

HIGH-PERFORMANCE CERAMICS

CONTAINMENT SHELL FOR PUMP MANUFACTURE

Application:

Magnetically coupled centrifugal pumps in the chemical and oil & gas industries

Material:

Zirconia FZM and FZM+

Containment shells made from FZM and FZM+ zirconia ceramics offer significant advantages over conventional materials such as plastic or metal:

Non-Magnetic Properties for Increased Efficiency

FZM and FZM+ ceramics are non-magnetic, preventing the formation of eddy currents that can lead to heat generation. The absence of heat loss allows for a 10-15% reduction in pump operating power. Magnetic coupling enables a hermetically sealed pump drive, ensuring completely leak-free operation with minimal maintenance. This eliminates environmental hazards associated with leakage in mechanically sealed pumps. Using ceramic containment shells is particularly beneficial when handling heat-sensitive materials, as it minimizes heat transfer and ensures safer operation.

Superior Corrosion Resistance

FZM and FZM+ ceramics provide excellent resistance to corrosion, making them suitable for use with a wide range of acids and alkalis. The only exceptions are: hydrofluoric acid (HF), 1% concentration (unstable at room temperature) and silicic acid (H_2SiF_6), 30% concentration (unstable at 30°C). For such cases we offer additional PTFE coatings on ceramics.

High Mechanical Strength and Pressure Resistance

FZM and FZM+ ceramics combine high mechanical strength with a low elastic modulus (E-modulus). They can withstand nominal pressures of up to 95 bar and temperatures reaching 450°C. The low E-modulus allows for elastic deformation, ensuring safety even at high pressures. To minimize the gap between inner and outer pump magnets, the cylindrical section of the containment shell can have a wall thickness as thin as 1.8 to 3.0 mm.

**Enhanced Safety for Hydrogen and Cryogenic Applications**

Hydrogen, a key element in renewable energy applications, is often pumped under high pressure, in cryogenic temperatures and in liquid form. To prevent unwanted heat transfer and evaporation, it is crucial to use non-magnetizing materials. FZM and FZM+ ceramics provide an ideal solution, as they do not generate heat in magnetic fields. With the advancement of high-pressure ceramics (FZM+), our containment shells can now handle even more demanding conditions. FZM+ white zirconia offers improved flexural strength and fracture toughness, enabling test pressures up to 95 bar (PN 63) across a temperature range from -200°C to over 450°C.

Applications in Critical Industries

Thanks to these outstanding properties, FZM and FZM+ ceramic containment shells (also known as pressure cans or pressure shrouds) are highly suitable for magnetically coupled pumps used in the chemical, oil & gas, and hydrogen industries. Each containment shell is customized to fit the specific pump type, ensuring optimal performance and reliability.

- ▶ Anti-magnetic
- ▶ Corrosion resistant
- ▶ High mechanical strength
- ▶ Thermal shock resistant