



 **BellowsTech, LLC**
PRECISION MANUFACTURING GROUP, LLC

Specialists in the Manufacturing of Edge Welded Bellows



EXPERIENCE THE NEXT GENERATION IN
EDGE WELDED BELLOWS MANUFACTURING



BELLOWS TECH, LLC

... is an industry leader in the development of custom-designed edge welded bellows. Our custom bellows are part of more than twenty-five diverse industries demanding intense vacuum-sealing situations, including:

- Vacuum
- Semiconductor
- Aerospace
- Commercial
- Medical
- Military
- Welding
- Mining
- Agricultural
- Oil Machinery

Dedicated to developing and perfecting edge welded bellows design and fabrication manufacturing technologies across several markets, BellowsTech bellows have consistently achieved outstanding performance and reliability reviews through a variety of challenging custom applications that benefit our customers and meet their exact requirements.





WHY EDGE WELDED BELLOWS?

Metal bellows provide a hermetic all-metal pressure barrier and seal that flexes in one or more directions. Edge welded metal bellows provide the most flex in the smallest amount of space. The flexible metal barrier that edge welded bellows provide, as a basic building block, can be put to use in many different ways to perform a variety of functions across many different industries.

For applications that require high quality, state-of-the-art micro fusion joining, edge welded bellows are more cost effective and functional than either Electron Beam or Laser Welding.

The manufacture of BellowsTech precision edge welded metal bellows is supported by a staff of expert bellows engineers dedicated to service, reliability, and the highest quality products to support custom applications across a wide variety of industries.

APPLICATION EXPERTISE

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We are proud to serve the aerospace, medical, semiconductor, oil services, vacuum, solar power, agriculture, commercial and other high-tech markets for edge welded bellows. Designing custom products for such technically diverse industries allows us to apply lessons learned from one application to another. Even though product design and custom requirements vary greatly across all industries, often development of one product leads to a better design approach for the next application.

We will design and manufacture bellows in a full range of diameters and thicknesses ranging from .394" (10mm) to 26" (660mm) in diameter in materials .002" (.05mm) to .036" (.91mm) thick. In order to address custom requirements, BellowsTech design specialists review the following information before each job – allowing us to determine the exact custom capabilities needed to ensure your success.

- Application/Function of the Bellows
- Operating Pressures (OD vs. ID)
- Proof & Burst Pressure
- Operating Temperature
- Media, Internal and External
- Bellows OD & ID
- Bellows Free, Compressed and Extended Lengths
- Compressive, Extension and/or Total Stroke
- Lateral Offset
- Angular Motion
- Mean Effective Area requirement
- Cycle Life Required
- Cycle Speed
- Leak Rate (std CC He/sec @ 1 atm dP)
- Spring Rate
- Bellows & Flange Material Type(s)
- Attached Flange/Hardware Ends Configuration
- Quantity Needed



We talk to our clients openly, ensuring we understand and can support your needs. Whether prototypes or large production blanket orders, this simple yet effective procedure allows us to configure the exact specs you need in the timeframe you need them.

CUSTOM ENGINEERED

CUSTOM ENGINEERED BELLOWS

BellowsTech employs experts in the field of edge welded metal bellows. This expertise coupled with our precision products allows us to serve almost every industry and solve any application challenge.

Standard edge welded bellows applications include:

- Accumulators
- Aneroid Capsules
- Face Seals
- Reservoirs
- Sensors
- Volume Compensators



EDGE WELDED BELLOWS—DEFINED – Related to the Vacuum industry, some of our applications have helped ignite new approaches for other markets with varying needs. Our Vacuum applications include:

VALVE STEM SEAL – The bellows is used to seal a shaft hermetically while allowing axial shaft movement.

FEEDTHROUGH – The bellows acts as a flexible seal, allowing movement of a tool within a sealed environment. Linear and angular motion for “wobble stick” applications is available.

ROTARY FEEDTHROUGH – The bellows are used within a bearing housing to translate rotation from an input shaft to a co-linear output shaft while sealing hermetically, eliminating the need for a dynamic seal.

TORQUE COUPLING – The bellows are used for precise transmission of rotary motion.

EXPANSION JOINT – The bellows allows for the expansion or contraction between two fixed bodies while maintaining a hermetic seal.

ACTUATOR – The bellows acts as a piston converting pressure to linear motion eliminating the need for a dynamic seal.

VIBRATION DAMPER – The bellows are used to isolate vibration from one end of the bellow to the other while sealing hermetically.

Working with a variety of industries and applications, BellowsTech has the experience and expertise to offer custom solutions that meet budget and deadline expectations.

EDGE WELDED BELLOWS

EDGE WELDED BELLOWS

EDGE WELDED BELLOWS-DEFINED – Our knowledge in specialty welding capabilities allows BellowsTech to offer the manufacture and machining of complex components that would otherwise be impossible or prohibitively expensive to develop.

Depending on the manufacturing requirements, some of the standard tools and applications we often utilize are as follows:



ACCUMULATOR – The bellows is normally pre-charged with gas and used to dissipate energy in dynamic fluid systems.

FACE SEAL – The bellows provides a positive load at the flat interface separating the rotating and non-rotating members. The bellows also acts as the secondary sealing element.

RESERVOIR – A fluid storage device, which supplies extra fluid to a system during operation or in the event of a leakage.

SENSOR – The bellows assembly is evacuated internally and hermetically sealed. The bellows responds to changes in temperature or pressure.

VOLUME COMPENSATORS – The bellows maintains a positive pressure on a fluid system while adjusting for volume fluctuations in the system. Used to prevent cavitation.



BellowsTech edge welded bellows specialists are readily available to answer any question about our manufacturing capabilities and experience designing hundreds of solutions for clients with difficult application challenges, tight deadlines, and modest budgets

DESIGN

NEXT GENERATION PRODUCT DESIGN

BellowsTech designs and manufactures a full range of edge welded metal bellows and related assemblies. We have experience and capability with all sizes, shapes and materials. We use state-of-the-art design tools such as Finite Element Analysis, CAD, and other proprietary software to produce truly optimized designs for your applications.

While our baseline manufacturing configuration will support most requirements, we also have the ability to quickly setup dedicated production cells to support larger volumes or specific types of data.

A SAMPLING OF OUR PRODUCT APPLICATIONS INCLUDE:



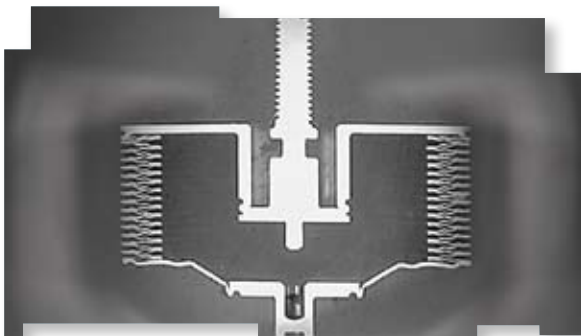
Custom Sizing and Bellows Types
Across All Industries



Custom Assemblies



Semiconductor Bellows with Custom
Flange Hardware



Cross Section Mount of an Aerospace
Aneroid Bellows Assembly



Aerospace Titanium Volume
Compensators



Lifter Bellows and Face Seal

CAPABILITIES

PROVEN PRODUCTION CAPABILITIES

Our primary focus is the design and manufacture of edge-welded bellows. This single concentration allows us to best serve our clients needs when it comes to any custom request.

Our edge welded bellows production capabilities include:

SIZE RANGES: OD: 0.3" (7.6mm) to 26" (660mm)*
ID: 0.15" (3.8mm) to 25.5" (648mm)*
Length: up to 96" (244cm)

SHAPES: Round
Non-round upon special request

MATERIAL TYPES:	THICKNESSES:
AM350	.002" and up every .0005"
304L SS	.002" and up every .001"
316L SS	.002" and up every .001"
347 SS	.002" and up every .001"
Titanium Gd 1-4/ASTM-B265	.002" and up every .001"
Haynes 242	.002" and up every .001"
Alloy 276 (Hasteloy C276)+	.003" and up every .001"
Alloy 625 (Inconel 625)+	.004" and up every .001"
Alloy 718 (Inconel 718)+	.004" and up every .001"

* Consult factory for additional capabilities on an individual order basis

+ Other alloys upon request

Our production capabilities are second to none along with a can-do attitude that places our clients at ease, no matter the design challenge.



BELLOWS & FLANGE MATERIALS

When compared with other edge welded bellows, BellowsTech bellows and flange materials outperform our competition time and time again. The following table outlines available materials related to standard leak rate capabilities.

MATERIAL	STANDARD LEAK RATE CAPABILITY
316L SS	<1x10 ⁻⁹ std CC He/sec
AM350 SS	<1x10 ⁻⁹ std CC He/sec
Inconel/Hastelloy	<1x10 ⁻⁵ std CC He/sec
Titanium	<1x10 ⁻⁹ std CC He/sec
Aluminum	<1x10 ⁻⁴ std CC He/sec

Each BellowsTech product can be custom designed to meet your exact requirements while exceeding your performance expectations.

VALUE ADDED SERVICES

VALUE-ADDED SERVICES

BELLOWS ASSEMBLY REPAIR & REFURBISHMENT *

BellowsTech offers a valuable, cost-effective alternative for your consumable bellows assembly needs. With our unique abilities and industry experience, BellowsTech can often repair your expensive bellows assemblies.

*Consult BellowsTech for your consumable bellows replacement needs before you discard any bellows assembly. We may have good news for you!

SPECIALTY WELDING CAPABILITIES

BellowsTech also offers expert specialty and micro welding capabilities. This capability is a natural outgrowth for BellowsTech based on our round and non-round bellows micro welding experience. Our application of semi-automated, three-dimensional, computer controlled weld paths allows BellowsTech to make complex welds with a superior cosmetic appearance and structural integrity, along with excellent repeatability and accuracy. This makes possible the manufacture and machining of complex components that would otherwise be impossible or prohibitively expensive. These options can significantly reduce the cost of producing these complex machined components.

CAPABILITY DETAILS INCLUDE†

- Round and Non-round path TIG welding of machined component (moderate cross section thicknesses less than 1/8 inch)
- Three-dimensional size capabilities 24"(61cm) by 12"(30cm) by 5" (13cm) weld envelope
- Post weld proof pressure testing
- Helium Mass Spectrometer leak testing
- Many alloys possible
- Micro welding consultation

†Consult factory for additional capabilities on individual order basis.

When it comes to price, delivery, quality and service, BellowsTech provides a balance that meets the customer's needs every time. We call that "net value".



SYNERGY ACROSS MANY MARKETS



NEXT GENERATION DESIGN AND FABRICATION TECHNOLOGIES

APPLICATION ASSISTANCE

BELLOWSTECH SPECIALIZES IN EDGE WELDED
METAL BELLOWS AND RELATED SERVICES.

BETTER BELLOWS PERFORMANCE



UNIQUE CUSTOMER SERVICE AND SUPPORT PHILOSOPHY



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