



# CRYOGENIC SEALS

## For Process Pumps

Since 1983, Flex-A-Seal has been and continues to be the leader in welded metal bellows technology. And we have successfully applied these engineering capabilities to solve the rigorous demands of very low-temperature cryogenic applications.

Each component in our cryogenic seal designs have been engineered for optimal performance including:

- **Edge Welded Bellows Construction**

347 Stainless Steel has proven to be the most favorable bellows material in cryogenic applications. 347 SS maintains its strength and does not become brittle in extremely cold environments. In addition, tightly-toleranced spring rates lead to lighter face loads and less heat generation at the faces.

- **Cryogenic Faces**

Extensive research has gone into verifying the optimal materials and designs to maintain the critical film of lubrication between the seal faces. The lubricant film is crucial for successful operations at temperatures approaching  $-328^{\circ}\text{F}$  ( $-200^{\circ}\text{C}$ ).

- **Compatibility**

Our cryogenic designs are engineered to fit virtually all standard centrifugal cryogenic process pumps used to transfer liquid nitrogen, hydrogen, oxygen, and argon. These pumps are found throughout the industry in processing systems, air separation, storage tanks, trucks and transfer stations.

- **Common Pumps**

We have seals to fit the most common pumps on the market including Cryostar, ACD™, Cosmodyne™, Airco Paul, Cryostar, and JC Carter™.

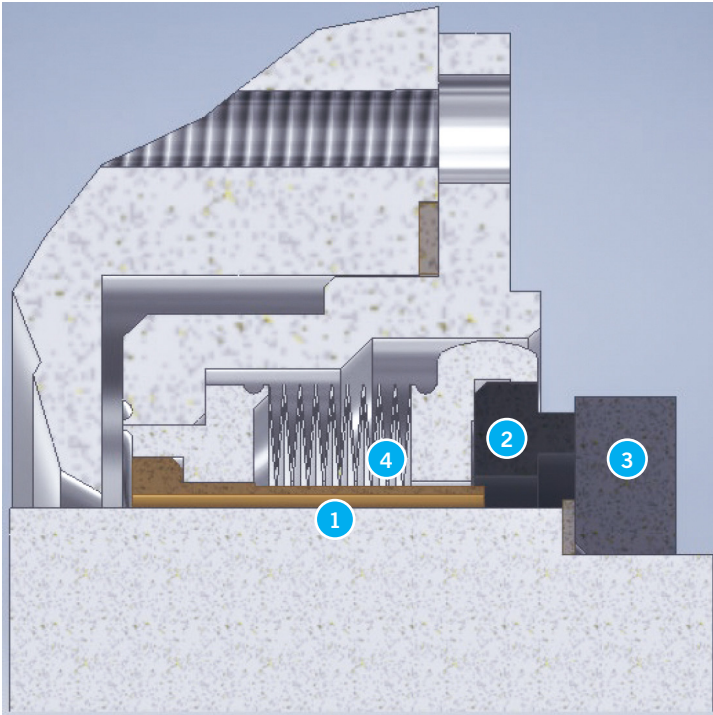
- **O2 Cleaning**

We provide full-service manufacturing including oxygen cleaning in accordance with industry standards and certifications.





## Anatomy of a Cryogenic Seal



### Cryogenic Seal Faces

- **2** Flex-A-Seal uses a special cryogenic grade of Carbon Graphite which has excellent film-forming properties, allowing for “self-lubricating” operation in the extreme low temperatures.
- **3** A Tungsten Carbide rotating face provides increased strength and better thermal conductivity properties over other hard face material options like hardened 440C steel, or brittle Silicon Carbide.
- The cryogenic face combination of Tungsten and special Carbon Graphite maximizes PV values. The hydraulic seal face balance is specifically designed for rigorous cryogenic services by minimizing the face closing load, lowering any generated heat near volatile fluids and gases.

### **1** Additional design elements incorporated per CGA G-4.7-2014: Reciprocating Cryogenic Pumps and Pump Installation

- Protective, non-sparking sleeve is used between the bellows and rotating shaft to prevent ignition caused from contact with the rotating shaft.
- No metal-to-metal contact between the stationary seal ring retainer and the rotating seat over the entire axial range of the bellows.

### **4** Edge Welded Metal Bellows

- 347 Stainless Steel has proven to be the ideal bellows material for cryogenic applications. 347 SS maintains its strength and does not become brittle in extremely cold environments.
- Precise, consistent, tightly controlled spring rates lead to lighter face loading, which provides a minimum amount of heat generation at the faces which is critical and necessary for sealing liquid close to its vapor point.

#### HEADQUARTERS

291 Hurricane Ln.  
Williston, VT 05495

TEL: 1-802-878-8307  
1-800-426-3594  
(USA Only)

FAX: 1-802-878-2479

[www.flexaseal.com](http://www.flexaseal.com)

#### GULF COAST

1719 South Sonny Ave.  
Gonzales, LA 70737

TEL: 1-225-484-0007  
FAX: 1-225-341-8922

#### BRAZIL

Rua Javaes, 441/443  
Bom Retiro, Sao Paulo  
Brazil CEP 01130-010

TEL: 55-11-3736-7373  
FAX: 55-11-3736-7371

#### DISTRIBUTED BY: