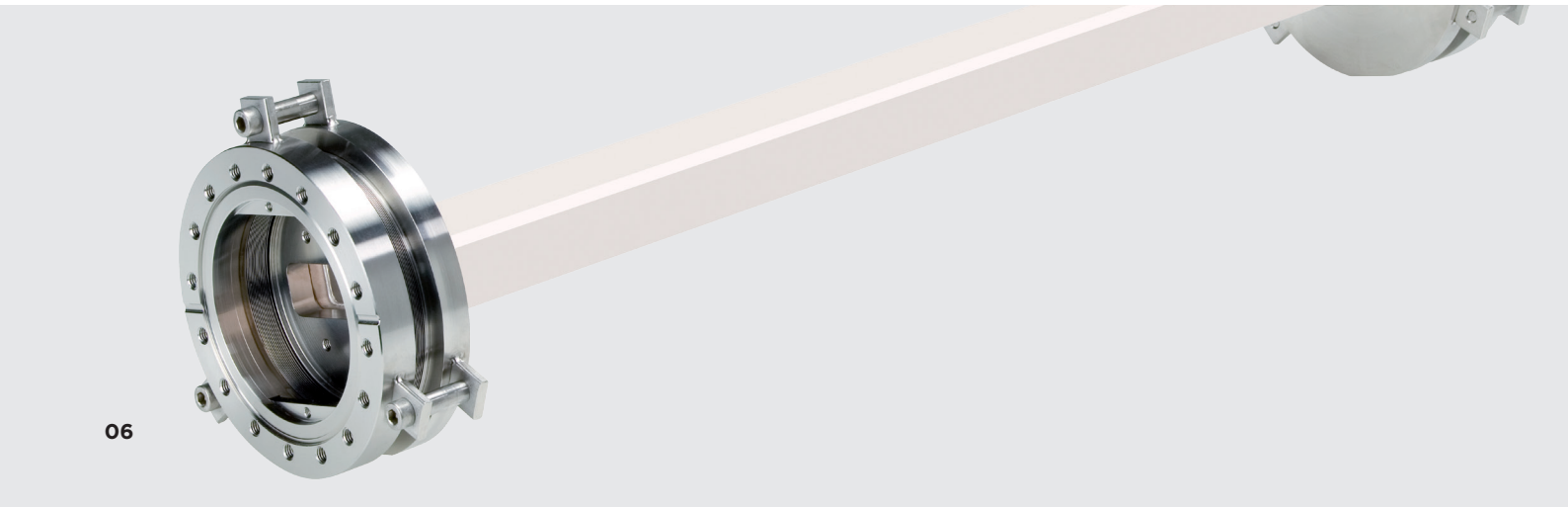
FRIALIT-DEGUSSIT High-Performance Ceramics is the optimum material for demanding applications in fundamental physical research, particle physics and materials research. Its material properties meet the very highest demands – even under extreme conditions.

Vacuum chambers made of FRIALIT-DEGUSSIT High-Performance Ceramics are used in accelerator units. In fast-pulsed bending magnets they also serve the purpose of injecting and extracting particles.

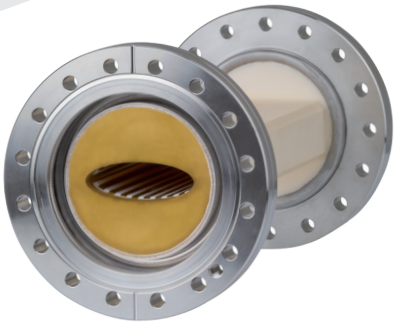
Demands on components made of oxide ceramics are extremely high during operation. High mechanical strength and loading capacity ensure reliability during operation.

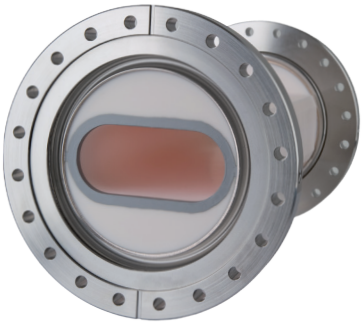
Components made of ceramic-to-metal compounds boast numerous-exceptional properties: They provide maximum electrical insulation, remain fully tight under extreme pressure or vacuum conditions, are exceptionally corrosion-resistant and even withstand temperatures exceeding 350 °C.

In contrast to metallic parts, ceramic components avoid the shielding of the rapidly changing external magnetic fields. Ceramic material is not heated by eddy currents. The additional coating on the inner surfaces of the ceramic chambers, e.g. Ti or TiN, ensures the reliable discharge of image current and prevents secondary electron emission.



Minimum outgassing and absorption rates





IN THE HIGH-VOLTAGE ACCELERATOR

the particles are pre-accelerated directly after the ion / electron source and then led into the ring accelerator.

Produced for:
Budker Institute of Nuclear Physics
Ø 350 x L 560 mm

VACCUM CHAMBERS

for particle accelerators made of FRIALIT-DEGUSSIT High-Performance Ceramics: The Ti or TiN coating ensures reliable discharge of image current.

Produced for:
Budker Institute of Nuclear Physics
Ø 150 x L 300 mm

THE KICKER CHAMBER

made of FRIALIT-DEGUSSIT High-Performance Ceramics is not heated by magnetic fields and ensures rapid and precise control of the beam.

Produced for:
RR CAT, Government of India
Ø 215 x L 400 mm

PREFERRED PARTNER
IN SCIENCE

FRIATEC products are today used in scientific and technological institutes all over the world. Components made of FRIALIT-DEGUSSIT High-Performance Ceramics are a major constituent of particle accelerators in renowned institutes.

In close cooperation with scientists, FRIATEC develops customized solutions of the highest technological standard. For this purpose FRIATEC carefully selects the best ceramic-to-metal compound for each application. Many different compounds can be implemented either by traditional methods using metalized ceramics or by active welding.

A wide variety of magnetic and non-magnetic metals are here available.

Due to their exceptional properties and the individual approaches offered, accelerator units made of FRIALIT- DEGUSSIT High-Performance Ceramics are the products of choice in renowned German institutes. These include the German Electron-Synchrotron Foundation (DESY) based in Hamburg and Zeuthen, the Jülich Research Centre (FZJ), the Helmholtz Centre for Heavy-Ion Research (GSI) in Darmstadt and the Karlsruhe Institute of Technology (KIT).

Also at international level many institutes rely on accelerator units made of FRIALIT-DEGUSSIT High-Performance Ceramics: the Large Hadron Collider (LHC) at CERN, the European Organization for Nuclear Research in Switzerland, Cornell University, Ithaca, USA, and the Budker Institute of Nuclear Physics (BINP) at Novosibirsk in Russia.

Excellence in technical solutions

HIGH-VOLTAGE INSULATORS

for electron sources consist of layers of brazed ceramics and metal electrode rings with welded CF flanges.

INSULATORS AND HIGH-VOLTAGE FEEDTHROUGHS

In order to increase insulation the insulators and high-voltage feedthroughs are fitted with ribs. Glazing provides for a dirt-resistant surface.

INDIVIDUAL VACUUM CHAMBERS

made of FRIALIT-DEGUSSIT High-Performance Ceramics are produced in close cooperation with the customer.

Produced for:
Joint Institute for Nuclear Research
Ø 340 x L 585 mm

Produced for:
Cornell University
Ø 560 x L 450 mm

Produced for:
RR CAT, Government of India
Ø 215 x L 400 mm

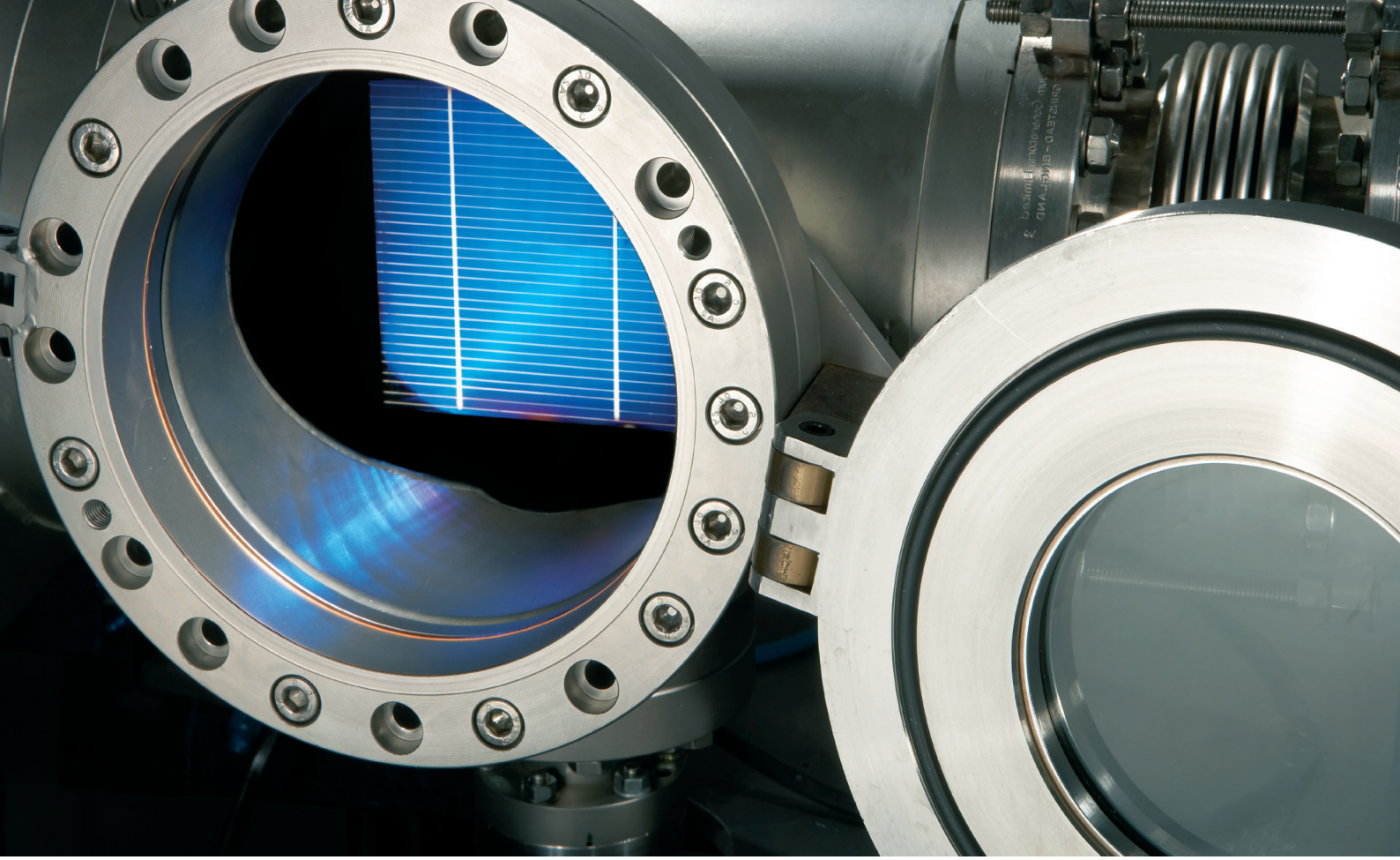
PRECISION EQUIPMENT **FOR RESEARCH**

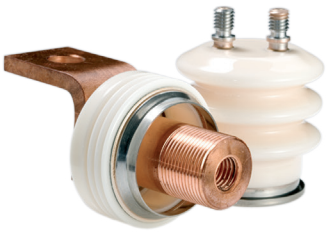
In Vacuum systems the outstanding properties of FRIALIT-DEGUSSIT High-Performance Ceramics ensure precise and reproducible measurement results.

The ultra-high vacuum places new demands on conventional materials and joining techniques. Components made of FRIALIT-DEGUSSIT High-Performance Ceramics are able to fully meet these challenges and show their strengths in the vacuum.

Minimum outgassing and leakage rates combined with optimum electrical insulation and thermal resistance guarantee an excellent level of reliability. Electrical feedthroughs made of ceramic-to-metal components allow transmission of the smallest measurement signals between the vacuum chamber and the outside. Insulation tubes provide reliable separation of areas with different potentials. With crucibles made of FRIALIT-DEGUSSIT High-Performance Ceramics materials can be reliably evaporated in the vacuum. Capillaries, tubes and insulating beads ensure perfect electrical insulation in vacuum chambers. Focusing units in electron microscopes require tolerances of just a few µm. Only this enables the most varied products from research and technology to be examined at maximum resolution and depth of field. The lowest leakage and desorption rates are decisive for the functionality of the microscope.

Due to their shape stability and outstanding electrical insulation properties, components made of FRIALIT- DEGUSSIT High-Performance Ceramics guarantee excellent measurement results.





TAILOR-MADE AND STANDARD COMPONENTS

Whether high current, high voltage or measurement signals, FRIATEC manufactures tailor-made and standard components to customer specifications.

SINGLE AND MULTIPLE FEEDTHROUGHS

for ultra high-vacuum applications using FRIALIT-DEGUSSIT High-Performance Ceramics ensure maximum electrical insulation with minimum outgassing and leakage rates.

INSULATION TUBES

made by FRIATEC provide maximum insulation and remain tight at extreme pressure and vacuum conditions and even resist temperatures exceeding 350 °C.

Aliaxis

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