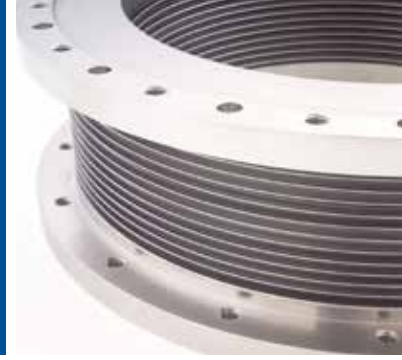


# Edge-Welded Bellows

BELFAB® Bellows, Components & Assemblies



Technetics Group is a world leader in the design, production, and application of high precision sealing products incorporating edge-welded metal bellows. As a fore-runner in the development of this technology, we continually work to advance the state of the art by engineering unique design solutions that solve critical needs within complex mechanical systems. We also offer contract assembly services including design, fabrication, welding, upper-level assembly, testing, and packaging. A certified Class 100/ Class 1000/ Class 10000 clean room assembly environment is available as required. As an ISO 9001-certified organization noted for world class cellular manufacturing, Technetics Group has built its reputation on a foundation of total quality achievement.

## ENGINEERED SOLUTIONS

Edge-welded metal bellows provide superior stroke capabilities and more precise spring rates than formed bellows, thus offering greater flexibility and control in the smallest possible place. Because edge-welded metal bellows are manufactured by welding both the inner and outer diameters of the bellows plates, they can be produced in a broader variety of materials than formed bellows, in which the number and shape of the bellows convolutions are limited by material ductility. Technetics Group's experience in optimizing bellows configurations for demanding applications gives you the edge you need to make your equipment perform better and satisfy your own product requirements.

Our engineers will design a robust product that achieves the highest life-cycle possible while addressing all of your operating parameters, including stroke (lateral, angular and/or axial movement,) pressure (internal and external,) temperature and environment. Linear and thermal movements, vibration isolation and assembly offsets can all be accommodated with BELFAB®-designed bellows devices. Technetics Group has developed the rapid design/prototyping and production-ramp capabilities required for our demanding industry.

## FEATURES

- Leak Tight to  $1 \times 10^{-10}$  std. cc/sec Helium
- Cleaned to the Highest Industry Standards
- Designed for the Highest Cycle Life Possible (One Million + Standard)
- Extreme Temperature Limits
- Low Magnetic Permeability
- Low Outgassing Rate
- Corrosion Resistant
- Linear/Wide Range of Spring Rates
- Diameters from 1/4" and up



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## Capabilities

### CLEAN ROOM ENVIRONMENTS

- Certified Class 100, Class 1000 & Class 10000
- Cleaned to the Highest Industry Standards

### CONTRACT ASSEMBLY

- Engineering
- Inventory Management
- Consignment, Kanban, MRP
- Manufacturing
- Material Procurement
- Metal Joining
- Packaging
- Supplier Management
- Testing
- Upper-Level Assembly
- Electro-mechanical
- Mechanical
- Welding
- Heat Treat Brazing

### DESIGN ENGINEERING

- BELCALX™ (Bellows Design Program)
- FEA (Finite Element Analysis)

### TESTING/RELIABILITY ENGINEERING

- Life Cycle (at Pressure, Temperature)
- Load/Force
- Mean Effective Area
- Metallurgical (Full Lab Onsite)
- MST (Mass Spectrometer Testing) Leak Detection
- Pressure (Burst, Impulse)
- Shock
- Spring Rate
- Vibration (Random, Sinusoidal)
- Volume Displacement

### WELDING

- Electron Beam Weld (EBW)
- Gas Tungsten Arc Weld (GTAW)
- Irregular (Non-Circular) Welding
- Laser Weld
- Micro Plasma Arc Weld (PAW)
- Automated and Semi-Automated
- Orbital Arc Weld

### BELLOWS MATERIALS

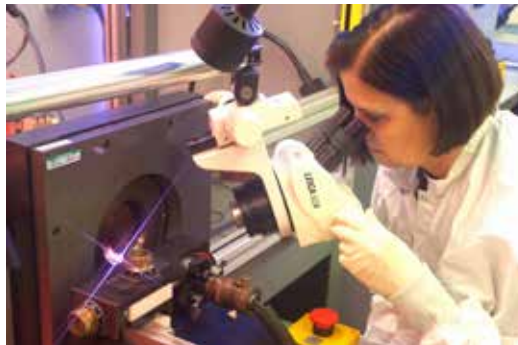
- 300 Series Stainless Steel
- Alloy 20
- AM 350 Stainless Steel: a heat treatable form of stainless steel that has been used successfully in high temperature and cryogenic seal applications
- Hastelloy C: good choice for most pumps because of its chemical compatibility
- Haynes 242
- Inconel 625, 718
- Monel
- Titanium

### CUSTOMER BENEFITS

- Custom Engineered Products
- Cycle Life Warranty
- Dedicated Product Lines
- Short Lead Times

### QUALITY ASSURANCE & TESTING

- Micro Inspection
- Detailed Review and Immediate Resolution
- Process Development



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## Applications

### AEROSPACE

- Reservoirs for A/C & Cooling Systems
- Accumulators for Turbo Pumps & Hydraulic Systems
- Reservoirs for High Voltage Transformer Cooling Systems
- Reservoirs for Fluid Processing & Life Support Systems
- Rotary Face Seals for Turbo Pumps
- Toggle Switches for Cabin Controls
- Accumulators for APUs, Emergency Brake Systems & Hydraulic Systems (HPMFAs)
- Cold Plate Assemblies
- Environmental Control System Components
- Reservoirs for Electronics Coolant Systems
- Reservoirs & Accumulators for Prop Pitch & Flight Controls
- Aneroids for Fuel Control & Ejection Seat Parachutes
- Bellows Assemblies for Flight Control LVDTs
- Fuel Drains
- Lock/Wave Springs for Lift Fans
- Valve Stem Seals for Thrust Vectoring
- Reservoirs for Electronics Coolant Systems
- Dampers for Active Shock Isolation Systems
- Kiss Seals for Engines

### OIL & GAS

- Accumulators
- Actuators
- Connectors
- Couplings (Flexible)
- Couplings (Torque)
- Feed Throughs
- Gas Lines
- Gate Valves
- Leak Detectors
- Reservoirs/Volume Compensators
- Sensors
- Valve Stem Seals

### SEMICONDUCTOR

- Accumulators
- Actuators
- Beam Lines
- Chamber-Lift Bellows
- Connectors

- Couplings (Flexible & Torque)
- Feed Throughs
- Gas Lines
- Gate Valves
- Leak Detectors
- Lifters
- Orienters
- Reservoirs/Volume Compensators
- Sensors
- Slit Valves
- Valve Stem Seals
- Vibration Isolation
- Wafer-Lift Bellows
- Wafer Handlers
- X-Y-Z Manipulators

### MEDICAL

- Batteries
- Blood Pumps
- Cardiac Arrhythmia Control
- Cardiovascular Devices
- Cardioverters
- Chemotherapy
- Cochlear Implants
- Defibrillators
- Drug Delivery
- Endoscopes
- Fixation Devices
- Infusion Pumps
- Insulin Dispersion
- Joint Repair
- Monitoring Devices
- Orthopedics
- Oxygen Pumps
- Pacemakers
- Pain Management
- Prosthetics
- Spasticity Control
- Spinal Repair
- Ultrasound
- Vacuum Pumps
- Valves

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## The BELFAB® Advantage

### EXPERIENCE

- Over 50 years of Bellows Design Knowledge
- Over 500,000 Bellows Produced
- Key/Preferred Supplier to Leading Equipment OEM's and End Users
- Trusted Source for Direct Aftermarket

### RELIABILITY

- Extensive Design Database
- Cycle Life Warranties
- Complete Testing Capabilities

### QUALITY

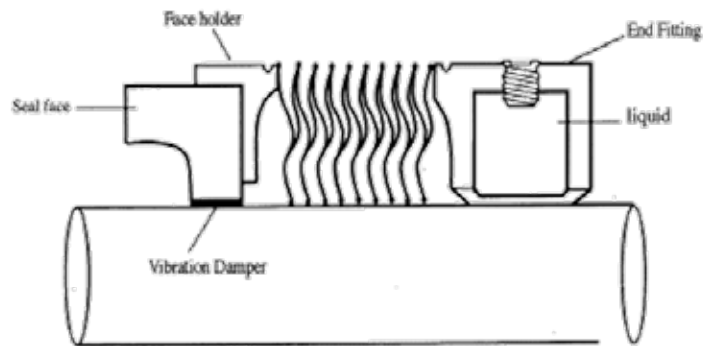
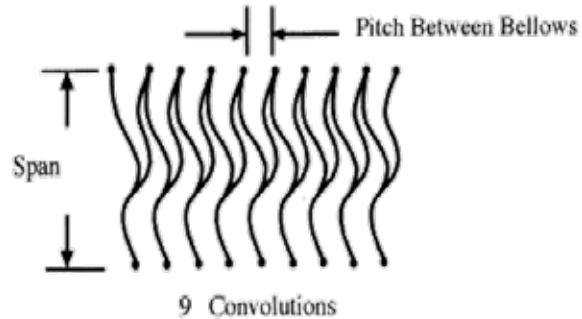
- AS9100C/ISO 9001 Certified
- NADCAP Certified Process (Welding, Heat Treat)
- Award-Winning Quality Programs
- Six-Sigma Focus

### CONVENIENCE

- Extensive Design Database
- Custom Engineering
- Rapid Prototyping/Short Lead Times
- Production in US and Asia

### GLOBAL FOOTPRINT

- 60,000 Square Feet of Facilities
- US East / West Coasts & Asia



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