

# *ThorburnFlex*



Metallic Expansion Joints



Rubber Expansion Joints



Fabric Expansion Joints

## **ALUMINUM SMELTING**

**Engineered Solutions For Pipe Motion**



[www.thorburnflex.com](http://www.thorburnflex.com)

## Potflex™ Potroom Dielectric Flexible Piping



Thorburn's Potflex™ technology was specifically developed to respond to the need for a superior alternative to rubber compressed air dielectric hose assemblies in the aluminum industry. Potflex™ is non-conductive and its state of the art construction dramatically increases flexibility, which simplifies difficult installations, while providing superior pressure and temperature resistancy for longer lasting maintenance free performance



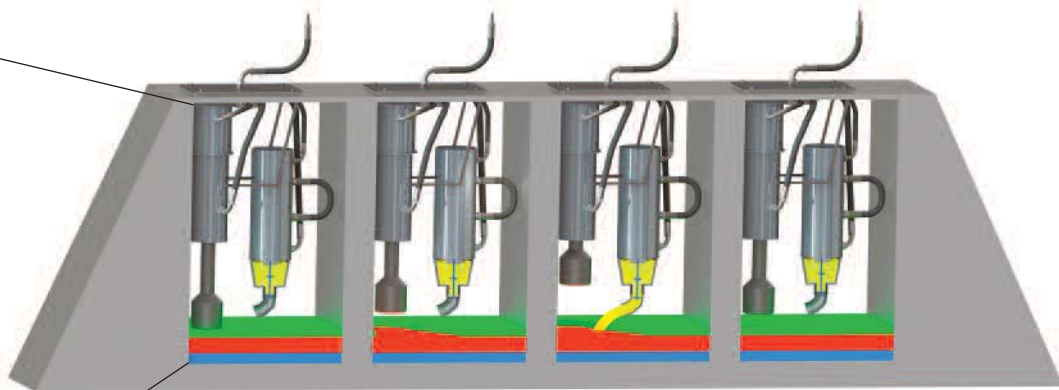
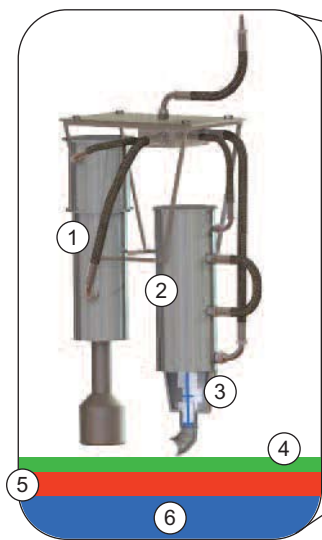
Aluminerie Alouette aluminum plant in Sept-Îles, Quebec

### Features and Benefits

- Non-conductive
- High pressure and high temperature service
- Non-aging
- Ultra flexible
- High flow and maintenance free

### Potroom and Superstructure Applications

- Pneumatic control lines
- Feeder and crust breaker lines
- Main feed lines
- Main exhaust lines
- General potroom hook-up lines



PotFlex™ is the flexible component used to transfer compressed air to the pneumatic control valves to the crust breaker/feeder cylinders.

- ① Crust Breaker ② Alumina Feeder ③ Alumina Hopper ④ Anode Cover/Top crust  
 ⑤ Cryolite Electrolyte ⑥ Aluminum Metal Pad

## Potflex™ TKP30 Dielectric Hose



### HOSE CONSTRUCTION:

**Inner Core:** Virgin white convoluted PTFE

**REINFORCEMENT:** PTFE-impregnated fiberglass and a double Kevlar 29 braid, covered with a flame retardant abrasive resistant polyester braid, specifically designed to protect the Kevlar 29 braid from UV degradation.

**TEMPERATURE RANGE:** 54°C to 175°C (-65°F to 350°F)  
-73°C to 204°C (-100°F to 400°F) intermittent service.

Thorburn's TKP30 is specifically designed for long term service as the flexible component used to transfer compressed air to pneumatic control valves and crust breaker/feeder cylinders found in potroom superstructures of aluminum smelters. TKP30 is completely non-conductive with dead tight sealing to 275 bar and its properties do not change over time, yielding superior maintenance free performance.

### FEATURES:

- Non-metallic, non-conductive throughout and flame resistant (will not sustain combustion). These characteristics make it appropriate for sound attenuation, electrical insulation, isolation or resistance to high frequency radiation.
- High tensile strength, Kevlar 29 braid, which makes it better suited for higher temperatures and pressures than Nomex-nylon braided hoses.
- The convoluted lightweight hose is extremely flexible and easy to work with.
- An ideal high pressure dielectric superstructure potroom hose.

### APPLICATIONS:

- Compressed air lines in aluminum smelters
- Coolant
- Oil and fuel
- Instrument lines
- Medium pressure gas systems

## Potflex™ TKP30 Dielectric Hose Coupling System



Male NPTF style Code 1 - Male BSPT style Code 2



Female JIC 37° Swivel style Code 3

Thorburn's Potflex™ Series TKP30 hose couplings are attached through a proprietary positive braid locking system called Sure Seal™. This unique coupling to hose connection system ensures a continuous long term, leak tight, seal with a high flowing orifice that will not leak or blow off before the burst pressure of the hose.

### Materials

Plated carbon steel (standard). Also available in stainless steel and anodized aluminum.

### Options

Staubli™ compatible Potflex™ TKP30 hose coupling plugs are designed to connect to Staubli™ quick release sockets.

*Staubli™ is a registered trademark of Staubli International AG*



Staubli compatible quick coupling plug style Code 4 | Staubli push button coupler

## Sure Temp™ Electrically Heated Hose



Manufacturing Sure-Temp™ electrically heated hose assembly



Thorburn's Sure-Temp™ hose assembly



Installing inner insulation on Sure-Temp™ hose

Electrically heated hoses are used wherever a liquid, viscous or melted medium has to be transported from one place to another without losing the temperature. The hose is designed to regulate the temperature of the process fluid entering the hose assembly as it passes through the hose. This is required to prevent solidification or an increase in the fluid viscosity. A heating element is spirally wrapped around the hose assembly to regulate the temperature. This self regulating heating element requires a sensor and controller to maintain a specific temperature. Electrical heating, as opposed to steam heating, is preferred because it is more convenient, more controllable and more readily available.

### Sure-Temp™ heated hoses are used to:

- Keep media fluid for processing
- Achieve their optimum properties for processing
- Avoid condensation of gaseous media
- Process in a more productive way (robotic applications)
- Ensure consistent quality in manufacturing
- Connect moving parts and devices

### Features & Benefits:

- Easily drained and cleaned
- High mechanical resistive strength
- Uniform heating prevents hot spots
- External temperature controller
- Greatest variety of end fittings for electrically heated hose assemblies
- J or K thermocouplers available
- Standard voltage 120V, 220V, 480V & 600V
- Optional built in temperature control

### Specifications:

#### Heated Pressure Hoses Gas Analysis:

Frost protection/holding temperatures | 5°C to 450°C  
Nominal ID | 4mm to 50mm  
Typical Design Pressures | Full vacuum to 300 psi (20 bar)

#### Heated Pressure Hoses Liquid Service:

Frost protection/holding temperatures | 5°C to 250°C  
Nominal ID | 8mm to 200mm  
Typical Design Pressures | Full vacuum to 300 psi (20 bar)

### Sure Temp™ Electrically Heated Hose Assemblies

Available with Factory Mutual Approval for use in Class 1, Div. 2, Group D areas

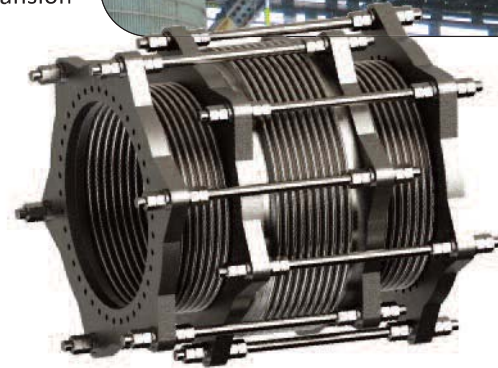
## In-Line Dual Purpose Pressure Balanced Expansion Joints

Thorburn Model IPBU in-line pressure balanced expansion joint will absorb thermal motion while eliminating the pressure thrust loads on a piping system without a change in direction of the piping. The unique design of this in-line pressure balanced joint consists of a constant volume device which is created by the addition of a balancing bellow where the difference in cross-sectional area is exactly twice the cross-sectional area of the line bellows.

By proper crosslinking, the change in volume of the line bellows, due to a change in length (i.e. compression and/or extension) can be made to cause an equal but opposite change in volume of the balancing bellows. Thus, since the volume changes are of an equal value, the pressure forces that are normally present in a piping system containing bellows expansion joints are eliminated.

### Features

- Absorbs axial deflection
- Absorbs lateral deflection independently from the balancing and line bellows
- Neutralizes pressure thrust forces
- Eliminates the requirement for main anchors
- Protects sensitive equipment against detrimental pressure thrust forces



## Elbow Pressure Balanced Metallic Expansion Joints



### Features

- Absorbs axial and lateral movements without imposing pressure thrust on the turbine nozzles
- Eliminates main anchors, Minimum guiding required

Thorburn's elbow expansion joint uses line and balancing bellows that are typically linked with tie rods. The balancing bellows is subjected to the same pressure as the line bellows. When there is thermal growth of the piping, the line bellows compresses. The tie rods transfer this thermal growth to the balancing bellows causing it to extend by an equal amount. Since there is no change in the volume of the system, the pressure thrust forces remain in balance. It should be noted that when the line bellows deflects laterally, there is also no volume change. The reader shall take note that the line bellows can absorb both axial and lateral motion but the balancing can only absorb axial motion.

Thorburn's custom designed pressure balanced elbow expansion joints are the ideal flexible piping solution when there is a change in direction of the piping and a main anchor cannot be installed at the change of direction and when the expansion joint must absorb axial movement and a small amount of lateral motion as it has only a single line bellows.

## Thorburn Hot-Flex™ PTFE Lined Metallic Bellows



Thorburn's Hot-Flex™ high pressure PTFE lined expansion joint system with tangent pipe combines the properties of metal and teflon into the most advanced and versatile expansion joint available in the world today

### High Pressure /Temperature & Corrosive Resistant

Thorburn's Hot-Flex™ "HF" Series PTFE lined expansion joint system is designed to provide high pressure and temperature transfer containment of highly corrosive media that could not be safely handled by conventional metallic, elastomeric or PTFE expansion joints. Hot-Flex™ expansion joints combine the high pressure rating of a metallic expansion joint with the high temperature corrosion resistance of PTFE, creating a product that will outperform them both. Hot-Flex™ PTFE lined expansion joints can be custom engineered to your specific application. Available in hinged, gimbal, pressure balanced or tied universal designs.

### Advantages

- Protects against start-up & surge forces
- Absorbs pipe movement
- Isolates mechanical vibration
- Reduced System Noise
- Compensates Misalignment

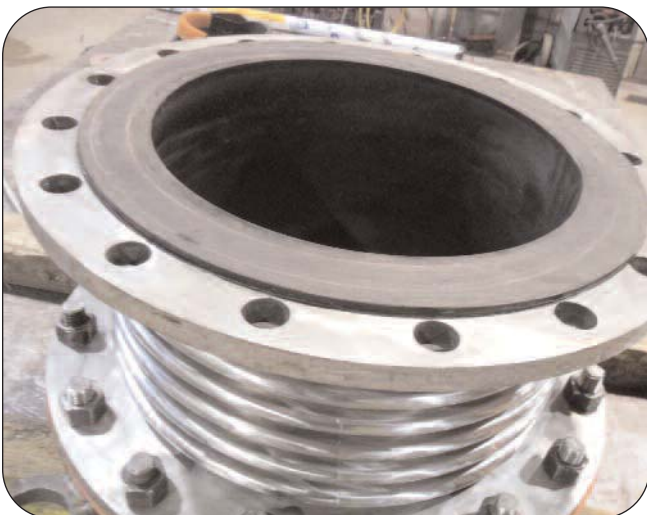
### Benefits

- Corrosive resistant & Anti stick
- PTFE Liner covers flange face
- Liners are spark tested
- Absorbs pipe movements and stress
- Isolates mechanical vibration
- No pigments or additives to the PTFE liner
- Reduces system noise
- Sizes from 1" to 96" (DN25 to DN2440)
- Protects against surge forces



Thorburn Model HF-LP high density ETFE (Ethylene tetrafluoroethylene) lined bellows for low permeation

## Thorburn Rubber Lined Metallic Bellows



RLB-SF Rubber Lined Metallic Expansion Joint

### Thorburn Rubber Lined Metallic Expansion Joints

Full vacuum to 70 bar (1000psi), Sizes 100mm to 4000mm

Thorburn's RLB Series rubber lined metallic expansion joints are specifically designed to address pipe movement requirements in high pressure applications that exceed the capabilities of Thorburn's 42HPXX Series rubber expansion joints. Thorburn's RLB Series incorporates the security of using ASME code allowable stress values to calculate pressure containment & movement capabilities of a metallic expansion joint while combining the superior abrasion, erosion and corrosion resistance of a rubber expansion joint.

### Features

- Provides smooth unobstructed flow
- Abrasive resistant to fine & coarse media
- Relieves stress in piping systems
- ASME B31.1 & B31.3 compliant
- CRN for all Canadian Provinces

## Thorburn In-line Rubber Pressure Balanced Expansion Joints



Eliminates pressure thrust loads on your piping system while absorbing axial & lateral movement. An alternative to metallic in-line pressure balanced bellows expansion joints, which are susceptible to failures from corrosive media, cyclic loading conditions and solids from settling into the thin walled metallic convolutions.

### Design

- ASME B31.1, B31.3 Pressure Piping Certification
- FSA Technical Handbook 8th Edition
- Sizes 12.7mm (1/2") to 4000mm (276") ID
- Pressures full vacuum to 20 bar
- Available with CRN

## Thorburn PTFE/FEP Lined Rubber Expansion Joints



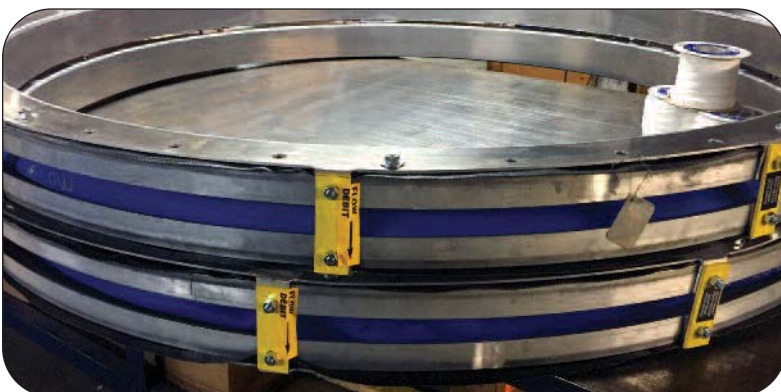
Thorburn's 42HPW Series PTFE/FEP lined rubber expansion joints are specifically designed to resist corrosive attack from chemically charged media at high temperatures and pressures. Custom designs for greater movements available upon request.

### Features

- Non-stick, self cleaning wide arch design
- 25% lower spring rate compared to a standard spool type
- Available with PTFE/FEP top hat liner for smooth flow
- Available in 1, 2, 3 or 4 arches
- Rated for full vacuum in all sizes
- Hand crafted by skilled builders

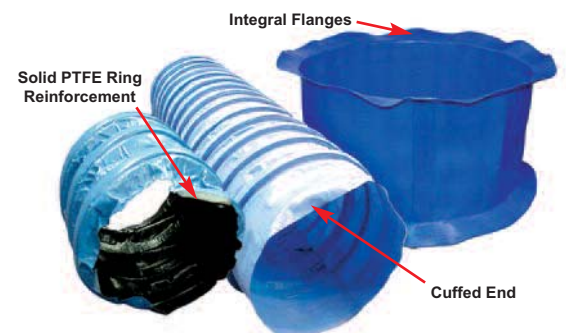
## Flexi-Duct™ Fabric Ducting Expansion Joints

Thorburn Flexi-Duct™ expansion joint technology provides a superior choice for aluminum gas treatment ducting applications. Flexi-Duct™ expansion joints are designed to absorb thermal expansion of ducts handling off-gasses coming from the pots (in the pot-room) while avoiding infiltrations in the duct systems. The aluminum potroom off-gas ducting system to the scrubber has a high concentration of corrosive hydrogen fluoride (hydrofluoric acid) which is one of the most challenging applications in an aluminum smelter.



Thorburn's Flexi-Duct™ expansion joints manufactured with Aluminum 6061-T6 (SB-209) frames & backing bars to resist corrosion and reduce weight on the aluminum ducting system

### Thorburn's TLFP Flexi-Duct™ Duct Connectors



Thorburn's TLFP expansion joints & connectors can be manufactured with flanged or cuffed ends. The reinforcing rings can be made from encapsulated solid PTFE or 316SS

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ISCIR Romania | CNCAN Romania | EN 13480-2002 | HAF 604 China | TSG China

## Other Innovative Thorburn Engineered Solutions for Pipe Motion



59TC Rubber Chemical Hose Assemblies



60TMH Ceramic Lined Flex-Pipe Hose Assemblies



60TMH Custom Flex-Pipe Hose Assemblies



58TC Composite Hose Assemblies



559TW Convoluted PTFE Hose Assemblies



22TWH High Pressure TPU Lined Lay Flat Hose Assemblies

