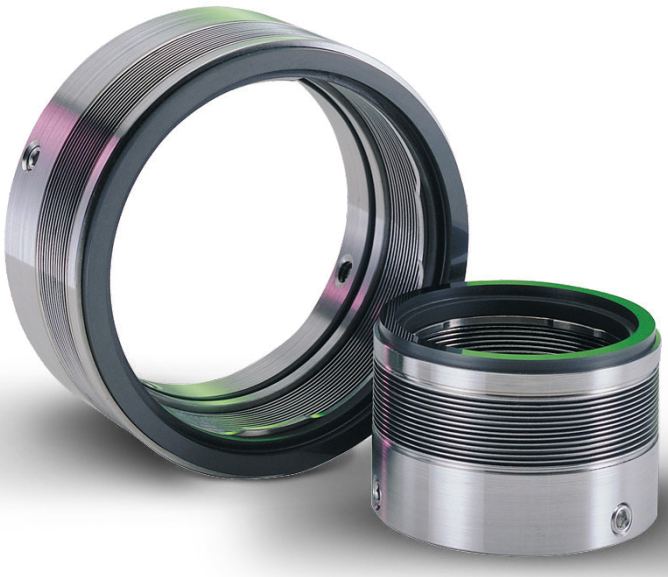
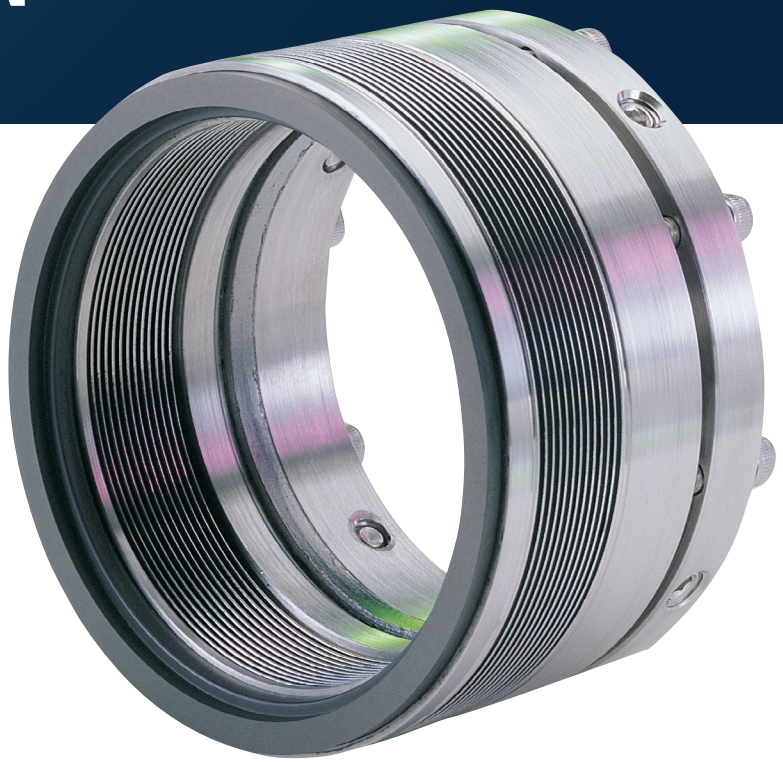
flexaseal
ENGINEERED SEALS AND SYSTEMS, LLC



INTRODUCTION TO

EDGE WELDED METAL BELLOWS SEALS

INTRODUCTION



Edge welded metal bellows mechanical seals have earned their place in today's fluid sealing marketplace because of their reliability and wide range of uses.

Bellows seals are problem solvers for many industries, providing an answer to common challenges such as harsh applications or pump alignment issues. This guide explores the features of edge welded metal bellows seals which make them ideal for so many applications.

ADVANTAGES OF EDGE WELDED METAL BELLOWS

RANGE OF OPERATING TEMPERATURES

One major advantage of edge welded metal bellows seals – and a feature which makes them effective in many different industries – is the wide range of available operating temperatures. Flexaseal designs and manufactures bellows suitable for operating parameters as high as 800°F (425°C) to -350°F (-212°C for cryogenic applications).

HYDRAULICALLY BALANCED

Seal face balance is typically expressed as a percentage of the hydraulic closing area to the contacting seal face area. Bellows seals are inherently balanced due to their mean effective diameter location. The balance line "cuts" through the bellows insert which means that only part of the seal face area is exposed to the hydraulic pressure. This results in less force on the two mating faces as compared to unbalanced mechanical seals. Reducing friction at these faces increases seal performance and prolongs seal life.

Potential issues which will occur when excessive heat is generated in the sealing area include:

- Failure of the seal's elastomers if they are not compatible with higher temperatures
- Ineffective face lubrication due to changes in product viscosity, which can lead to "flashing" or dry-running
- Corrosive properties will increase as the seal's operating temperature rises. This change will cause adverse operating conditions affecting the performance of the seal's elastomers or metallurgy

DIVERSE MATERIALS OF CONSTRUCTION

Edge welded metal bellows cores and end fittings can be engineered and manufactured in a wide range of metallurgies spanning different grades of stainless steel to Inconel, Hastelloy™ and other alloys. Flex-A-Seal has extensive experience with the heat treatment of bellows cores, which enable our seals to retain their strength and spring rate at elevated temperatures

Metallurgy, along with the sealing faces and elastomers should be selected based on application parameters including temperatures, pressures, and rpms.

NO DYNAMIC O-RING

This feature provides the following advantages over a pusher-style component seal:

- The bellows seal is less likely to take a set or hang up from heat or chemical attack
- No o-ring hang-up due to material build-up on the shaft
- Allows a bellows seal to be more forgiving when it comes to axial movement and vibration, eliminating fretting

EFFECTIVE REPLACEMENT FOR PUSHER-STYLE SEALS

If your facility must comply with API Standard 682 or ISO Standard 21049 which require all cartridge seals to utilize a balanced seal design, standardizing on hydraulically balanced, edge welded metal bellows seals ensures positive seal run-time and low seal maintenance for your equipment.

Flexaseal's application engineers are available to evaluate your sealing challenges and to assist you in upgrading your current pusher-style component or cartridge seal designs to the correct bellows mechanical seal for your application.

Common Applications of Edge Welded Metal Bellows Seals

- Chemical
- Oil & Gas
- Heat Transfer Fluid
- Waste Water Treatment
- Mixers, Agitators, Centrifuges

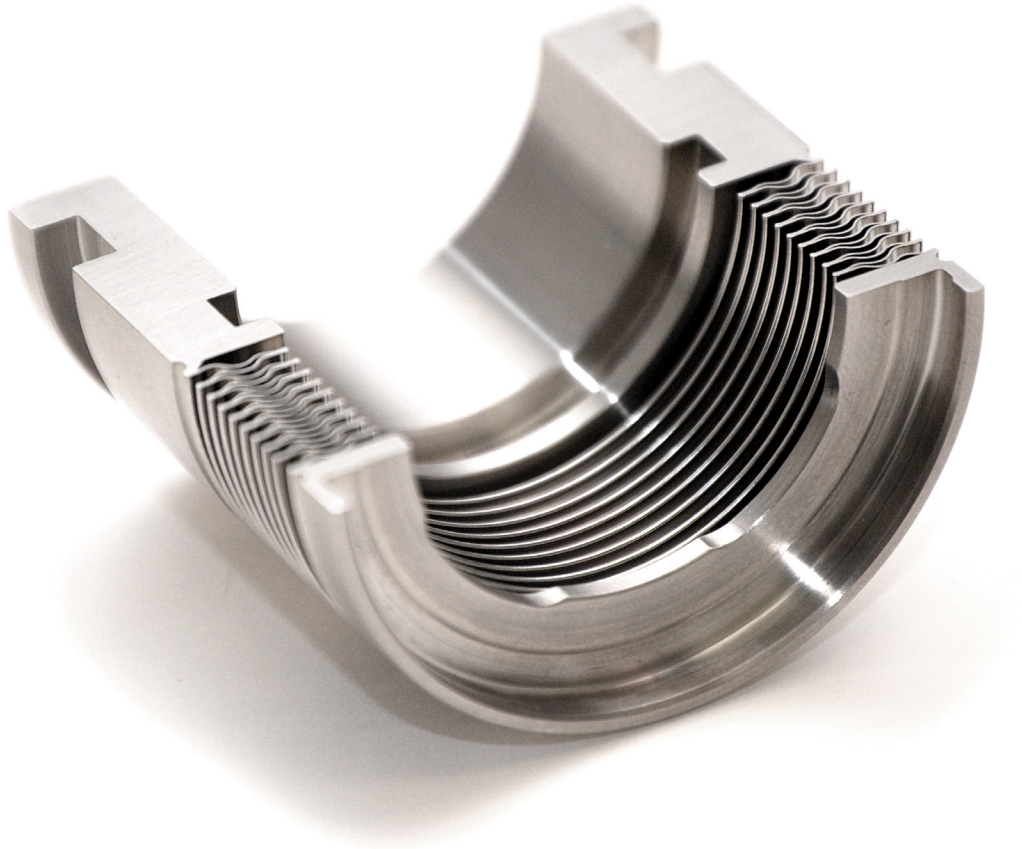
THE MANUFACTURING PROCESS MAKES ALL THE DIFFERENCE

FORMED BELLOWS VS. EDGE WELDED BELLOWS

Formed or convoluted bellows are produced by forcing a metal tube to expand under hydraulic pressure inside a bellows-shaped mold. When the reformed tube is removed, it has assumed the convoluted shape of the mold.

Edge welded bellows are manufactured by welding a number of individually formed diaphragms to each other. Properly welding bellows is a precise, microscopic process.

FORMED BELLOWS	WELDED BELLOWS
Produced by forcing metal tubes to expand inside a mold by using hydraulic pressure.	Produced by welding individually formed diaphragms to each other.
Typically less expensive per piece.	Precise, microscopic edge-welding process that requires great skill.
Low performance characteristics due to thick walls and high stiffness.	Higher performance in a smaller package.
Materials are limited to metals with high elongation properties such as brass.	May be produced from a wide range of strong alloys and corrosion-resistant metals, making them extremely versatile.
	Dramatically greater flexibility allows for greater range of motion and space allowance.
	Resistant to dents and nicks.



DESIGN, TESTING, AND MEASUREMENT

Flexaseal engineers use state of the art tools and research to design and develop our bellows products. These designs are manufactured with frequent production checks throughout the process as well as sustaining numerous air, water, and/or helium leak tests.

We also have the added quality assurance of testing and calibrating every bellows core here at our manufacturing facility before it is sent to our customers.

SOLVE YOUR

SEALING CHALLENGES

with edge welded metal bellows designed, engineered,
& manufactured in the USA.

CONTACT FLEXASEAL

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