

ThorburnFlex



Solving Pipe Motion Problems for High Pressure
Slurry & Bitumen Transfer Piping Systems



Rubber Expansion Joints



Rubber Lined Metallic Bellows



Wire Reinforced Flexpipe

MINING & OILSANDS Engineered Solutions For Pipe Motion

Canada¹
www.thorburnflex.com

Expansion Joints for High Pressure Slurry & Bitumen Transfer Piping Systems



RLB-SF Rubber Lined Metallic Expansion Joint

Thorburn Series RLB Rubber Lined Metallic Expansion Joints

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

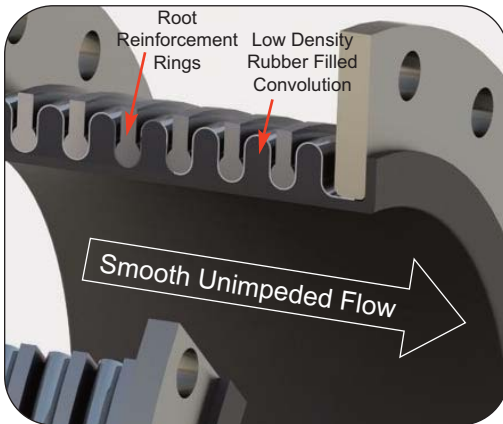
Thorburn's RLB Series rubber lined metallic expansion joints are specifically designed to address pipe movement requirements in high pressure applications that exceed the capabilities of Thorburn's 42HPXX Series rubber expansion joints. Thorburn's RLB Series incorporates the security of using ASME code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

Thorburn Series RLB 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

Media Compatibility (HNBR/FKM Lining)

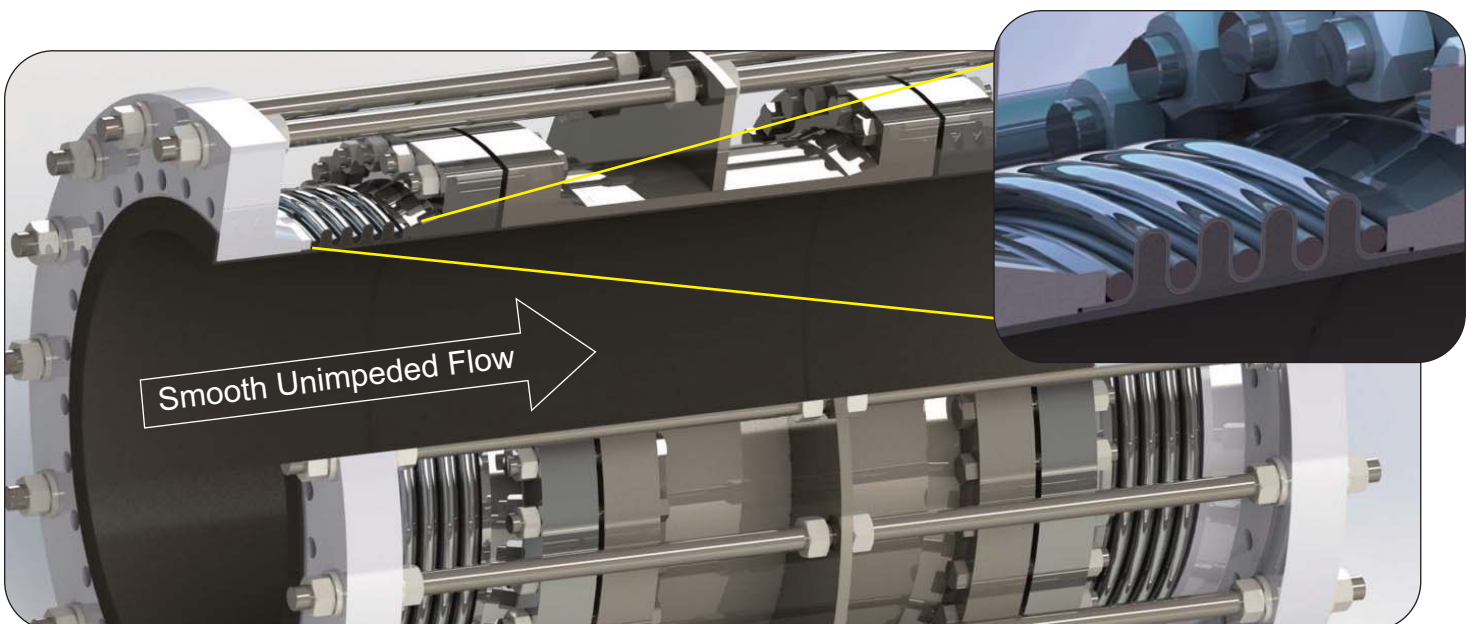
Chemically inert & resistant to isopentane, & N-Pentane solvents, Bitumen - Maltene & Bitumen - Asphaltene, H2O & Air



Low density rubber filled convolutions & root reinforcement rings

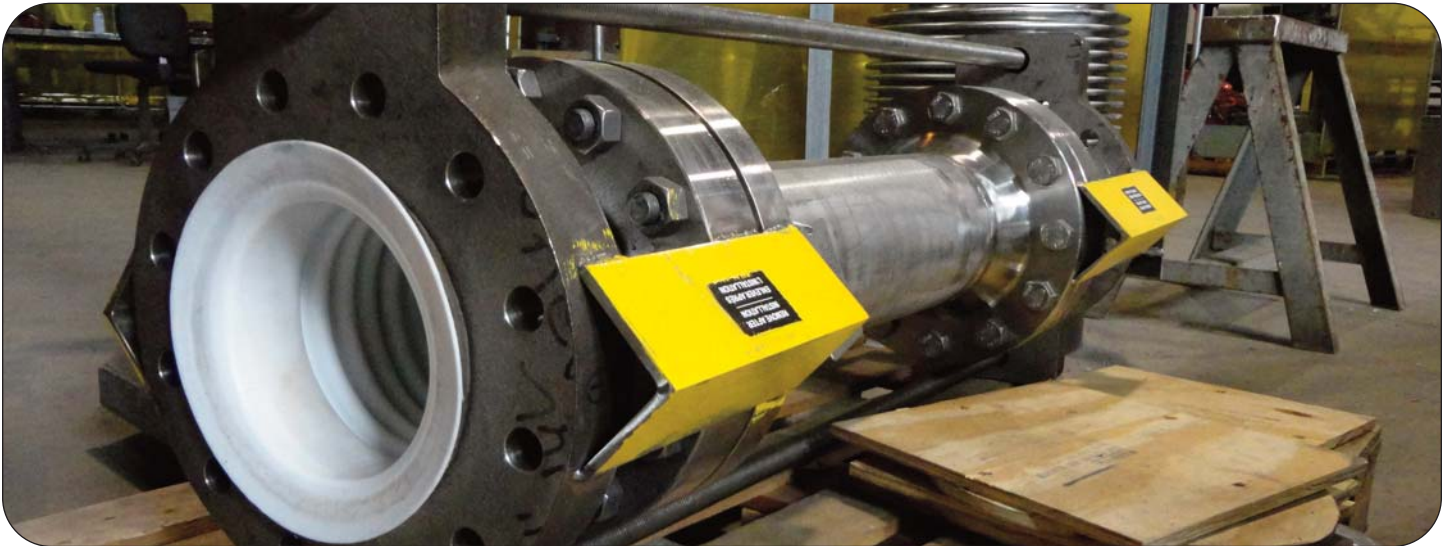
Thorburn's RLB Series rubber lined metallic expansion joint uses 3 proven technologies

Lining metal pipes with rubber is a technology that has been in service in mines for over a century to handle abrasion, erosion & corrosion problems. Low density rubber filled arches in rubber expansion joints to provide smooth unimpeded flow is a technology that was perfected in the 1930's. Thorburn's RLB rubber lined metallic expansion joints are an innovation of combining three proven technologies (metallic expansion joints, rubber lining of metallic surfaces & low density rubber filled expansion joint arches) to address high pressure pipe motion problems found in transferring slurry and bitumen to tailing processing facilities.



Thorburn's Dual Flex Model RLB-DFT - Tied Universal Rubber Lined Metallic Expansion Joint System

Thorburn's Hot-Flex "HF" Series PTFE Lined Metallic Expansion Joints



Thorburn's Hot-Flex high pressure PTFE lined expansion joint system with tangent pipe



Thorburn's Hot-Flex with isostatically molded unpigmented PTFE convolutions

High Pressure /Temperature & Corrosive Resistant

Thorburn's Hot-Flex "HF" Series PTFE lined expansion joint system is an engineered product that was specifically designed to provide high pressure / temperature transfer containment of highly corrosive media that could not be safely handled by conventional metallic, elastomeric or teflon expansion joints.

Thorburn's Hot-Flex PTFE lined 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.

Each Hot-Flex PTFE lined expansion joint can be custom engineered to your specific application: pressure/temperature rating, spring rate movement (axial, lateral and angular), metallic carcass (stainless steel, monel, inconel, hasteloy, etc.), various face-to-face dimensions. Available in hinged, gimbal, pressure balanced or tied universal designs.



Thorburn's Hot-Flex expansion joint PTFE liner undergoing a 10,000 Volt spark test to detect perforation

Advantages

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



Hot-flex installed in a sulphuric acid transfer line



Thorburn 42HPXX High Pressure Rubber Expansion Joints

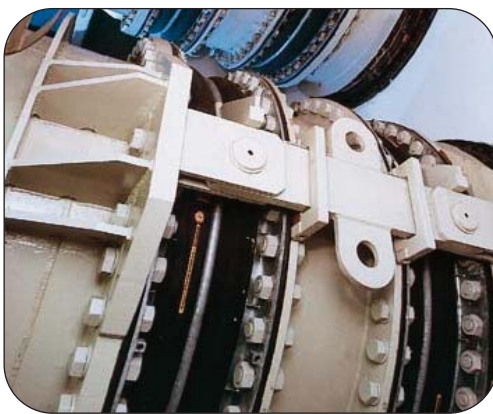
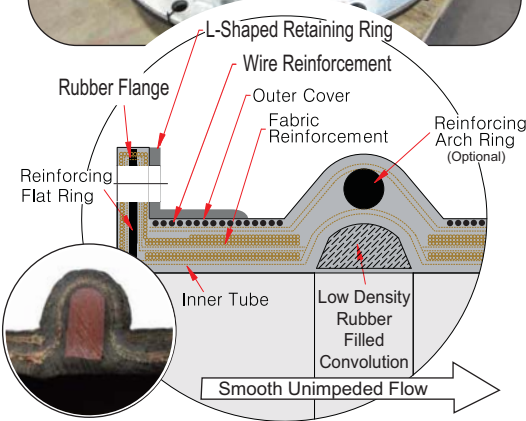
Full vacuum to 20 bar (300psi), Sizes 25mm to 4000mm - CRN (Canada)

Thorburn's rubber expansion joints are used to absorb movements in all directions and are capable of absorbing unexpected shock induced movements caused by pumps, blowers, ship to shore movements and other agitating equipment.

Shown Left: 42HPXX 800mm ID (32 in) 20 bar (300 psi) 4-to-1 safety factor

42HPXX Advantages

- **Smooth abrasion, erosion & corrosion resistant liner (Inner Tube)**
Impervious to the harmful effects of slurry, thickened tailings, bitumen & most chemicals
- **Vibration and sound absorption with high resistance to shock**
Absorbs transmission of vibration without stress
- **Freedom from embrittlement**
Flexing keeps the rubber "alive" and eliminates flex cracking
- **High resistance to shock**
Absorbs movement in all directions and capable of preventing unexpected shock induced movements caused by pumps, blowers and other agitating equipment during plant startups & shutdowns



Thorburn's Rubber Hinged/Gimbal Expansion Joints

Full vacuum to 20 bar (300psi), Sizes 25mm to 4000mm - CRN (Canada)

Thorburn's Rubber Hinge Expansion Joints are typically used in sets of two or three, to absorb pipe movement in one or more directions in a single plane piping system. Each individual joint in the system is restricted to pure angular rotation by its hinges.

Thorburn's Rubber Gimbal Expansion Joints incorporate a pair of hinges connected to a common floating gimbal ring that provides for close control of movement imposed upon the bellows while supporting the dead weight of the piping system. Wind loading and shear loads are also transmitted through the gimbal structure.

42HPXXH/62HPXXH Hinge Advantages

- Angular motion in one plane only
- Eliminates pressure thrust forces
- No main anchors required
- Low forces on piping system
- Prevents torsion loads on rubber bellows
- Filled Arch Design Prevents Media Sediment buildup

42HPXXG/62HPXXG Gimbal Advantages

- Angular movement in more than one plane
- Eliminates pressure thrust forces
- No main anchor required
- Low forces on piping system
- Prevents torsion loads on rubber bellows
- Filled Arch Design Prevents Media Sediment Buildup

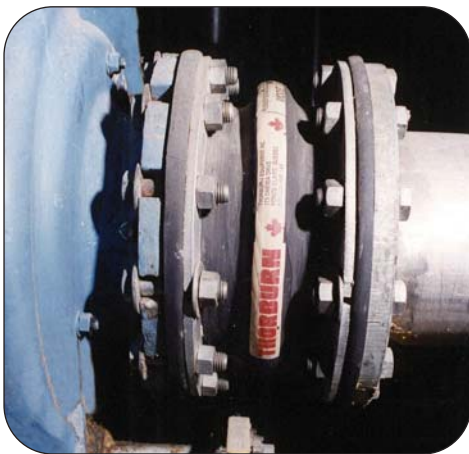


Thorburn Rubber Hinged Expansion Joint Demonstrating Deflection In one Plane



Thorburn Rubber Gimbal Expansion Joint Demonstrating Deflection In Multiple Planes

42HPXX-J Series PTFE/FEP Lined Rubber Expansion Joints



60TMH-E90 Rubber 90° Elbow Fitting



60TMH-T Tee Rubber Fitting

Full vacuum to 20 bar (300psi), Sizes 25mm to 2000mm - CRN (Canada)

Thorburn's 42HPXX-J Series PTFE lined rubber expansion joints are specifically designed to resist corrosive attack at high temperatures and pressures. The PTFE lining tube is custom molded virgin PTFE, FEP or PFA that extends beyond the flange bolt holes providing complete protection to the elastomer body of the expansion joint.

Advantages

- Corrosive Resistant
- Absorbs Pipe Movement
- Reduced System Noise
- Isolates Mechanical Vibration
- Compensates Misalignment
- Eliminates Electrolytic action & electrolysis
- Protects against start-up & surge forces

Construction

TUBE: Single molded PTFE (For sizes below 350mm) or FEP (For sizes above 350mm) leakproof lining

CARCASS: High strength calendared polyester or Aramid reinforcing fabric between the PTFE liner and the cover

METALLIC REINFORCEMENT: Chemically treated solid round rings or high tensile strength helical wire embedded in the carcass. The metallic reinforcement provides additional strength for pressure and vacuum service.

COVER: Available in Neoprene, EPDM or Viton

Thorburn's 59TT PTFE Lined Flexible Metal High Pressure Hose



Thorburn's 59TT smooth PTFE lined high pressure transfer hose



Applying PTFE liner before flaring on Thorburn's 59TT Hose

Thorburn's 59TT smooth PTFE lined flexible metal hose offers the flexibility and near universal corrosion resistance of PTFE combined with the high pressure ratings attainable through the use of SA 240 type 321/316 stainless steel corrugated hose with stainless steel braided reinforcement.

Perfect for use as pump connectors and transfer hose for loading & unloading of process vessels & storage tanks

Thorburn's 59TT smooth PTFE lined hose assemblies are designed and manufactured to the highest quality standards to provide safe and cost effective solutions. Thorburn offers fast response assembly capability, using advanced hose assembly and testing techniques to ensure rapid delivery service.

Features & Benefits

- Chemical inertness
- Pressure rating up to 3000 psi (for 1 inch size)
- Temperature resistant (-100°F to 500°F) (-73°C to 260°C)
- Flexing & temperature cycling resistant
- Low friction & low pressure drop
- Non contaminating & FDA compatible
- Non conductive & excellent dielectric properties
- Steam compatibility & non adhesive
- CRN for all Canadian Provinces

Thorburn's 60TMH Wire Reinforced Flexpipe



Available with smooth tube & cover to provide smooth flow with bend radius of 4X ID



Available with corrugated tube & cover with integral annular rings to increase flexibility to 2X ID



Available with factory assembled permanently attached crimped ends

Thorburn's 60TMH Flexpipe is custom designed for use in piping systems that require isolation and absorption of severe noise, vibration, misalignment, lateral deflection and movements caused by mechanical or temperature changes. The 60TMH Flexpipe system replaces metal piping and is optimal for pipelines requiring resistance to electrolysis, corrosion, abrasion and water hammering.

Construction

TUBE: Available with various tube compounds wall thickness with smooth or corrugated construction as determined by the application and the media. *Please call Thorburn for details.*

REINFORCEMENT: Multiple layers of precisely angled cross woven fabric with calendared polyester or fiberglass fabric. Integrally built with an evenly spaced heavy duty helix spring wire or annular rings that withstand the rated working pressures from full vacuum to 1000 psi (70 bar). Can be designed to support a minimum bend radius from two times the diameter or maintain unsupported rigidity over long lengths. *Please call Thorburn for details.*

COVER: Available with various cover compounds and wall thicknesses with smooth or corrugated construction as determined by the application and the media. *Please call Thorburn for details.*

SIZES: 1/2" (12mm) to 48" (1200mm) I.D. up to 100ft (30m) long. *Longer lengths available on special order only.*

SPECIAL NOTES:

1. Thorburn's 60TMH assemblies are custom designed for specific applications, therefore the construction may vary depending on pressure, bend radius requirements & media.
2. The standard bend radius is typically 6X ID.
3. Corrugating the cover and tube will improve the bend radius at lower pressures.
4. Incorporating annular rings with a smooth tube and cover will improve the bend radius at high pressures.
5. The forces required to make a bend have a direct relation to the pressure.
6. Arches can be added to provide axial movement.
7. Special end configuration (other than Flanges) are available upon request.

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Other Typical Applications



Ground Settling Systems



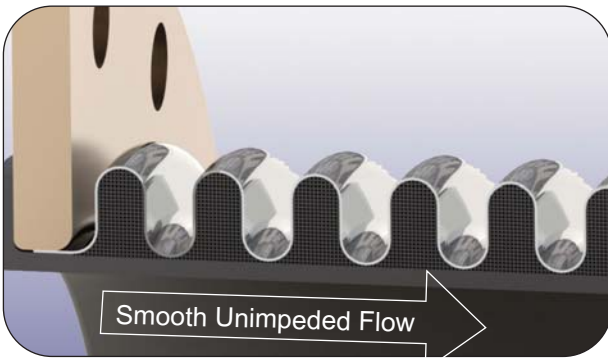
Ore & Slurry Pipeline Systems



Process Water Pipeline Systems



Sand & Gravel Dredging



Smooth Unimpeded Flow

Cyclic movement testing (1000x) of Thorburn's Singleflex Model RLB-SF rubber lined metallic expansion joint with low density rubber filled convolutions to prove its dynamic movement capabilities. The metallic expansion joint provides pressure containment while the rubber lining provides abrasion erosion & corrosion resistance. The expansion joints metal surfaces are chemically etched to provide the ideal surface for rubber lining. Adhesion test are performed on the rubber lining to ensure its bonding strength.



Thorburn's Model RLB-SF Cyclic Movement Testing



*Over 50 years of flexible piping experience
 waiting to serve you...*