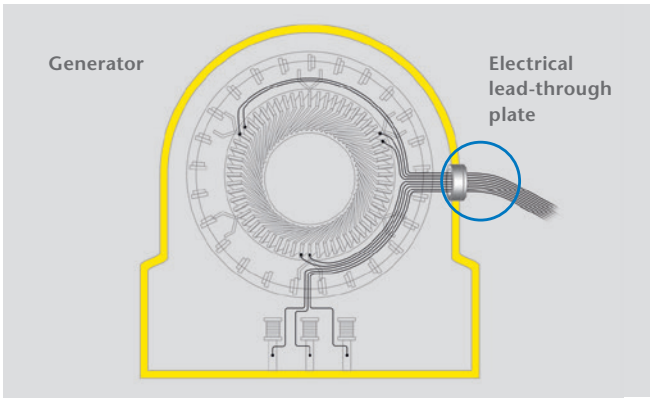
SCHOTT
glass made of ideas

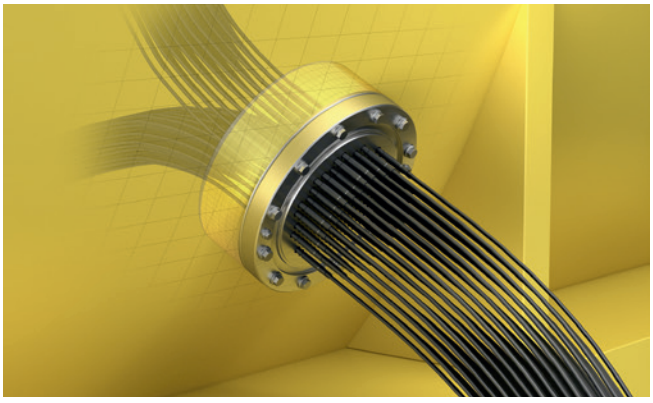
SCHOTT Eternaloc®

Gas-tight electrical
lead-through plates

SCHOTT is a leading international technology group in the areas of specialty glass and glass-ceramics. With more than 130 years of outstanding development, materials and technology expertise we offer a broad portfolio of high-quality products and intelligent solutions that contribute to our customers' success.

For more than 75 years, SCHOTT's Business Unit Electronic Packaging has used glass-to-metal sealing technology to manufacture hermetic feedthroughs that transmit electrical power or data, while simultaneously acting as gas diffusion-proof isolation elements. Today, our cable penetrations represent a proven worldwide standard in a variety of safety-critical, harsh-environment applications, including nuclear power plants and pressure vessel construction. This handbook shall provide helpful information on the advantages of Eternaloc® lead-through plates for hydrogen gas-cooled generators.





Electrical feedthroughs – Important for efficient operation, longevity, and safety of hydrogen gas-cooled generators

In hydrogen-cooled turbo generators, electrical lead-through plates have two main functions:

- Serve as the hermetic feedthroughs for electrical power supply as well as for instrumentation and control purposes.
- Simultaneously maintain the pressure boundary integrity of the generator and remain absolutely gas- and leak-tight.

Hermetic sealing is important for safety as well as efficiency and longevity of the generator and its equipment. This is provided through two functions of the hermetic seal: preventing dangerous leakage of highly flammable hydrogen and preventing intrusion of oxygen or water into the generator, which can cause impurity of the hydrogen coolant and subsequent reduced efficiency and even damage to the equipment.

Reliable hermetic sealing can only be achieved with non-aging materials

The sealing of the feedthroughs' electrical connections represents a potential weak point. Lead-through plates that use organic, naturally aging epoxy seals could compromise the generator's pressure integrity, resulting in leakage and electrical malfunction. To achieve the highest reliability, non-aging specialty glass is the sealing material of choice.

SCHOTT Eternaloc® electrical lead-through plates

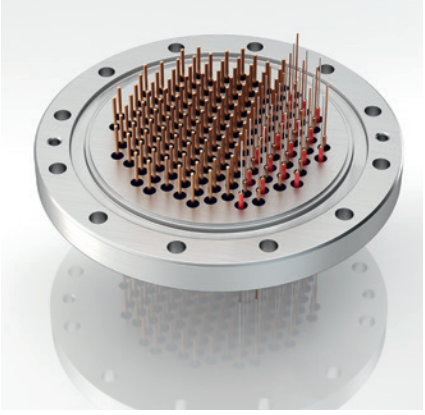
Reliably gas-tight, proven and tested.

Proven and tested

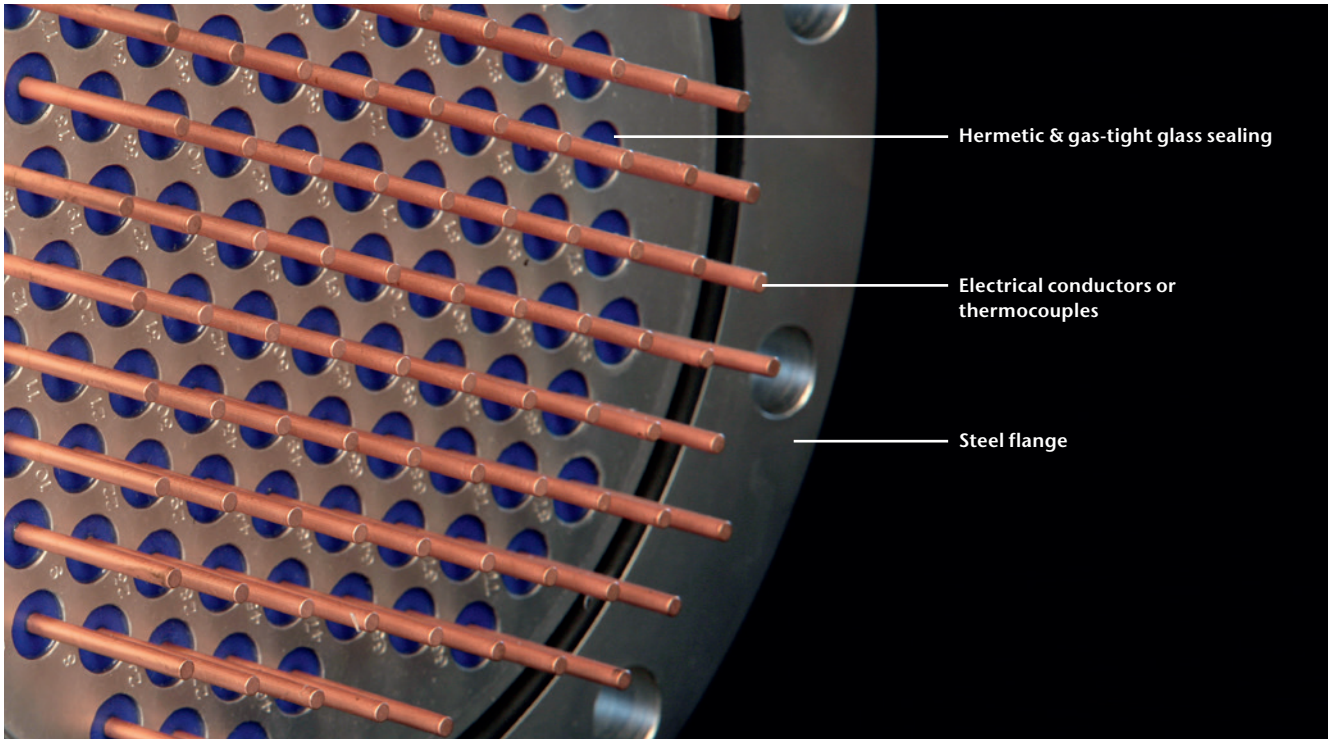
SCHOTT has been supplying Eternaloc® lead-through plates to leading manufacturers of hydrogen gas-cooled generators for more than 25 years. Working with SCHOTT allows you to focus on your core competencies and outsource this small but important component to one of the leading manufacturers of electrical feedthroughs.

Reliable gas-tight sealing

To design its Eternaloc® lead-through plates, SCHOTT relies on inorganic and therefore non-aging materials: the feedthroughs consist of a steel flange with the conductors or thermocouples sealed in using compression glass-to-metal sealing technology. The specialty glass thereby acts as the electrical insulator and hermetic seal, which reliably prevents leakage of hydrogen as well as intrusion of oxygen or moisture.

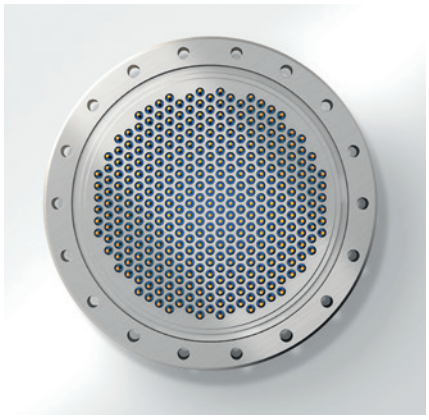


Feedthrough with RTD and thermocouple conductors



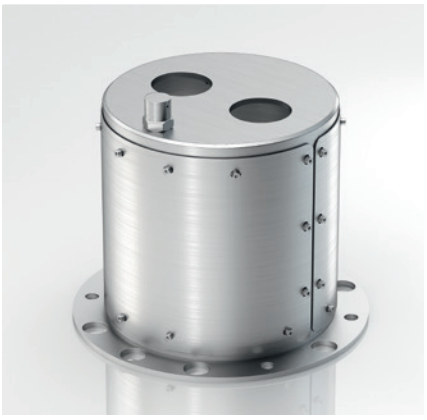
SCHOTT Eternaloc® electrical lead-through plates

Maintenance-free, customizable and explosion-proof.



Feedthrough with RTD conductors

Feedthrough with coax conductors



Junction box

Maintenance-free robustness reduces your cost-of-ownership

- Made from purely inorganic materials, glass-to-metal seals from SCHOTT are non-aging and maintenance-free, thereby reducing recalls and replacements as well as the total cost of ownership.
- Proven resistance against harsh environment conditions including mechanical stress, high pressure, extreme temperature ranges and radiation.

Customizable according to your requirements

Our in-house engineering capabilities, including materials science, simulations and type tests as well as certification know-how, enable us to provide both standard as well as fully customized designs of lead-throughs, connectors and complete electrical system solutions.

Available with explosion-proof certification

Based on our long-term experience, Eternaloc® feedthroughs can be certified according to ATEX and IECEx standards as well as local regulations such as KOSHA or CU TR.

Available with complete electrical assembly

SCHOTT can supply Eternaloc® lead-through plates with electrical assembly inlcuding junction box, connectors and cables, thereby reducing your overall supply chain process.

SCHOTT Eternaloc® electrical lead-through plates

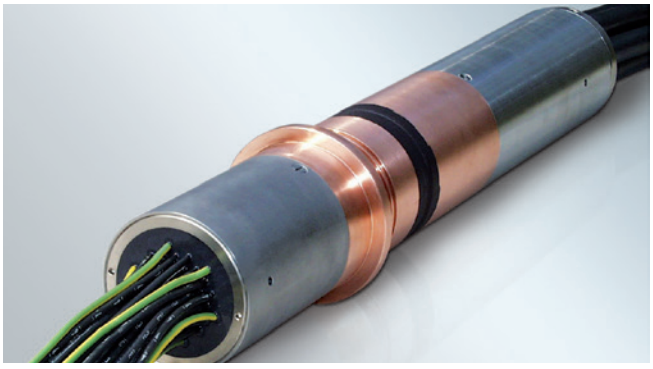
	Features	Your benefit
Conductors	For power supply and signal transmission and measurements, such as: • Temperature (RTD = Resistance Temperature Detector, Thermocouple) • Vibration • Motor speed counting Available as standard and customized designs	• Manufactured according to your requirements, no limitation regarding the type of signal • Economy of scale with standard lead-through plate designs • Wide variety of choice
Pressure resistance	Withstand high pressures up to 2700 bar	Maintain pressure boundary integrity of generator
Leak-tightness	Gas-tight hermeticity is usually tested to pass 10-8 mbar l/s leakage rates, which prevent leakage of hydrogen and intrusion of media into the generator.	• Safety and efficiency of generator's operation • Explosion-proof protection
Electrical rating	• High-, medium-, and low-voltage (up tp 13800 V) and amperage (up to 1500 A) designs • Coax and thermocouple wires for measuring equipment available • Fiber optical penetration designs possible	Technological variety enables you to equip the whole generator with glass-to-metal sealed feedthroughs
Quality Assurance	100% final inspection of all products	Minimizes your efforts for incoming inspection
Installation	• Minimum space impact • Easy to install using detailed installation instructions • Supervision and training offered	Reduces the final weight and bulkiness of generator
Lifetime	Unlimited lifetime of non-aging pressure barrier No maintenance required	Contributes to longevity and lower cost-of-ownership of the generator
Certifications	Certifiable according to international safety standards, such as IECEx, ATEX, as well as local regulations, such as KOSHA, PESO, CU TR, UL, CSA	Customer receives internationally and locally certified product to supply parts worldwide and benefit from SCHOTT's long-term certification experience

SCHOTT – Experts for hermetic electrical feedthroughs

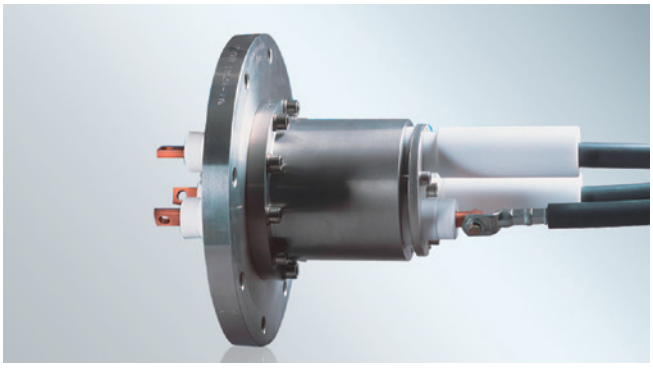
As early as the 1930s, SCHOTT developed specialty glasses for the permanent sealing of glass and metal. Ever since, hermetic glass-to-metal sealing technology has been used to manufacture electrical feedthroughs for a broad variety of safety-critical, harsh-environment applications, including nuclear power plants, pressure vessel construction, and special ship building applications.

Once installed, feedthroughs from SCHOTT provide maintenance-free gas-tight sealing for decades.

Extensive track record in demanding energy applications



Nuclear Reactors
Since 1962, more than 12,000 electrical penetrations from SCHOTT have been installed in approx. 100 Nuclear Power Plants worldwide as leak-tight pass-throughs for power, control and instrumentation cables through the containment structure.



Liquefied Natural Gas Applications
Eternaloc® feedthroughs have been installed in more than 6,000 expanders, compressors and submerged pumps since 1985.

All of these feedthroughs have performed maintenance-free since their installation.

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