



# MECHANICAL SEAL SOLUTIONS FOR THE OIL & GAS INDUSTRY



# INNOVATION SINCE 1983

Flex-A-Seal is a leading manufacturer of custom engineered mechanical seals, welded metal bellows and the world's first patented two-piece split cartridge mechanical seal. Flex-A-Seal also offers an extensive line of replacement mechanical seals for a full array of rotating equipment.

## Design Manufacturing

Flex-A-Seal is committed to designing and manufacturing sealing products and accessories of the highest quality.

- The world's first split cartridge mechanical seal
- Single cartridge seals
- Welded metal bellows
- Dual cartridge seals
- Heavy duty slurry seal
- Engineered component seals
- Mixer/agitator seals
- Gas seal

## Repair & Service

Flex-A-Seal supplies sealing products to refineries all over the world. We are knowledgeable in the specific challenges of emission controls, high pressures, speeds, and temperatures as well as sealing toxic, corrosive, and flammable products. We understand the importance of ensuring a seal is repaired quickly and to API specifications for industry compliance and safety.

- API Repair & Reliability Improvements
- Reverse Engineering
- Competitor Repair & Exchange Programs
- Seal repair services available in both our Vermont and Louisiana locations

# GLOSSARY OF API TERMS

These definitions should be used as reference only. For a complete guide of all API terminology and specifications, please consult API Standard 682 Fourth Edition, May 2014.

**API** – American Petroleum Institute

**ASME** – American Society of Mechanical Engineers

**CATEGORY** – Defines the dimensional parameters of the pump seal chamber design and the corresponding allowable operating ranges and limitations

- **Category 1:** ASME B73.1 & B73.2 seal chamber specifications (non-API 610). -40°F to 500°F (-40°C to 260°C), 0 PSIG to 300 PSIG
- **Category 2:** API 610 seal chamber specifications -40°F to 750°F (-40°C to 399°C), 0 PSIG to 600 PSIG
- **Category 3:** API 610 (or equal) seal chamber specifications with mandatory qualification testing and documented seal design -40°F to 750°F (-40°C to 399°C), 0 PSIG to 600 PSIG

**TYPE** – Defines the mechanical seal design. All three types listed below must be a balanced cartridge design mounted inside the seal chamber

- **Type A:** Pusher seal with multi-spring design. Secondary seal design - elastomeric O-rings
- **Type B:** Metal bellows seal. Preferred bellows material - Alloy C-276, secondary seal design - elastomeric O-rings
- **Type C:** Metal bellows seal. Preferred stationary design; bellows material - Alloy 718, secondary seal design - flexible graphite

**ARRANGEMENT** – Defines mechanical seal layout and support system parameters

- **Arrangement 1:** One seal per cartridge assembly
- **Arrangement 2:** Two seals per cartridge assembly; space between the seals is below seal chamber pressure
- **Arrangement 3:** Two seals per cartridge assembly; space between the seals is pressurized by an external source to a pressure higher than the seal chamber pressure

## MATERIALS OF CONSTRUCTION

- **Seal Faces:** Carbon, Antimony-Impregnated Carbon, Sintered Silicon Carbide, Graphite-Loaded Silicon Carbide, Reaction-Bonded Silicon Carbide, Ni-B Tungsten Carbide
- **Welded Metal Bellows:** Alloy C-276, Alloy 718, AM350HT
- **Secondary Sealing:** Viton®, Ethylene Propylene, Aflas®, Buna, Neoprene, Perfluorelastomers, Flexible Graphite

Other materials available upon request and design approval



# API RANGE OF SEALS

## TYPE A | Category 1 & 2 Contacting Wet Seals

### Flex-A-Seal Style 58A

#### Arrangement 1

#### Description:

- Rugged stationary single seal design for high pressures
- Robust and reliable seal face drive
- Multi-point injection feature to ensure maximum, uniform cooling of seal faces
- Flush, quench and drain connections
- Piloted gland with confined gland packing to prevent blow out or gland packing extrusion
- Fixed and floating throttle bushing options available



### Flex-A-Seal Style 79A

#### Arrangement 2/3

#### Description:

- Heavy duty tandem multi-spring cartridge design
- Application-specific pumping ring design and tangential gland connections will allow for optimal barrier/buffer fluid circulation
- Double balanced inboard face allows for reverse pressures in upset conditions
- Multi-point injection feature to ensure maximum, uniform cooling of seal faces



## TYPE C | Category 1 & 2 Contacting Wet Seals

### Flex-A-Seal Style 66A/63A

#### Arrangement 1

#### Description:

- Style 63A - Stationary welded metal bellows design
- Style 66A - Rotating welded metal bellows design
- Double-ply welded metal bellows design available for higher pressures
- Piloted gland with confined metal-to-metal gland gasket for even seal face loading
- Steam deflector option diverts quench media to inside of stationary bellows design to prevent coking
- Multi-point injection feature to ensure maximum, uniform cooling of seal faces



### Flex-A-Seal Style 78HT

#### Arrangement 2/3

#### Description:

- Tandem rotating heat-treated welded metal bellows cartridge design for high temperature applications
- Double-ply welded metal bellows design available for higher pressures
- Multi-point injection feature to ensure maximum, uniform cooling of seal faces
- Pumping ring design and tangential gland connections for optimal fluid circulation
- Piloted gland with confined metal-to-metal gland gasket for even seal face loading



## TYPE B | Category 1 & 2 Contacting Wet Seals

### Flex-A-Seal Style 53A

#### Arrangement 1

#### Description:

- Heavy duty single welded metal bellows seal designed for API 682 recommendations
- Self-cleaning rotating welded metal bellows
- Piloted gland with confined gland packing to prevent blow out or gland packing extrusion
- Multi-point injection feature to ensure maximum, uniform cooling of seal faces
- Double-ply welded metal bellows design available for higher pressures



### Flex-A-Seal Style 78A

#### Arrangement 2/3

#### Description:

- Tandem rotating welded metal bellows cartridge seal
- Application-specific pumping ring design and tangential gland connections allow for optimal barrier/buffer fluid circulation
- Double-ply welded metal bellows design available for higher pressures
- Multi-point injection feature to ensure maximum, uniform cooling of seal faces



## STYLE FC | Dry-Running Secondary Containment Seal

#### Description:

- Can be added to single seal styles including Style 53A, 58A, 63A, and 66A
- Welded metal bellows technology maintains a uniform and controlled light load on dry running seal faces for long seal life
- Stationary design enables optimum face tracking
- Static O-ring position eliminates friction during operation and potential failures caused by O-ring hang up
- Seal faces are heat shrunk retained for higher strength and torque transfer – no pin drive
- Most commonly used with API Plans 72 and 76



# PRODUCTS & SERVICES

## for the oil & gas industry

### Style 85 Split Cartridge Mechanical Seal

The Flex-A-Seal Style 85 split cartridge mechanical seal requires just two pieces to be handled for installation.

Both sealing faces are safely secured in the cartridge halves and cannot be cocked, chipped or scarred. The Flex-A-Seal 2-piece split cartridge mechanical seal is completely assembled and pressure tested before it is shipped to you.



### High-Temp Welded Metal Bellows

Designed to withstand temperatures up to 800°F (427°C). Compact and versatile, available with heat-treated AM350 or Alloy 718 bellows in sizes up to 7.00" (-112).



### PACKRYT® ORM Bearings

Provides additional bearing support to centralize and stabilize the rotating shaft in the stuffing box/seal chamber. Also acts as a bushing to significantly reduce the amount of water or flush media going into the sealed product.



### Seal Support Systems

Liquid-lubricated dual mechanical seals require an external source of clean, cool lubricating fluid. Flex-A-Seal offers a range of choices to address your specific requirements. Our standard tank offering for API 682 flush plans 52 & 53A include but are not limited to the following options:



- **API 682**

MAWP 950 psig, Temp -20°F to 200°F (-29°C to 93°C)

- **ANSI Plus**

MAWP 350 psig, Temp -20°F to 200°F (-29°C to 93°C), Hydrostatically tested at 525 psig

- **ANSI Lite**

MAWP 160 psig, Temp -20°F to 100°F (-29°C to 38°C)

### Flowmeters

Designed for applications requiring controlled and uninterrupted seal water flow for cooling and lubrication.



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