TIMKEN

TIMKEN® BEARINGS FOR CRYOGENIC APPLICATIONS

In the demanding world of cryogenic applications, Timken bearings deliver exceptional performance, reliability, and longevity. Our specialized bearings are engineered with advanced materials and processes to withstand extreme conditions and ensure optimal functionality.

ENGINEERED FOR EXTREME CONDITIONS

Developing bearings for cryogenic environments, such as Liquid Hydrogen (-253°C/-423.4°F) and Liquid Nitrogen (-196°C/-320.8°F), requires meticulous material selection and design. Key components, including rings, cages, and balls/rollers, are carefully analyzed for thermal expansion to ensure optimal clearance at operating temperatures.

Common applications for Timken cryogenic bearings include:

- Liquefied Gas Pumps (LNG, LN2, LO2, LH2, LHe2)
- Cryogenic Submersible Pumps
- LOX (Liquid Oxygen) Turbo Pumps
- Helium Circulators
- Turbo Expanders
- Cryogenic Storage Tanks
- Liquid Turbines
- And much more

INNOVATIVE DESIGN FOR CRYOGENIC APPLICATIONS

Timken bearings for liquefied gas pumps are designed to operate within the flow path of process media, simplifying construction by eliminating the need for rotary seals. These bearings can handle various liquefied gases as their sole lubrication, making them ideal for submersible pumps transporting gases at temperatures from -74°C (-101°F) to -253°C (-423°F).

Our bearings resist damage from:

- Thin Lubrication Film
- External Vibrations
- Thermal Expansion Mismatch
- Stray Electric Currents
- Oxidation and Corrosion

ADVANCED MATERIALS AND CONSTRUCTION

- **440C Stainless Steel Rings:** Provide robust corrosion protection and ensure longevity and reliability in cryogenic environments.
- **Ceramic Balls (Silicon Nitride - Si3N4):** Offer higher stiffness, reduced friction, lower operating temperatures, and increased bearing life. Ceramic balls also provide electrical insulation, protecting against micro-welding under poor lubrication conditions.
- **PEEK Cages:** Optimal for cryogenic applications due to excellent mechanical properties, low-temperature resistance, and low thermal conductivity. Our PEEK cages are enhanced with graphite and PTFE for improved antifriction properties.

SPECIALIZED HEAT TREATMENT

Timken bearings undergo unique heat treatment processes to ensure dimensional stability, hardness, and toughness at low temperatures. This includes sub-zero chilling and tempering cycles to stabilize the structure, ensuring durability and stability across temperature gradients.

DESIGN FEATURES

- **Hybrid Bearings with Special Clearances:** Silicon nitride balls and stainless steel rings with special clearance accommodate differential thermal expansion, ensuring reliable performance across varying temperatures.
- **Extended Outer Rings:** Provide additional support and stability.
- **Anti-Rotation Notches:** Prevent outer ring rotation under load, ensuring precise performance.

Timken bearings for cryogenic applications are specially designed and processed to meet the extreme demands of such environments. With advanced materials, specialized heat treatments, and hybrid designs, our bearings ensure superior performance, reliability, and longevity. Choose Timken for your cryogenic bearing needs and experience unmatched quality and engineering excellence.

For more information, contact your local representative.

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The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets bearings, gear drives, automated lubrication systems, belts, brakes, clutches, chain, couplings, linear motion products and related industrial motion rebuild and repair services.

Stronger. By Design.

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