POWER-TO-X PROCESSES

Our gaskets for hydrogen applications

Metal profile gasket H5
All-metal chamber gasket with two sealing rings made of easily deformable, malleable metal

Grooved gaskets B9A
Grooved stainless steel carrier with graphite coating on both sides

Corrugated gasket W1A-3
Stainless steel corrugated ring with graphite coating

Rubber-steel gasket profile KNG B
Power shunt gasket electrically conductive with NBR sealing lip

Rubber-steel gasket profile WG
Power-locking NBR rubber gasket with internal steel support

Further information on our gaskets and resistance certificates can be found at www.klinger-kempchen.de.
If you have any technical questions, please contact our advisory service on +49 208 8482 253.

We are happy to support you with the technical design and the mathematical verification, for example in accordance with 1591-1! Just get in touch with us.

Certified according to DIN EN ISO 9001:2015, ISO 14001:2015 and ISO 45001:2018. Subject to technical changes. Status: January 2024
KLINGER Kempchen GmbH / Im Waldteich 21 / DE - 46147 Oberhausen
Tel +49 (0) 208/8482 0 / email: info@klinger-kempchen.de

Hydrogen as a challenge in sealing technology

» Hydrogen is becoming increasingly important as an energy source in various industries.
» The transportation of hydrogen, whether as a pure substance or as an admixture to natural gas, also increases the demands on sealing technology.
» Due to its high flammability, its explosive nature in combination with oxygen (oxyhydrogen) and its low atomic mass, the safe design of flange connections is of crucial importance.

MEDIA RESISTANCE

A distinction must be made between metal and the soft material component of a gasket. Metallic materials obtain their strength from a lattice structure that can be weakened by the penetration of hydrogen atoms. More precisely, hydrogen accelerates the stress corrision. This chemical process is critical for steels with a high carbon content and at elevated application temperatures (> 300 °C). Ferritic steels are particularly affected, while austenitic steels (Cr-Ni alloys such as 1.4404 (316L) and 1.4571 (316Ti)) appear to be more resistant.

In principle, soft materials are not affected by hydrogen. This also applies to nitrile butadiene rubber (NBR), which is used in rubber-steel seals. The sealing material graphite is also considered to be chemically resistant to hydrogen at operating temperatures below 300 °C. Graphite flat gaskets (e.g. RivaTherm-Super) with metallic carrier foils made of austenitic chromium-nickel steels such as 1.4404 (AISI 316L) and surrounds made of 1.4571 (AISI 316Ti) can also be used without hesitation.

TIGHTNESS

Due to the small atomic size (H) or molecular mass (H2) of hydrogen, an increased tightness of the flange connection is required. A flange connection for which a mathematical verification in accordance with DIN EN 1591-1 for tightness class L0.01 is available is considered technically tight. The sealing characteristics in accordance with DIN EN 13555 are determined using helium as the medium. Although atomic helium has twice the molar mass of hydrogen, the difference is not significant due to the usual molecular form (H2).

CONCLUSION

To ensure maximum safety in hydrogen applications, metal gaskets, metal/soft material gaskets (corrugated gaskets, grooved gasket profiles) and rubber-steel gaskets are recommended. Care must be taken to select a durable material.

For a secure flange connection, we recommend a mathematical design in accordance with DIN EN 1591-1. Our engineering team will be happy to assist you with this. To impart assembly knowledge we regularly carry out flange assembly training courses in accordance with DIN EN 1591-4. We have a modern training center available for this purpose, or alternatively we can come to you with our mobile equipment to you. Numerous resistance certificates for various gasket types are available for download on our website.

2024 Edition I Printing and typesetting errors excepted

KLINGER Kempchen GmbH
Im Waldteich 21 » 46147 Oberhausen
T: +49 208 8482-0 » F: +49 208 8482-285
info@klinger-kempchen.de

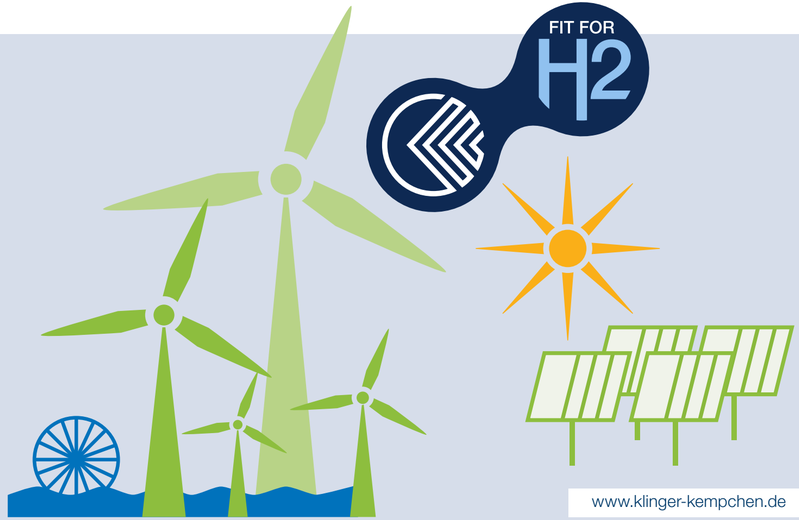
01/2024

www.klinger-kempchen.de

KLINGER Kempchen

POWER-TO-X

Our gaskets for hydrogen



www.klinger-kempchen.de

PROCESS STEPS POWER-TO-X

KLINGER Kempchen – the best gasket for every step

KLINGER Kempchen accompanies you in the production and distribution of renewable energy

Electricity generated from renewable energies can be fed directly into the power grid and used for electromobility, for example. However, it can also be used to produce hydrogen.

Hydrogen is one of the energy sources. It can be fed directly into the gas supply network, but it is also suitable for use as a fuel for fuel cells in vehicle technology and stationary modules, as an industrial raw material and for energy storage.

With the addition of CO_2, hydrogen is used to produce methane – another energy source and industrial raw material. Methane can also be produced in biogas plants.

A further processing step is then the production of synthetic fuels (e-fuels such as petrol, kerosene and diesel), which are therefore CO_2-neutral and enable vehicles, ships and airplanes to operate in an environmentally friendly manner.

KLINGER Kempchen provides the right gaskets for individual process steps in this chain.

High-quality products that contribute to the transition to a climate-neutral energy supply.