

Radial Seal

Radial seals are used to minimize the direct air to gas leakage that occurs at the center section or sealing surfaces in the airheater. The seals are attached to each diaphragm of the rotor to maintain close contact with the sealing surface that separates the air and gas streams.

DuraMax™ A Smarter Seal

DuraMax™ is a high performance self-adjusting seal that was designed to provide a superior seal. The design enables the seal to dynamically adjust thus always maintaining constant contact with the sealing surface.

The seal incorporates a unique patented bellows architecture that ensures positive contact with the sealing surface. When sealing edge wear does occur, the DuraMax™ seal can be simply adjusted, rather than replaced, this reduces maintenance costs and increases plant productivity.

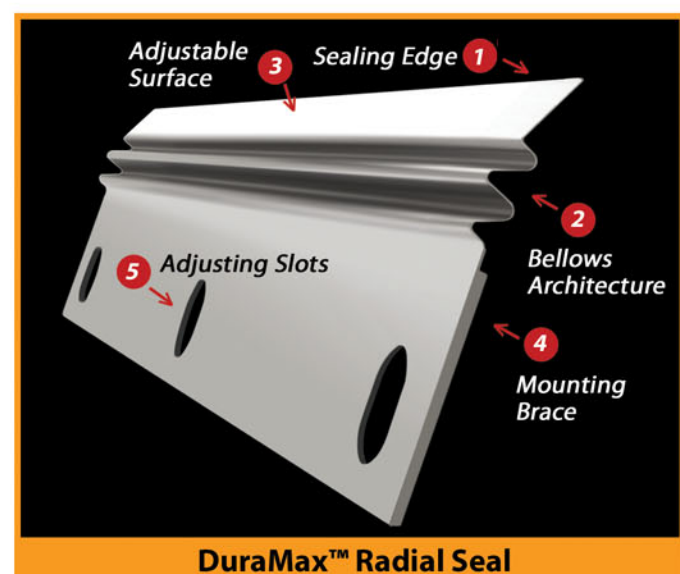
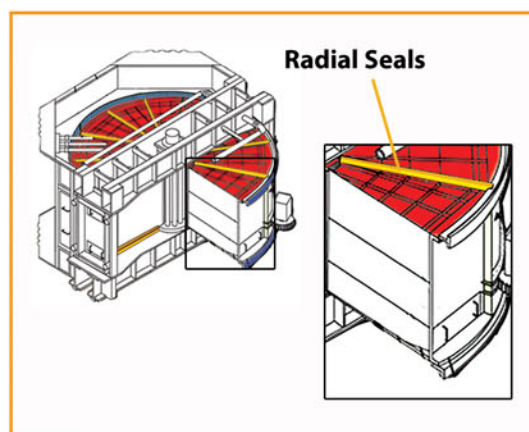


DuraMax™ Radial Seal

Benefits

The DuraMax™ Technology is a patented and industry proven product exclusively designed for customers seeking to maximize the efficiency and reliability of the airheater. This product has an unmatched track record in the industry; efficiency improvements have increased our customer productivity and significantly reduced fuel cost. The product quality is unsurpassed and customers report they last longer than any sealing product available in the market place.

- Superior sealing technology reduces leakage
- Reduces load on the fan and saves fuel
- Corrosion resistant for increased durability and longevity in SCR environments
- Built in thermal properties to ensure minimal distortion under high temperatures
- Patented design ensures maximum efficiency
- Precision manufacturing processes that incorporates stage stress testing
- Longer lifespan compared to OEM seals
- Holding strips and fasteners included
- No airheater modifications needed
- Product Performance Guarantee



DuraMax™ Radial Seal

Technical Description

DuraMax™ radial seals are designed to act like a spring that sustains an appropriate level of force to maintain a positive contact between the radial seal and the sealing surface. ① The spring force prevents the seal from opening due to high differential pressure across the hot and cold ends of the airheater. The unique geometric design of the bellows, ② coupled with the carefully engineered spring characteristics of the material give the seal the ability to “self adjust” over time if wear occurs on the sealing edges. ③ By eliminating the gaps between the seal and the sealing surface, leakage between the hot and cold sides of the airheater is drastically reduced. The DuraMax™ seal replaces the OEM seals and attaches to each diaphragm utilizing the existing holding hardware and the existing bolt hole layout in the diaphragms. ④ The seals are installed and adjusted to maintain the appropriate force and clearance between the seal and sealing surface. ⑤ There are no airheater modifications needed to take advantage of the benefits of a DuraMax™ solution.



Product Functionality

The DuraMax seal is an improved seal for rotary regenerative heat exchangers. The radial seal is mounted to the diaphragm and reduces direct leakage between the hot gas and cold air sides. A set of bellows is positioned on the seal to provide flexibility and resiliency. This allows the seal to maintain contact with the sealing surface even as airheater experiences rotor turndown due to thermal distortion.

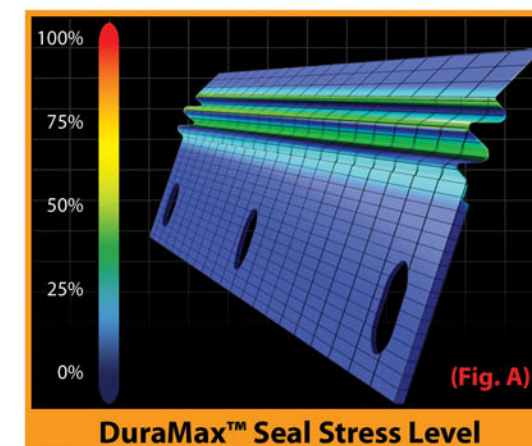
Seal Flex Simulation



Quality Testing

The spring bellows on DuraMax™ radial seals are designed to maintain their full strength and integrity in excess of 5 million flex cycles when lab tested. DuraMax™ radial seals are specifically engineered to minimize stresses at all flex points in the bellows. Further, the design geometry of the DuraMax™ bellows is integrated with Paragon's proprietary bellows forming methods to completely eliminate any material hardening or residual stresses resulting from the manufacturing process. The seal design is tested for stress and strength with engineering analysis and electron microscope metallurgical analysis. It is also physically tested using Paragon's variable temperature seal flex machine which can test for mechanical integrity over millions of cycles. (Fig. A - Engineering Analysis Only)

Paragon's stainless steel material has exceptional spring characteristics and an offset edge seal geometry. This enables the DuraMax seal to maintain continuous contact with the sealing surface and eliminate gaps caused by uneven surfaces, normal wear or high differential pressures.



DuraMax™ Seal Stress Level

DuraMax Manufacturing Process

DuraMax seals are manufactured utilizing a 5 stage process; each step is quality checked and measured to ensure the production of the seal is consistent and precise.

Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
Raw material laser or stamped cut	Bellows formation (multi-step proprietary press)	Doubler strategically spot welded	Surface is prepped and finished	Automated laser inspected

The seals are labeled then stacked and coated with a corrosion resistant sealant, palletized and wrapped in plastic, to maintain the integrity through transportation and weather exposure after delivery.

Product Characteristics

- 300 series stainless steel bellows with exceptional spring characteristics and high corrosion resistance
- Mechanically tested to endure over 5 million flex cycles while maintaining full integrity
- Engineered for 100% over-flex with no reduction on long term effectiveness or reliability
- Allows hot end seals to be installed “tighter” than conventional seals reducing leakage rates
- Proprietary bellows forming methods are used to eliminate residual stress during manufacturing
- Manufactured with specific materials, innovative production designs and manufacturing methods that insure quality
- Integrated engineering and metallurgical analysis to achieve high levels of functionality and reliability
- Damage resistant during most airheater high pressure water wash procedures
- Flexible enough to eliminate radial seal leakage without wearing airheater sealing surfaces



Performance Guarantee

Contact your Paragon Representative for details on the Product Performance Guarantee