

The Eaton logo is displayed in white, bold, sans-serif capital letters. The letter 'A' is stylized with a white dot in its center. The logo is set against a blue background that features a faint, technical line drawing of an aircraft engine or ducting system.

**Aerospace**  
**Fluid Conveyance**

Aeroquip® Brand Bleed Air  
Ducting Components



# Capabilities

Eaton Aerospace products are designed, engineered and manufactured to the strictest quality standards in the industry. . . our own. Computer aided design and drafting techniques are incorporated to assure dimensional accuracy. Mock-ups are provided to ensure proper installation, and prototype components are thoroughly tested and evaluated to substantiate structural integrity and functional life expectancy.

Eaton's Aeroquip® brand products go through a formal in-house qualification and verification of:

- Proof pressure
- Leakage
- Temperature shock
- Vibration
- Motion cycling
- Pressure cycling
- Temperature cycling
- Thermal integrity
- Burst pressure
- Environmental (salt, fog, humidity, fungus, ultraviolet, etc.)
- Flow
- Pressure Drop

Additionally, Eaton's metallurgical laboratory is continually evaluating mechanical properties of new and alternate materials to improve function and/or reduce manufacturing costs. Eaton utilizes the latest and most sophisticated equipment to perform these chemical and physical analyses.

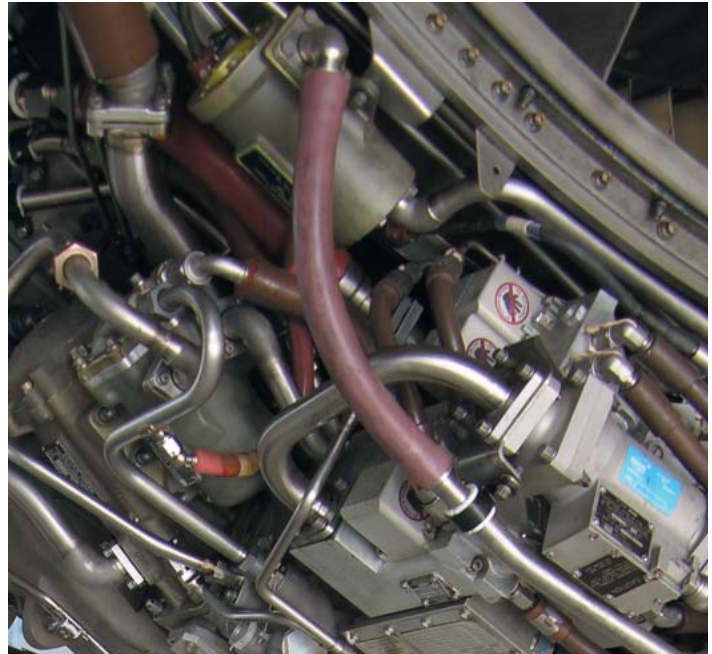
Further, Eaton's manufacturing processes utilize the latest techniques to accommodate all ducting materials currently used, such as 300 series corrosion resistant steels,

high-strength heat treatable material including nickel base alloys, titanium and aluminum. Normal sheet metal forming methods are used to shape the various components which are then joined into specific assemblies by welding, brazing and, in some instances riveting.

Eaton's manufacturing experience includes tubing and flexible ducting, with diameters ranging from 3/4 inch up to 10 inches, and ducting wall thicknesses of .012 to .125 inches.

## The Complete Supplier

Since pioneering the original reusable hose fitting assembly for military aircraft prior to World War II, Eaton's Aeroquip® brand products have emerged as the world leader in aerospace fluid power and fluid handling components. Eaton's excellence in design, manufacture, and customer service has made us the logical choice for precision-made customer-engineered components in each succeeding generation of military and commercial aircraft. Eaton produces an extensive line of aerospace components including Aeroquip® brand hose and fittings, duct assemblies, clamps, couplings, and fuel handling systems. Aeroquip® brand products are manufactured in the U.S., Canada, and Europe and are supported by distributors worldwide.



## Aeroquip® Brand Bleed Air Ducting Components

The heart of any bleed air system is the flexible joint. A precisely designed system must provide for installation tolerances and accommodate cyclic motions induced by aircraft flexure and thermal growth.

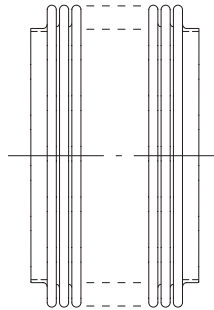
The key to optimum flexible joint performance is the convoluted bellows. Properly designed bellows will provide the axial compression and extension, angular deflection and lateral offset. Due to the many variables in design and function, all Aeroquip® brand bellows and flexible joints are designed to specific customer requirements to ensure that all functional criteria are satisfied.

### Maximum Material Temperatures

Corrosion Resistant Steel	- 800°F
High Strength Steel Alloys	2,000°F
Titanium	500°F

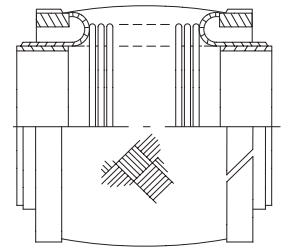
## Bellows

Bellows are the primary components of all zero-leakage flexible joints. Eaton's Aeroquip® brand bellows are fabricated from multiple ply, thin-wall tubing to provide maximum strength and durability while maintaining flexibility. Eaton can manufacture Aeroquip® brand bellows from virtually any material available in sheet stock. Convolutions are mechanically formed, rolled and sized to ensure uniform strength and spring rate. Each bellows is sealed on both ends using dry seam welds and is subsequently baked to ensure that no moisture has been trapped between piles during manufacture. Proof pressure and leakage checks are conducted on each and every bellows manufactured by Eaton.



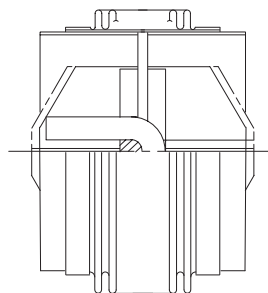
## Braided Bellows

Braided bellows are used in medium pressure tension systems. They provide integral restraint to prohibit overextending without limiting the bellows motion compensation.



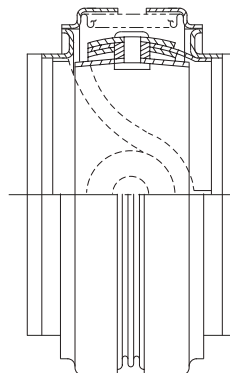
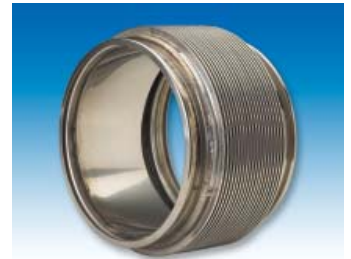
## Link Joints

Aeroquip® brand link joints provide a low profile means of angular deflection in high pressure tension type ducting systems. The "chain link" center pivot permits angular movement while providing joint end load restraint. Where required, a lightweight protective shield can be provided to cover thin walled bellows convolutions. Used in proper geometric combinations, these link joints will provide additional motion in any direction.



## Gimbal Joints

Aeroquip® brand gimbal joints are used in high pressure bleed air systems. They provide flexibility without compromising weight or pressure drop. These extremely small envelope gimbal joints can be installed in series to provide complete motion compensation.

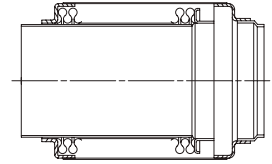


# Joins and Bellows



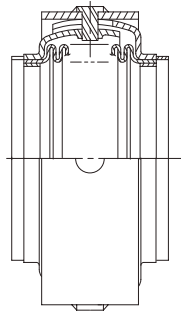
## Slide Joints

Aeroquip® brand slide joints are installed in compression type bleed air ducting systems. They accommodate axial travel and angular deflection with a minimal pressure drop. They are also ideal in systems which are subject to high temperatures and surge pressures. The external surface of the bellows is exposed to system pressure to prevent squirm. In addition, this exposure to pressure increases the joints flexibility and prolongs operating life.



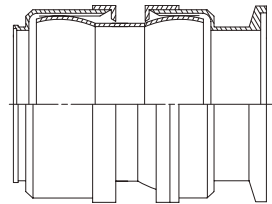
## Universal Joints

Aeroquip® brand universal joints provide very low pressure drop because the integral gimbal system is on the outside of the bellows. Universal joints are used in tension type bleed air ducting systems. This design also protects the bellows from external damage and high end loading in applications with low bending moments.



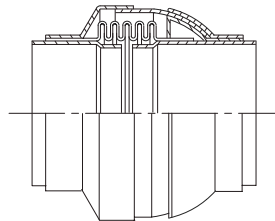
## Slip-Flex Joints

The Aeroquip® brand slip-flex joint is designed to accommodate all types of motion requirements in a compression system. This low-profile, lightweight, flexible component utilizes the latest advancements in high-temperature, non-bellows pressure containment. It allows angular deflection, lateral offset, axial motion and 360° rotation with minimal leakage rates.



## Ball Joints

Bellows ball joints allow for angular deflection in tension-type duct systems. The design incorporates a ball and socket to counteract pressure induced end loads and a leak-tight bellows to provide flexibility. The ball and socket also act as a backup seal in the unlikely event of a bellows failure. Internal liners may be used to minimize flow-induced vibration and pressure drop.



Eaton can manufacture almost any duct assembly configuration, from the simplest to the most complex.



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