CATALOG INDEX

Accessory Adapters

Air Compressor Connectors

ASME Brochure

Bellows Pump Connectors

CRN Products

Cryogenic

Custom Fabrication

Exhaust

Expansion Compensators

Externally Pressurized EJ

Flexible Pump Connectors

Industrial Brochure

LNG and CNG Products

LPG Connectors

Metal Expansion Joints

Metal Heat Pump Hose

OEM Brochure

Pipe Guides and Slides

Press Ready Connectors

PTFE Expansion Joints

PTFE Hose

Reducing Pump Connectors

Rubber Expansion Joints

Specialty Application Hose

Thermal Seismic Connectors

UL Lead-Free Flex Connectors

TCH Fire SafeFlex™ Connectors
Accessory adapters are the perfect solution for those complicated piping arrangements found at larger air handlers and for pumping system heating and cooling coils. Accessory adapters can hold up to four accessory port openings for drains, P/T ports, gauge cocks and thermo wells.

**ADVANTAGES**

- Fabricated in the U.S.A.
- Quick delivery of stock sizes
- Saves space in crowded mechanical rooms
- Avoid extra fittings with the proper end connections (male, weld, flanged and grooved)
- Reduces labor costs by providing all the ports required
- Custom fabricated and stock sizes 2” I.D. through 12” I.D.
- Use with a flexible connector and have it built in one piece!
- May be installed effectively in a vertical or horizontal pipeline
- Custom accessory adapters can be fabricated to meet your exact specifications

**APPLICATIONS**

- Pump Suction and Discharge Connections
- Plate and Frame Heat Exchanger Connections
- Steam to Water or Water to Water Heat Exchangers

**END FITTINGS**

- FW - Flange and Weld
- RFW - Reducing Flange and Weld
- FM - Flange and Male
- RFM - Reducing Flange and Male
- FF - Flange and Flange
- RFF - Reducing Flange and Flange
- FG - Flange and Groove
- RFG - Reducing Flange and Groove
Flexible metal air compressor hoses are available in a variety of diameters and lengths. Our compressor hoses are fabricated and 100% leak tested at the factory in Rogers, MN. In-stock and ready to ship standard compressor assemblies are stainless steel braided hose with a carbon steel Schedule 40 end fitting.

Special length assemblies that require different types of end fittings such as, unions, couplings, or any other type of pipe fitting can be fabricated in 1-2 days. Please contact us for specific pricing and availability of the non-standard items.

**ADVANTAGES**

- Fabricated in the U.S.A.
- In-stock, ready to ship
- Custom lengths and end fittings
- Vibration isolation
- Corrects misalignment

**APPLICATIONS**

- Compressor Systems
- Air Handling Systems
- Energy Supply Systems
- Transport and Transfer Lines
- Vacuum Pumps and Systems

**END FITTINGS**

- Schedule 40 carbon steel male NPT
- Carbon steel hex male NPT
- Carbon steel female pipe union
- 150# drilled carbon steel flange

**SIZES**

- ½” I.D. - 3” I.D.
- 12”, 18”, 24” OAL

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCHS - 050 - MMT - XX</td>
<td>½”</td>
</tr>
<tr>
<td>TCHS - 075 - MMT - XX</td>
<td>¾”</td>
</tr>
<tr>
<td>TCHS - 100 - MMT - XX</td>
<td>1”</td>
</tr>
<tr>
<td>TCHS - 125 - MMT - XX</td>
<td>1 ¼”</td>
</tr>
<tr>
<td>TCHS - 150 - MMT - XX</td>
<td>1 ½”</td>
</tr>
<tr>
<td>TCHS - 200 - MMT - XX</td>
<td>2”</td>
</tr>
<tr>
<td>TCHS - 250 - MMT - XX</td>
<td>2 ½”</td>
</tr>
<tr>
<td>TCHS - 300 - MMT - XX</td>
<td>3”</td>
</tr>
</tbody>
</table>

Standard assemblies listed above are carbon steel male NPT ends, in 12”, 18” and 24”

XX = Length of connector, please specify when ordering

* Custom assemblies available

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCHS - 250 FLG</td>
<td>2 ¼” x 9”</td>
</tr>
<tr>
<td>TCHS - 300 FLG</td>
<td>3” x 9”</td>
</tr>
<tr>
<td>TCHS - 400 FLG</td>
<td>4” x 9”</td>
</tr>
<tr>
<td>TCHS - 500 FLG</td>
<td>5” x 11”</td>
</tr>
<tr>
<td>TCHS - 600 FLG</td>
<td>6” x 11”</td>
</tr>
<tr>
<td>TCHS - 800 FLG</td>
<td>8” x 12”</td>
</tr>
</tbody>
</table>

Standard assemblies listed above are carbon steel 150# plate flanges

*Custom assemblies available
By request, TCH can fabricate to ASME B31.3 manufacturing specifications. TCH helps your next project to comply with applicable regulations, while achieving cost and safety benefits gained by industry best practices. Our ASME certified welders have years of experience and are experts with complicated piping arrangements and metal hose assemblies. We are here to help you achieve your project goals with our custom fabrication options.

Our factory in Rogers, MN has been audited and has successfully implemented a manufacturing and quality control program which meets the ASME B31.3 and CSA B51 Appendix “H” as applicable.

These requirements meet standards for:
- Petroleum Refineries
- Chemical Plants
- Pharmaceutical
- Textile Machinery
- Paper Mills
- Cryogenic plants

Processing plants and terminal stations can rest assured TCH materials and components are covered in design, fabrication, assembly examination, inspection and testing.

Fluids include:
- Raw
- Finished Chemicals
- Petroleum Products
- Gas
- Steam
- Water
- Cryogenic Fluids
MPB AND MPBR BELLOWS PUMP CONNECTOR

MPB and MPBR have been engineered and designed to be multi-purpose flexible pump connectors. They have been designed for axial and lateral motions to minimize the forces caused by thermal growth within a rigid piping system or within mechanical equipment. Compact to save space, they are proven to minimize the stress on pump and compressor housings. With the multi-ply bellows standard on both the MPB and MPBR connectors are an excellent choice to reduce pipe vibration throughout a structure.

ADVANTAGES

- Integral tie rods
- Reduces stress
- Reduces vibration
- In-stock, economical
- Absorbs axial movement
- Allows operation at high temperatures
- MPB has a very small face to face dimension
- MPBR exact dimension of single sphere rubber EJ (MS1)

APPLICATIONS

- Pumps
- Steam
- Vacuum
- Skid Systems
- Compressor Systems

MATERIALS

- Carbon steel 150# plate flanges
- 300 Series multi-ply stainless steel bellows
- Carbon steel limit rods and nuts
We offer a variety of CRN approved products including V and U seismic connectors, reducing assemblies and straight connectors. These assemblies are approved for use in Manitoba, Ontario, Alberta, British Columbia, Québec, Toronto, and Saskatchewan.

Our CRN products are in alliance with TSSA’s Boiler and Pressure Vessels (BPV) Safety Program, which regulates all pressure retaining components manufactured or used on boilers, pressure vessels and piping systems conform to the Technical Standards and Safety Act, 2000 and applicable regulations, codes and standards.

**ADVANTAGES**

- Approved in 6 provinces
- In-stock, Ready to ship
- All documents and registrations
- Reduces vibration
- 100% leak tested

**APPLICATIONS**

- Skid Packages
- Water Treatment
- Boiler Feed Systems
- Process Piping System
- Chemical/Petrochemical
- Fluid and Gas Transfer Systems
- Pressure Pump and Piping Systems

**MATERIALS**

**Hose:**
- Corrugated Bronze
- Corrugated Stainless Steel

**Braid:**
- Bronze Wire Braid
- Stainless Steel Wire Braid

**Braid Collar:**
- Copper
- Stainless Steel

**SIZES**

Seismic V's, U's, and Straight Flexible Connectors:
- ¼” I.D. - 12” I.D. available
- Straight assemblies of any OAL
- Up to 10” of movement for seismic V and U flex connectors

**END FITTINGS**

- Weld
  - Carbon Steel
- Sweat
  - Copper
- RFSO Flange
  - Carbon Steel
- Male NPT
  - Carbon Steel
We work closely with the cryogenic industry to develop flexible transfer assemblies for cryogenic applications and industrial gases. Our assemblies are available in a wide range of sizes and materials.

**ADVANTAGES**
- In-house oxygen cleaning
- Individually cleaned, capped and bagged
- Full or partial armor guard
- End fitting customization

**APPLICATIONS**
- CNG/LNG
- Air Separation
- Manifold Lines
- Fueling and Fuel Systems
- Nitrogen and Oxygen Liquefiers
- Other Industrial Gas Applications

**CLEANED, CAPPED, AND BAGGED**
Oxygen cleaning services are performed in-house in our clean room.
PTFE PIGTAILS

All PTFE and stainless steel pigtails are fabricated at the factory in Rogers, MN.

**PTFE pigtails** consist of PTFE smooth bore hose with stainless steel braid and choice of end fittings. Recommended for frequent cylinder replacement situations.

**Sizes Available:**
- ¼", ⅜", ½"
- Male or female brass or stainless steel

**Stainless steel** pigtails consist of corrugated stainless steel hose with stainless steel braid. Recommended for high-usage or corrosive gas.

**Sizes Available:**
- ¼", ⅜" and ½"
- Male or female NPT stainless steel

Custom PTFE or stainless steel assemblies are available with a variety of end fittings.

FILLER ADAPTERS

**“90” Elbow**
**“S” Straight**
**“T” Adapter**

**Easy On and Off:**
This unique design requires no tools. The filler adapter freely spins to allow for quick connect and disconnect, this saves time when filling one or more cylinders.

**Styles and Sizes:**
The filler adapter is available in either a straight, T or 90 degree elbow configuration to fit your specific system, design and set-up.

**Advantages:**
90 degree elbow prevents the hose from over-bending, thus extending the life of the hose. Stainless steel construction eliminates oxidizing, distortion, cracking and leaking.
CUSTOM FABRICATION

TCH is a global fabricator that provides custom metal hose solutions for difficult applications to a diverse customer base. We provide a complete fabricated solution for commercial and industrial markets. Our experienced sales team will help you choose or design the right assembly for your application.

SOLUTIONS

We domestically fabricate custom metal hose products, piping arrangements, and steel piping manifolds. We fabricate to our customers’ specifications and satisfaction. Contact us if you have a complicated project that demands customized parts. We are ready to discuss these applications and how we help you achieve your goals for your next project.

ADVANTAGES

- Large fitting pipe and hose inventory, ensuring quick turn-around times
- Custom assemblies are manufactured in house giving you short lead times
- All custom parts and products are tested at the TCH factory so you can install with confidence
- Our ASME certified welders have years of hose experience and are experts with difficult fabrications
- Product cleaning is available for cryogenic and medical gas hose or any application that requires this service
- Facility manufacturing in accordance with ASME B31.3

TCH CAN MEET YOUR CUSTOM FABRICATION REQUIREMENTS - CALL TODAY!

ASME B31.3

By request, TCH can fabricate to ASME B31.3 manufacturing specifications

- ASME certified welders
- MTR, COC, and Testing certificates
EXHAUST

We fabricate standard and custom exhaust assemblies and supply components for all major Power Gen-Set Manufacturers and re-packagers around the world.

TCH has the experience, knowledge and production capability to design and fabricate exhaust products to meet your exact requirements. Our extensive inventory of OEM components, hose and end fittings are readily available. Allow us to fabricate exactly what you need, when you need it.

ADVANTAGES

- Fabricated in the U.S.A.
- High temperature capabilities
- Vibration isolation
- Axial movement absorption
- Retro-fit capabilities

APPLICATIONS

- Blower Systems
- Exhaust Gas Lines
- Ventilation Systems
- Gas Turbine Exhaust
- Gen-Set OEM Solutions
- Fuel and Coolant Supply

BRAIDED FLEX CONNECTORS

Stainless Steel Connectors

Sizes:
½" I.D. - 24" I.D. / Open OAL
Custom sizes available

End Fittings:
ANSI and all major coolant style flanges as well as any other end fitting your application requires. Custom fabricated end fittings are available and built to your specifications.
EXHAUST

CORRUGATED FLEX CONNECTORS

End Fittings
- NPT = Schedule 40 Carbon Steel
- ANSI = 125#/150# ANSI Carbon Steel Plate Flanges
- OEM FLG = Caterpillar, Cummins, Detroit Marmon and Specials
- Other = Reducing ANSI flanges, butt weld ends and reducing NPT fittings, as well as any other non-standard fittings that might be required. All are readily available, contact us for pricing.

Corrugated Hose Specifications
Stainless steel hose type 321, rated for 1500°F temperature
EXHAUST

EXHAUST EXPANSION JOINTS

All diesel exhaust connectors are factory assembled and 100% leak tested. There is a broad selection from 3" through 30" diameters available.

When flow velocities exceed 75 ft/sec. liners (internal sleeves) may be required for optimum connector service. These connectors were designed specifically for engine exhaust systems and have a maximum service rating of 25 PSIG at 1000°F. Consult TCH for applications where higher pressure and temperature are encountered.

<table>
<thead>
<tr>
<th>Model Number</th>
<th>Nom. Pipe Size</th>
<th>L (in.)</th>
<th>X Max (in.)</th>
<th>Y Max (in.)</th>
<th>Axial</th>
<th>Lateral</th>
<th>D (in.)</th>
<th>T (in.)</th>
<th>N</th>
<th>d (in.)</th>
<th>J (in.)</th>
<th>Wt. (lbs.)</th>
<th>Thrust Area (in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCB - 03 - S</td>
<td>3&quot;</td>
<td>4 ⅜</td>
<td>0.63</td>
<td>0.13</td>
<td>375</td>
<td>2,320</td>
<td>2.90</td>
<td>7 ½</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>LCB - 03 - L</td>
<td>7 ½</td>
<td>1.25</td>
<td>0.38</td>
<td>487</td>
<td>2,90</td>
<td>7 ½</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>LCB - 04 - S</td>
<td>4&quot;</td>
<td>5 ¼</td>
<td>0.88</td>
<td>0.13</td>
<td>728</td>
<td>2,720</td>
<td>3.20</td>
<td>9 ½</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>17</td>
<td>20</td>
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<tr>
<td>LCB - 04 - L</td>
<td>7 ½</td>
<td>1.56</td>
<td>0.44</td>
<td>364</td>
<td>2,90</td>
<td>7 ½</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>LCB - 06 - S</td>
<td>6&quot;</td>
<td>8 ¾</td>
<td>2.50</td>
<td>0.88</td>
<td>143</td>
<td>1,630</td>
<td>2.00</td>
<td>11 ⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>25</td>
<td>41</td>
</tr>
<tr>
<td>LCB - 06 - L</td>
<td>12</td>
<td>2.50</td>
<td>0.88</td>
<td>143</td>
<td>3,510</td>
<td>4.40</td>
<td>13 ½</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>26</td>
<td>41</td>
</tr>
<tr>
<td>LCB - 08 - S</td>
<td>8&quot;</td>
<td>9 ⅛</td>
<td>2.50</td>
<td>0.44</td>
<td>185</td>
<td>2,470</td>
<td>3.10</td>
<td>16 ⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>47</td>
<td>66</td>
</tr>
<tr>
<td>LCB - 08 - L</td>
<td>12</td>
<td>2.50</td>
<td>0.88</td>
<td>143</td>
<td>3,510</td>
<td>4.40</td>
<td>13 ½</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>48</td>
<td>66</td>
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<tr>
<td>LCB - 10 - S</td>
<td>10&quot;</td>
<td>14 ⅜</td>
<td>2.06</td>
<td>0.25</td>
<td>514</td>
<td>2,470</td>
<td>3.10</td>
<td>16 ⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>65</td>
<td>105</td>
</tr>
<tr>
<td>LCB - 10 - L</td>
<td>14 ⅜</td>
<td>4.13</td>
<td>0.10</td>
<td>257</td>
<td>2,470</td>
<td>3.10</td>
<td>16 ⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>71</td>
<td>105</td>
</tr>
<tr>
<td>LCB - 12 - S</td>
<td>12&quot;</td>
<td>10 ⅛</td>
<td>2.13</td>
<td>0.25</td>
<td>602</td>
<td>3,950</td>
<td>4.00</td>
<td>19 ⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>91</td>
<td>144</td>
</tr>
<tr>
<td>LCB - 12 - L</td>
<td>18 ⅛</td>
<td>4.63</td>
<td>1.00</td>
<td>301</td>
<td>3,950</td>
<td>4.00</td>
<td>19 ⅛</td>
<td>⅛</td>
<td>⅛</td>
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<td>97</td>
<td>144</td>
</tr>
<tr>
<td>LCB - 14 - S</td>
<td>14&quot;</td>
<td>10 ⅜</td>
<td>2.13</td>
<td>0.25</td>
<td>796</td>
<td>4,060</td>
<td>5.10</td>
<td>21 ⅛</td>
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<td>⅛</td>
<td>109</td>
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<tr>
<td>LCB - 14 - L</td>
<td>18 ⅛</td>
<td>4.63</td>
<td>1.13</td>
<td>398</td>
<td>4,060</td>
<td>5.10</td>
<td>21 ⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
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<tr>
<td>LCB - 16 - S</td>
<td>16&quot;</td>
<td>10 ⅛</td>
<td>2.13</td>
<td>0.25</td>
<td>904</td>
<td>5,940</td>
<td>7.40</td>
<td>23 ⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>130</td>
<td>225</td>
</tr>
<tr>
<td>LCB - 16 - L</td>
<td>18 ⅛</td>
<td>4.63</td>
<td>1.00</td>
<td>452</td>
<td>5,940</td>
<td>7.40</td>
<td>23 ⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>139</td>
<td>225</td>
</tr>
<tr>
<td>LCB - 18 - S</td>
<td>18&quot;</td>
<td>11 ⅛</td>
<td>2.13</td>
<td>0.25</td>
<td>1,012</td>
<td>8,320</td>
<td>10.40</td>
<td>25 ⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>132</td>
<td>283</td>
</tr>
<tr>
<td>LCB - 18 - L</td>
<td>20 ⅛</td>
<td>4.63</td>
<td>0.88</td>
<td>506</td>
<td>8,320</td>
<td>10.40</td>
<td>25 ⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>⅛</td>
<td>144</td>
<td>283</td>
</tr>
</tbody>
</table>

Contact Twin City Hose for larger sized expansion joints.

Bellow: Stainless steel ASTM A240 Type 321. Bellows design (more corrugations, less height) provides greater flexibility and reduces pressure-bending stress for extended life.

Liners: Stainless steel ASTM A240 Type 321 for these optional single-piece and telescoping types.

Flanges: Carbon steel ASTM A285 Grade C, flat face plate flange with precisely drilled bolt holes for easy installation.

Assembly: TIG welding of bellow necks to flange bores. 100% leak tested at the Twin City Hose factory.

Service Rating: 25 PSIG at 1000°F maximum.

Pipe Expansion - In. / Ft.

<table>
<thead>
<tr>
<th>Temp ° F</th>
<th>Carbon Steel</th>
<th>Stainless Steel</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>0.037</td>
<td>0.031</td>
</tr>
<tr>
<td>600</td>
<td>0.047</td>
<td>0.064</td>
</tr>
<tr>
<td>700</td>
<td>0.055</td>
<td>0.078</td>
</tr>
<tr>
<td>800</td>
<td>0.067</td>
<td>0.091</td>
</tr>
<tr>
<td>900</td>
<td>0.077</td>
<td>0.104</td>
</tr>
<tr>
<td>1000</td>
<td>0.088</td>
<td>0.117</td>
</tr>
</tbody>
</table>

Contact Twin City Hose for larger sized expansion joints.

Bellow: Stainless steel ASTM A240 Type 321. Bellows design (more corrugations, less height) provides greater flexibility and reduces pressure-bending stress for extended life.

Liners: Stainless steel ASTM A240 Type 321 for these optional single-piece and telescoping types.

Flanges: Carbon steel ASTM A285 Grade C, flat face plate flange with precisely drilled bolt holes for easy installation.

Assembly: TIG welding of bellow necks to flange bores. 100% leak tested at the Twin City Hose factory.

Service Rating: 25 PSIG at 1000°F maximum.
EXHAUST

EXHAUST GASKETS AND NUTS/BOLTS

Call TCH if you do not see the gasket or nut and bolt kit you need.

Other gasket materials are available:
- PTFE
- Rubber
- Graphite
- Special high temperature materials

<table>
<thead>
<tr>
<th>Size / Type</th>
<th>Hi Temp Ceramic</th>
<th>Coolant Gaskets</th>
<th>Bolt / Nut Kits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Full Face 1/16”</td>
<td>Full Face 1/16”</td>
<td>Gr 2, Zinc Plate</td>
</tr>
<tr>
<td></td>
<td>2000°F Constant</td>
<td>400°F Constant</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2300°F Maximum</td>
<td>700°F Maximum</td>
<td></td>
</tr>
<tr>
<td>3” ANSI</td>
<td>FFGSK300970</td>
<td>FFGSK300</td>
<td>BNK - 2” - 3” ANSI</td>
</tr>
<tr>
<td>4” ANSI</td>
<td>FFGSK400970</td>
<td>FFGSK400</td>
<td>BNK - 3.5” - 4” ANSI</td>
</tr>
<tr>
<td>5” ANSI</td>
<td>FFGSK500970</td>
<td>FFGSK500</td>
<td>BNK - 5” ANSI</td>
</tr>
<tr>
<td>6” ANSI</td>
<td>FFGSK600970</td>
<td>FFGSK600</td>
<td>BNK - 6” ANSI</td>
</tr>
<tr>
<td>8” ANSI</td>
<td>FFGSK800970</td>
<td>FFGSK800</td>
<td>BNK - 8” ANSI</td>
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<tr>
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<td>FFGSK100970</td>
<td>FFGSK100</td>
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<td>FFGSK140970</td>
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<td>BNK - 14” ANSI</td>
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<td>CATGSKT400-970</td>
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<td>8” CAT</td>
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<td>12” CAT</td>
<td>CATGSKT012-970</td>
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<td>14” CAT</td>
<td>CATGSKT014-970</td>
<td>CATGSKT014</td>
<td>BNK - 14” CAT</td>
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<td>5” Cummins</td>
<td>CUMGSKT5-970</td>
<td></td>
<td>BNK - 5/6” CUMMINS</td>
</tr>
<tr>
<td>6” Cummins</td>
<td>CUMGSKT6-970</td>
<td></td>
<td>BNK - 5/6” CUMMINS</td>
</tr>
<tr>
<td>8” Det Diesel</td>
<td>CATGSKT012-970</td>
<td>CATGSKT012-970</td>
<td>BNK - 8” DDSL</td>
</tr>
<tr>
<td>10” Det Diesel</td>
<td>CATGSKT014-970</td>
<td>CATGSKT014-970</td>
<td>BNK - 10” DDSL</td>
</tr>
</tbody>
</table>

CALL TWIN CITY HOSE FOR ADDITIONAL EXHAUST PRODUCTS
- Custom tube extensions
- Bulk interlock and corrugated exhaust hose
- OEM flanges for all Gen-Set Manufacturers
Expansion compensators are the perfect solution to absorb thermal expansion for smaller I.D. systems. Expansion compensators can be utilized in piping for domestic hot water, chilled water, heating water, steam and steam condensate. Expansion compensators can also be used for other equipment as indicated within the specifications, drawings and equipment schedules to compensate for thermal pipeline growth.

Constructed with multi-ply Series 300 stainless steel bellows and carbon steel shroud and end fittings. Expansion compensators include an internal anti-torque device. All connections shall have ends to match the piping system.

Joints have a rating of 200 PSIG working pressure and axial movements of 1 ¾” compression and ¼” extension. Maximum temperature of 750°F.

• EXCS for copper sweat piping ends  
• EXCW for welded piping ends  
• EXCM for threaded piping ends  
• EXCF for flanged piping ends  
• EXCG for grooved piping ends

**ADVANTAGES**

- Long life dependability  
- Compact to save space  
- Eliminates bellow squirm  
- Requires no maintenance  
- Compensates for thermal growth

**APPLICATIONS**

- Vertical Risers  
- Return and Supply Lines  
- Heating and Cooling Systems  
- Steam and Steam Condensate  
- Domestic Hot Water, Chiller Water, and Heating Water

**MATERIALS**

Cross Section
Note:
Drawings referenced from © 1985 Expansion Joint Manufacturers Association, Inc. (Fig. B-8.2)

**TABLE 1 THERMAL EXPANSION**

Linear thermal expansion of pipe and tube per 100 feet between 70°F and tabulated temperature.

<table>
<thead>
<tr>
<th>Saturated Steam Pressure (PSIG)</th>
<th>Temperature</th>
<th>Copper Tube</th>
<th>Carbon Steel Pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEG F</td>
<td>DEG C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-200</td>
<td>-129</td>
<td>-2.85</td>
<td></td>
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<tr>
<td>-150</td>
<td>-101</td>
<td>-1.61</td>
<td></td>
</tr>
<tr>
<td>-100</td>
<td>-73</td>
<td>-1.61</td>
<td></td>
</tr>
<tr>
<td>-50</td>
<td>-46</td>
<td>-1.32</td>
<td>-0.84</td>
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<tr>
<td>0</td>
<td>-18</td>
<td>-0.75</td>
<td>-0.49</td>
</tr>
<tr>
<td>25</td>
<td>-4</td>
<td>-0.47</td>
<td>-0.32</td>
</tr>
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<td>29.7</td>
<td>32</td>
<td>0</td>
<td>-0.39</td>
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<tr>
<td>29.6</td>
<td>50</td>
<td>10</td>
<td>-0.19</td>
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<td>29.2</td>
<td>70</td>
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<td>0</td>
</tr>
<tr>
<td>28.0</td>
<td>100</td>
<td>38</td>
<td>0.38</td>
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<tr>
<td>26.0</td>
<td>125</td>
<td>52</td>
<td>0.66</td>
</tr>
<tr>
<td>22.4</td>
<td>150</td>
<td>66</td>
<td>0.94</td>
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<tr>
<td>16.3</td>
<td>175</td>
<td>80</td>
<td>1.23</td>
</tr>
<tr>
<td>6</td>
<td>200</td>
<td>93</td>
<td>1.51</td>
</tr>
<tr>
<td>0</td>
<td>212</td>
<td>100</td>
<td>1.6</td>
</tr>
</tbody>
</table>

**TABLE 2 INTERMEDIATE PIPE SPACING**

(.center to center, feet)

<table>
<thead>
<tr>
<th>Nominal Size</th>
<th>50</th>
<th>75</th>
<th>100</th>
<th>150</th>
<th>200</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model EXC-M,W,G,F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sch. 40 Carbon Steel Pipe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>¾&quot;</td>
<td>7.7</td>
<td>7.3</td>
<td>8.9</td>
<td>6.3</td>
<td>5.8</td>
</tr>
<tr>
<td>1</td>
<td>11.9</td>
<td>11.0</td>
<td>10.3</td>
<td>9.2</td>
<td>8.4</td>
</tr>
<tr>
<td>1 ¼&quot;</td>
<td>16.3</td>
<td>14.7</td>
<td>13.5</td>
<td>11.7</td>
<td>10.5</td>
</tr>
<tr>
<td>1 ½&quot;</td>
<td>19.4</td>
<td>17.2</td>
<td>15.6</td>
<td>13.4</td>
<td>11.9</td>
</tr>
<tr>
<td>2&quot;</td>
<td>26.8</td>
<td>23.2</td>
<td>20.7</td>
<td>17.5</td>
<td>15.4</td>
</tr>
<tr>
<td>2 ½&quot;</td>
<td>31.3</td>
<td>27.5</td>
<td>24.8</td>
<td>21.2</td>
<td>18.8</td>
</tr>
<tr>
<td>3&quot;</td>
<td>38.8</td>
<td>33.5</td>
<td>29.9</td>
<td>25.2</td>
<td>22.0</td>
</tr>
<tr>
<td>4&quot;</td>
<td>47.7</td>
<td>40.7</td>
<td>36.4</td>
<td>30.8</td>
<td>27.0</td>
</tr>
<tr>
<td>¾&quot; Copper Tubing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1&quot;</td>
<td>4.0</td>
<td>3.7</td>
<td>3.5</td>
<td>3.2</td>
<td>2.9</td>
</tr>
<tr>
<td>1 ¼&quot;</td>
<td>5.7</td>
<td>5.2</td>
<td>4.9</td>
<td>4.3</td>
<td>3.0</td>
</tr>
<tr>
<td>1 ½&quot;</td>
<td>7.5</td>
<td>6.8</td>
<td>6.2</td>
<td>5.4</td>
<td>4.9</td>
</tr>
<tr>
<td>2&quot;</td>
<td>10.0</td>
<td>9.0</td>
<td>8.3</td>
<td>7.2</td>
<td>6.5</td>
</tr>
<tr>
<td>2 ½&quot;</td>
<td>13.9</td>
<td>12.2</td>
<td>10.9</td>
<td>9.4</td>
<td>8.3</td>
</tr>
<tr>
<td>3&quot;</td>
<td>16.8</td>
<td>14.7</td>
<td>13.2</td>
<td>11.2</td>
<td>9.9</td>
</tr>
</tbody>
</table>

Note:
Drawings referenced from © 1985 Expansion Joint Manufacturers Association, Inc. (Fig. B-8.2)
EXTERNALLY PRESSURIZED EXPANSION JOINTS

TFEP expansion joints are designed with external pressure to the bellows along with an internal guide ring, which eliminates bellow squirm. They have an integral design to eliminate flow-induced vibrations along with an internal limit stop to eliminate over-extension and compression of the bellows. They are compact in comparison to a pipe loop, saving valuable space. Simplicity of this proven design eliminates packing, requires no maintenance, will demonstrate long-life and dependability, and is easy to insulate.

ADVANTAGES

• In-stock
• Long life dependability
• Compact to save space
• Eliminates bellow squirm
• Requires no maintenance
• Compensates for thermal growth
• Domestic and custom available

APPLICATIONS

• Sanitary Systems
• Return and Supply Lines
• Heating and Cooling Systems
• Steam and Steam Condensate
• Domestic Hot Water, Chiller Water, and Heating Water

MATERIALS

TFEP expansion joints are constructed with multi-ply T-304 stainless steel bellows and a seamless carbon steel shroud that encases the bellows. This will ensure a high level of safety and long service life. These joints have a guide ring and a limit stop. TFEP expansion joints may be provided with weld ends, grooved ends, threaded ends, or 150# and 300# flanges. Whatever fitting configuration you may require, we can custom fabricate to your exact specifications. TFEP expansion joints are the most economical way to absorb large axial motions.

SIZES

Joints are rated for 300 PSIG working pressure up to 650°F. Axial movements of 4” compression and ¾” extension (short) or 8” compression and 1 ½” extension (long).

END FITTINGS

• TFEPW for welded piping ends
• TFEPM for threaded piping ends
• TFEPF for flanged piping ends
• TFEPG for grooved piping ends

INSTALLATION

Carefully align joint and make proper allowance for temperature of pipe at time of installation. Pipe guides should be placed per EJMA standards (refer to Table 2, Page 2).
**EXTERNALY PRESSURIZED EXPANSION JOINTS**

Pipe or tube run requiring one EJ.

Pipe or tube run requiring more than one EJ.

**ENGINEERING SPECIFICATIONS**

TCH expansion joints shall be utilized on heat transfer piping, tubing, heaters, radiators, domestic hot water, chilled water, heating water, steam and steam condensate and other equipment as indicated within the specifications, drawings and equipment schedules to compensate for thermal pipeline growth. Joints shall be constructed with Series 300 stainless steel multi-ply bellows and carbon steel seamless shroud, internal liner and end fittings. All connections shall have ends to match the piping system. Joints for steel piping shall have plain weld ends, male NPT threaded ends, grooved ends or flanged ends. Joints have a minimum rating of 300 PSIG working pressure and axial movements of 4” or 8” axial compression required. Carefully align joint and make proper allowance for temperature of pipe at time of installation. Pipe guides should be placed per EJMA standards.

**PIECE GUIDES**

Table 1 Thermal Expansion Linear thermal expansion or pipe and tube per 100 feet between 70°F and tabulated temperature.

<table>
<thead>
<tr>
<th>Saturated Steam Pressure</th>
<th>Temperature DEG F</th>
<th>DEG C</th>
<th>Carbon Pressure Carbon Pipe</th>
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</thead>
<tbody>
<tr>
<td>29.7</td>
<td>32</td>
<td>0</td>
<td>0.25</td>
</tr>
<tr>
<td>29.6</td>
<td>50</td>
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<td>0.14</td>
</tr>
<tr>
<td>29.2</td>
<td>70</td>
<td>21</td>
<td>0</td>
</tr>
<tr>
<td>28.0</td>
<td>100</td>
<td>38</td>
<td>0.23</td>
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<tr>
<td>26.0</td>
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<td>0.42</td>
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<tr>
<td>24.4</td>
<td>150</td>
<td>66</td>
<td>0.61</td>
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<tr>
<td>16.3</td>
<td>175</td>
<td>80</td>
<td>0.80</td>
</tr>
<tr>
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<td>0.99</td>
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<tr>
<td>0</td>
<td>212</td>
<td>100</td>
<td>1.10</td>
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**Nominal Size**

<table>
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<tr>
<th>Pressure (PSIG)</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>300</th>
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</thead>
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<td>30</td>
<td>15</td>
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<tr>
<td>12&quot;</td>
<td>118</td>
<td>85</td>
<td>118</td>
<td>70</td>
</tr>
</tbody>
</table>

---

**TCH TFEP EJ**

**TCH pipe guide**

Typical pipe guide position for pipe or tube run requiring one compensator

TCH TFEP EJ adjacent to main anchor

Intermediate pipe guide (refer to table 2 for spacing)

Primary source: TWIN CITY HOSE, INC.

---

**Table 2 Intermediate Guide Spacing**

(Center to Center, Feet)

**Nominal Size**

<table>
<thead>
<tr>
<th>Pressure (PSIG)</th>
<th>50</th>
<th>100</th>
<th>150</th>
<th>300</th>
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</thead>
<tbody>
<tr>
<td>2&quot;</td>
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<td>30</td>
<td>15</td>
</tr>
<tr>
<td>2 1/2&quot;</td>
<td>35</td>
<td>28</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>3&quot;</td>
<td>38</td>
<td>28</td>
<td>38</td>
<td>23</td>
</tr>
<tr>
<td>4&quot;</td>
<td>52</td>
<td>38</td>
<td>52</td>
<td>28</td>
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<tr>
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<tr>
<td>12&quot;</td>
<td>118</td>
<td>85</td>
<td>118</td>
<td>70</td>
</tr>
</tbody>
</table>

---

**20615 Commerce Blvd., Rogers, MN 55374**

**1-800-670-9475**

**763-428-5111**

**sales@twincityhose.com**

**www.twincityhose.com**
FLEXIBLE PUMP CONNECTORS

Problems in the mechanical room and piping system increase maintenance costs, damage a building’s structure and create noisy systems. Our pump connectors can help resolve problems within the most complicated piping systems. Pump connectors from TCH are domestically fabricated and continuously stocked in a variety of standard sizes. We also offer custom fabricated metal hose assemblies that are built exactly to any required specifications.

ADVANTAGES
• Fabricated in the U.S.A.
• In-stock, ready to ship
• Extends service life
• Eliminates pressure stress
• Compensates for misalignment
• Elevated temperature & PSI capacity

APPLICATIONS
• Pump Systems
• Boiler Systems
• Mechanical Rooms
• Return and Discharge Lines

MATERIALS

Hose:
• Bronze
• Stainless Steel

Braid Collar:
• Bronze
• Stainless Steel

Braid:
• Bronze
• Stainless Steel

End Fittings:
• Copper
• Carbon Steel
• Stainless Steel

SIZES

• Sizes: 1/4” I.D. - 24” I.D.

We offer pump connectors with a 3/4” offset and connectors with an open overall length. Please call TCH for more information.

* Custom sizes are available

END FITTINGS

• Weld
• Sweat
• Flange
• Groove
• Male NPT

* Custom end fittings are available

BUY AMERICAN ACT COMPLIANT

MANUFACTURING IN ACCORDANCE WITH

ASME B31.3
INDUSTRIAL PRODUCTS

ADVANTAGES
- ASME B31.3 fabrication availability
- In-house oxygen cleaning is available
- 38+ year trusted reputation in the metal hose industry
- TCH metal hose assemblies are fabricated domestically and meet the Buy American Act
- All assemblies are pneumatically leak tested
- Large inventory of materials in-stock, ready to ship assemblies
- An average of 12,000 assemblies manufactured per month
- Dedicated sales and customer service team with experience in industrial markets
- Fast lead times and next day delivery is available

APPLICATIONS
- OEM
- Refineries
- Steel Mills
- Paper Mills
- Steam Lines
- Power Plants
- Waste Water Treatment
- Commercial Food Service
- Petroleum and Chemical Plants
- Food and Drink Processing Plants
- Many Other Applications

PRODUCTS
- Flexible Braided Metal Hose Connectors
- Expansion Joints (Rubber and Metal)
- Exhaust Products
- Traced Hose Assemblies
- Jacketed Hose Assemblies
- Cryogenic and LPG
- Custom and Stock Applications
- Interlock Hose
- Dry Bulk Conveying Hose
- PTFE Hose and Expansion Joints
- Clamps and End Fittings

SOLUTIONS FOR
- High Pressure
- High Temperature
- Random Motion
- Thermal Growth
- Corrosive Media
- Vibration Isolation
- Seismic Movement

20615 Commerce Blvd, Rogers, MN 55374  P 1-800-670-9475  F 763-428-5111  E sales@twincityhose.com  W www.twincityhose.com

11/2016
**INDUSTRIAL PRODUCTS**

**METAL HOSE**

**In-Stock, Ready to Ship!**

**Sizes:** ¼” I.D. - 24” I.D.

**Materials:** 304, 321, and 316 Stainless Steel, and Bronze

**End fittings:** Weld, Sweat, Flange, Groove, and Male NPT

*Custom sizes available

**BUY AMERICAN ACT COMPLIANT**

---

**RUBBER EXPANSION JOINTS**

**Sizes:** ¾” I.D. - 30” I.D.

**Common Elastomers:** Neoprene, EPDM, Nitrile and Chlorobutyl

- Temperatures 20°F to 250°F
- Spool Type

*Custom sizes and materials available

---

**METAL EXPANSION JOINTS**

**Sizes:** 2” I.D. through 36” I.D.

**Material:** 304, 321, and 316 Stainless Steel

Liners and Covers are available

**End Fittings:** Weld, Vanstone, Specialty and Custom Flanges available

*Custom sizes and materials available

---

**V AND U EXPANSION JOINTS**

**Sizes:** Standard ½” I.D. - 24” I.D.

**Material:** Stainless Steel Hose and Braid, or Bronze Hose and Braid

**End Fittings:** Weld, Sweat, Flange, Groove, and Male NPT

**Movement:** 2”, 3”, 4” standard

*Custom sizes, fittings and movements available

---

**CUSTOM FABRICATION**

TCH specializes in servicing customers who need custom fabricated products for their complicated projects. Fabricated support skids, manifolds, flexible metal hose and expansion joints are just a sampling of the types of products that we can build.
LNG AND CNG
LIQUID AND COMPRESSED NATURAL GAS HOSE

We work closely with the liquid and compressed natural gas industry to fabricate flexible transfer hose assemblies for all types of liquids and gases. Flexible metal hose and PTFE assemblies are available in a wide range of sizes and materials.

ADVANTAGES

• Custom fabrication
• Variety of end fittings
• In-house oxygen cleaning
• Full or partial hose guards
• Stainless steel construction
  = longer service life
• High PSI and temperature

APPLICATIONS

• Vehicles
• Fill Stations
• Storage Cylinders
• Re-Gasification Systems
• Ship to Ship, and Ship to Shore Transfer

MATERIALS

LNG and CNG assemblies are stainless steel hose and braid with stainless steel or brass fittings. Spring guard, armor guard and spiral guard are available upon request. TCH offers high performance flexible hose and braid for the most demanding projects.

Our experienced sales team will help you choose the right assembly for your application.
LNG AND CNG

STAINLESS STEEL HOSE

Stainless steel hose and braid, and end fittings to fit any application.

**Sizes Available**
- ¼" I.D. - 10" I.D.
- Open Overall Length

**Hose Types**
- 304, 321, 316
- Single and Double Braided

**End Fittings**
- Stainless Steel Flange
- Stainless Steel Male Pipe
- Stainless Steel or Brass SAE
- Stainless Steel or Brass Male and Female JIC
- Other Types Available

PTFE HOSE

PTFE hose with stainless steel braid and choice of end fittings. Recommended for frequent cylinder replacement situations.

**Sizes Available**
- Open Overall Length
- ¼" I.D. - 1" I.D. Smooth Bore PTFE Hose
- 1" I.D. - 4" I.D. Corrugated PTFE Hose
- 4" I.D. and Larger PTFE Lined Metal Hose

**Hose Types**
- Smooth bore PTFE hose with stainless steel braid
- Corrugated and Ultra High Pressure Hose is available

**End Fittings : Brass or Stainless Steel**
- Male NPT
- Male and Female JIC

CLEANING

Cleaned, capped and bagged
Oxygen cleaning services are performed in-house in our cleanroom. Contact us with any and all types of cleaning requirements or certifications.

LIQUID, PROPANE GAS

Liquid, propane gas assemblies
We offers a variety of double braided stainless steel LPG assemblies with optional heat shrink cover. Contact TCH for more information.
LPG HOSE

LPG/NH3 assemblies are constructed with stainless steel corrugated hose and two layers of stainless steel braid. An optional heat shrink cover is available. Our standard assembly will have an extra heavy, welded, male NPT fitting and the other end can be one of the following:

- 3000# forged steel female NPT union
- Extra heavy welded Sch. 80 male NPT fitting

Each assembly is tested and tagged as follows:

- LPG & NH3
- 350 PSI, 1750 Burst
- Date of MFG

* Manufacturer does not recommend metal braided hose assembly on a hose reel application

ADVANTAGES

- End fitting customization
- Heat shrink cover available

APPLICATIONS

- CNG/LNG
- LPG Fill Tank
- Air Separation
- Manifold Lines
- Fueling and Fuel Systems
- Vapor Recovery Systems
- Nitrogen and Oxygen Liquefiers

MATERIALS

Metal Hose:
- 321 stainless steel hose and double braid

Braid Collar:
- 304 stainless steel

Fittings:
- 3000# carbon steel female union
- Sch. 80 carbon steel male NPT

Standard Sizes:

- ¼” I.D. - 3” I.D.
- 12", 18", 24” OAL

* Custom sizes and end fittings are available
METAL EXPANSION JOINTS

We offer metal expansion joints constructed of single or multi-ply stainless steel. These expansion joints are available in single, universal and pressure balanced with or without liners, tie rods or covers. Metal expansion joints are a solid alternative when limited space is a consideration and we can custom design to your exact system specifications.

ADVANTAGES

- Absorbs movement
- Vibration isolation
- Shock reducing
- High temperature
- Corrosive material

APPLICATIONS

- Steel Mills
- Refineries
- Wind Power
- Power Plants
- Gas Turbines
- Cement Plants
- Boiler Systems
- District Heating
- Water Treatment
- Power Generation
- Pulp and Paper Plants
- Diesel and Gas Engines
- Heat and Ventilation Systems
- Chemical and Petrochemical Plants

MATERIALS

- Stainless steel materials include 304, 321, 316
- Exotics

END FITTINGS

- Weld
- Vanstone (Floating Flange)
- Specialty & Custom Flanges

Options:

- Liners
- Tie Limit Rods
- Covers/Shrouds

METAL EXPANSION JOINTS

- Ceramic Lined Metal Expansion Joint
- Epoxy Coated Metal Expansion Joint
- Lined Metal Expansion Joint
METAL HEAT PUMP HOSE

We domestically fabricate Buy American Act compliant metal heat pump hose assemblies. These assemblies are specifically designed to endure high temperature, pressure and corrosive media.

**ADVANTAGES**
- High Temperature
- Corrosive Media
- Vibration Isolation
- Pipe Misalignment

**MAX TEMP WITH**

<table>
<thead>
<tr>
<th></th>
<th>Stainless Steel Ends</th>
<th>Carbon Steel Ends</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1250° F</strong></td>
<td></td>
<td><strong>800° F</strong></td>
</tr>
</tbody>
</table>

**APPLICATIONS**
- Geothermal
- Fan Coil Units
- Radiant Flooring
- Water Fountains
- Flash Hot Water Heaters
- Water Source Heat Pumps
- Water Coolers and Heaters

**Stock Lengths:** 12” - 48” in 6” increments

- Custom lengths available

**Carbon Steel End Fittings:**
- Male NPT Thread
- Hex Male NPT Thread
- Female Union
- Female JIC
- JIC X NPT Adapter

Custom fabrication for specific system requirements is available upon request. These assemblies are available in a wide range of sizes and materials.

<table>
<thead>
<tr>
<th>Size</th>
<th>WRK. PSIG</th>
<th>@ TEMP.</th>
<th>WRK. PSIG</th>
<th>@ TEMP.</th>
</tr>
</thead>
<tbody>
<tr>
<td>½”</td>
<td>796</td>
<td>70° F</td>
<td>557</td>
<td>700° F</td>
</tr>
<tr>
<td>¾”</td>
<td>597</td>
<td>70° F</td>
<td>417</td>
<td>700° F</td>
</tr>
<tr>
<td>1”</td>
<td>455</td>
<td>70° F</td>
<td>318</td>
<td>700° F</td>
</tr>
<tr>
<td>1 ¼”</td>
<td>441</td>
<td>70° F</td>
<td>308</td>
<td>700° F</td>
</tr>
<tr>
<td>1 ½”</td>
<td>370</td>
<td>70° F</td>
<td>259</td>
<td>700° F</td>
</tr>
<tr>
<td>2”</td>
<td>370</td>
<td>70° F</td>
<td>259</td>
<td>700° F</td>
</tr>
</tbody>
</table>

Metal heat pump hoses are recommended for continuous service with temperatures above 140°F.

All metal heat pump hoses are domestically fabricated, welded and leak tested in-house.

Please contact TCH for current pricing and availability.
OEM / SPECIALTY APPLICATIONS

We specialize in OEM assemblies and custom OEM solutions.

**APPLICATIONS**
- HVAC
- Marine
- Railroad
- Radiators
- Aerospace
- Automotive
- Oil and Gas
- Refrigeration
- Diesel Engines
- Skid Packages
- Hydraulic Lines
- Grain Elevators
- Steam Air Lines
- Road Machinery
- Fire Extinguishers
- Molding Machines
- Laundry Equipment

**ADVANTAGES**
- Expedite available
- Next day air delivery available
- In-stock, ready to ship standard assemblies
- We offer fast lead times and competitive pricing

- Buy American Act compliant
- Complete domestic hose assemblies are available

**METAL BRAIDED HOSE ASSEMBLIES**
- Reduces risk of system damage
- Absorbs vibration and harmonics
- Compensates for pipe misalignment
- Large and custom I.D. and OAL available
- Special materials and end fittings available
- Greater service life, low maintenance costs
- Ideal for high temperature and high pressure

*Custom end fitting options are available

**PRODUCTS**
- Flexible Braided Metal Hose
- Expansion Joints (Rubber, Metal and PTFE)
- Metal Exhaust Bellows
- Cryogenic and LPG Hose
- Custom and Stock Applications
- PTFE Lined Metal Hose
- PTFE Hoses
- Clamps and End Fittings

**Available Stock Material:**
- Copper, Stainless Steel and Carbon Steel Components and End Fittings
- Stainless Steel and Bronze Hose and Braid (304, 321, 316)

**Stock Assemblies:**
- Rubber Expansion Joints
- Pump Connectors ¼” I.D. - 24” I.D.

*Custom I.D. and OAL sizes available
PIPE GUIDES AND SLIDES

Pipe guides are needed to facilitate the thermal expansion of a pipeline so that the movement is properly directed to the expansion joint. Guides are designed to prevent buckling or squirming of the pipe. Proper guiding and anchoring are essential to the functional operation of expansion joints.

ADVANTAGES

- Fabricated in the U.S.A.
- Axial movement 4”, 8”, and 12”
- Prevents buckling and squirming
- Facilitates thermal expansion of pipeline
- Pre-insulated

APPLICATIONS

- Refining Systems
- Oil and Gas Systems
- Process Power Systems
- Commercial HVAC Systems
- LNG and Cryogenic Systems
- Water and Waste Water Systems
- HVAC Commercial System

Pipe Guide Spacing:

Pipe guides are always recommended in applications involving pipe movement.

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Expansion Joint to First Guide</th>
<th>First to Second Guide</th>
<th>Maximum Distance Between Intermediate Guide (ft.) For Pressures (PSIG) Shown Below</th>
</tr>
</thead>
<tbody>
<tr>
<td>3”</td>
<td>1’</td>
<td>3’6”</td>
<td>38’ 28’ 23’ 19’ 16’</td>
</tr>
<tr>
<td>4”</td>
<td>1’4”</td>
<td>4’8”</td>
<td>52’ 38’ 31’ 27’ 24’</td>
</tr>
<tr>
<td>5”</td>
<td>1’8”</td>
<td>5’10”</td>
<td>63’ 45’ 38’ 31’ 29’</td>
</tr>
<tr>
<td>6”</td>
<td>2’</td>
<td>7’</td>
<td>68’ 48’ 40’ 34’ 31’</td>
</tr>
<tr>
<td>8”</td>
<td>2’8”</td>
<td>9’4”</td>
<td>87’ 62’ 45’ 43’ 40’</td>
</tr>
<tr>
<td>10”</td>
<td>3’4”</td>
<td>11’8”</td>
<td>107’ 75’ 60’ 53’ 49’</td>
</tr>
<tr>
<td>12”</td>
<td>4’</td>
<td>14’</td>
<td>118’ 85’ 70’ 60’ 53’</td>
</tr>
</tbody>
</table>

SPIDER PIPE GUIDES

- Available in ½” I.D. - 24” I.D.
- Standard axial travel of 4”, 6”, and 8”
- Spider-housing design ensures positive pipe alignment, protecting both the pipe and the expansion device
- Bolted, split-housing construction allows for easy assembly
- For steel and copper pipe

PRE-INSULATED SLIDES

- Bolt or weld bases
- 4” or 10” standard axial travel
- Available in ½” I.D. - 24” I.D.
- Maintenance free bearing surface, minimizing stress on pipe and support structures

PTFE PIPE SLIDES

- Insulation available
- Fabricated in the U.S.A.
- Standard axial travel of 4” or 10”
- Offers resistance to chemical corrosion, solvents, abrasion and impact

Base options:
Lateral, axial weld, axial bolt
PRESS READY

Bring your connections up to speed with Press Ready flexible connectors. Press Ready improves and speeds up the connection of a flex connector within a copper piping system, delivering significant savings.

Press Ready flexible connectors neutralize mechanical equipment vibration by isolating it at the connection. They also compensate for misalignment, motion issues and protect the investment made to major equipment by minimizing stress and early fatigue problems.

ADVANTAGES

• Greater service life
• Fabricated in the U.S.A.
• Eliminate pressure stress
• Compensate for misalignment
• Increase temperature capacity
• Easy installation with press fittings
• Clean, cap and bag service available
• Reduce pump vibrations and harmonics

Press Ready Compatible With:

• Press Fit Couplings
• Solder Ring Couplings
• Push Fit Couplings

Custom:

TCH can meet your exact specifications with our complete in-house fabrication shop. You get the hose type, length and end fittings you need to solve your specific need. We can clean, cap and bag assemblies upon request.

MATERIALS

Hose: 
- Bronze
- Copper

Braid Collar: 
- Copper

Braid: 
- Bronze
- Copper

End Fittings:
- Male Threaded
- Female Threaded

SIZES

<table>
<thead>
<tr>
<th>SIZE</th>
<th>MAX WORKING PSI @ 70°F</th>
<th>LATERAL OFFSET</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2” X 6 ½”</td>
<td>566</td>
<td>1/16”</td>
</tr>
<tr>
<td>3/4” X 7”</td>
<td>468</td>
<td>1/16”</td>
</tr>
<tr>
<td>1” X 8”</td>
<td>334</td>
<td>1/16”</td>
</tr>
<tr>
<td>1 ¼” X 8 ½”</td>
<td>306</td>
<td>1/16”</td>
</tr>
<tr>
<td>1 ½” X 9”</td>
<td>297</td>
<td>1/16”</td>
</tr>
<tr>
<td>2” X 10 ½”</td>
<td>230</td>
<td>1/16”</td>
</tr>
<tr>
<td>2 ½” X 12”</td>
<td>194</td>
<td>1/16”</td>
</tr>
<tr>
<td>3” X 12”</td>
<td>166</td>
<td>1/16”</td>
</tr>
<tr>
<td>4” X 12”</td>
<td>145</td>
<td>1/16”</td>
</tr>
</tbody>
</table>

END FITTINGS

• Couplings

Hose:
- Bronze

Braid:
- Bronze

Braid Collar:
- Copper

End Fittings:
- Copper
PTFE EXPANSION JOINTS

Constructed of molded PTFE, these joints provide exceptional corrosion resistance and accommodate for varying degrees of misalignment, axial travel and angular deflection within the system.

ADVANTAGES
• Chemical resistant characteristics of the PTFE bellows
• Easy installation due to the short face-to-face dimension
• Integral steel limit control bolts
• Convoluted design reduces vibration
• Compensates for axial and lateral motion
• Corrosion resistant

APPLICATIONS
• Piping Systems
• HVAC Installations
• Corrosive Applications
• Chemical and Petrochemical Industries

SIZES

Available in 2, 3, and 5 convolutions

T2
Available in 1” I.D. - 12” I.D.
Axial movement ¼” - ½”
Lateral movement ¼” - ⅛”

T3
Available in 1” I.D. - 12” I.D.
Axial movement ⅛” - ¼”
Lateral movement ⅛” - ¼”

T5
Available in 1” I.D. - 8” I.D.
Axial movement ½” - 1 ¼”
Lateral movement ½” - ⅛”
PTFE HOSE

TCR-115 HOSE ASSEMBLIES

TCR-122 CONDUCTIVE HOSE ASSEMBLIES

These general purpose PTFE hoses are the most widely utilized hoses throughout the industry. They are presently found in operations as diverse as chemical transfer, steel processing, paint spraying, fuel, and lubricant handling, hydraulic systems, plastic molding machines, food processing, marine, and transportation industries.

Sizes 1/8” I.D. through 5/8” I.D. are rated for full vacuum. Larger hose sizes can be reinforced with an internal support spring for full vacuum service. For continuous pneumatic service at the highest pressure ratings, we recommend the use of high pressure hoses for enhanced performance.

CONSTRUCTION

TCR-115 has a smooth inner-core of extruded white PTFE resin with type 304 stainless steel wire braid reinforcement.

TCR-122 has a precisely controlled amount of carbon black added to the inner 15% of the PTFE inner-core. This homogeneous material provides a continuous conductive path to the metal and fittings, to bleed off static electricity.

Temperature Range:
- -65°F to 450°F (-54°F to 232°C) for continuous service.
- -100°F to 500°F (-73°C to 260°C) for intermittent service only.

Standards:
Meets requirements for SAE 100R5 and is accepted by the U.S. Coast Guard.

Specifications:

<table>
<thead>
<tr>
<th>HOSE PART NUMBER</th>
<th>NOMINAL SIZE IN.</th>
<th>NOMINAL ID IN.</th>
<th>NOMINAL OD IN.</th>
<th>OPER. PSI AT ROOM TEMP.</th>
<th>OPER. PSI AT 450°F</th>
<th>MIN. BURST PSI AT ROOM TEMP.</th>
<th>TYP. MAX CONTINUOUS LENGTH FT.</th>
<th>MIN. BEND RADIUS IN.</th>
<th>HOSE WEIGHT LB./FT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCR-115-3</td>
<td>3/16</td>
<td>.125</td>
<td>.234</td>
<td>3,000</td>
<td>3,000</td>
<td>15,000</td>
<td>200</td>
<td>2</td>
<td>.050</td>
</tr>
<tr>
<td>TCR-115 / 122-4</td>
<td>1/4</td>
<td>.187</td>
<td>.312</td>
<td>3,000</td>
<td>3,000</td>
<td>15,000</td>
<td>200</td>
<td>2</td>
<td>.070</td>
</tr>
<tr>
<td>TCR-115 / 122-5</td>
<td>5/16</td>
<td>.250</td>
<td>.375</td>
<td>3,000</td>
<td>3,000</td>
<td>14,000</td>
<td>150</td>
<td>3</td>
<td>.099</td>
</tr>
<tr>
<td>TCR-115 / 122-6</td>
<td>3/8</td>
<td>.312</td>
<td>.445</td>
<td>2,500</td>
<td>2,500</td>
<td>12,000</td>
<td>150</td>
<td>4</td>
<td>.110</td>
</tr>
<tr>
<td>TCR-115-6T *</td>
<td>3/8</td>
<td>.375</td>
<td>.503</td>
<td>2,250</td>
<td>2,250</td>
<td>10,000</td>
<td>150</td>
<td>4.5</td>
<td>.124</td>
</tr>
<tr>
<td>TCR-115 / 122-8</td>
<td>1/2</td>
<td>.406</td>
<td>.549</td>
<td>2,000</td>
<td>2,000</td>
<td>8,500</td>
<td>100</td>
<td>5.2</td>
<td>.123</td>
</tr>
<tr>
<td>TCR-115 / 122-10</td>
<td>5/8</td>
<td>.500</td>
<td>.648</td>
<td>1,500</td>
<td>1,500</td>
<td>6,000</td>
<td>75</td>
<td>6.5</td>
<td>.154</td>
</tr>
<tr>
<td>TCR-115 / 122-12</td>
<td>3/4</td>
<td>.625</td>
<td>.778</td>
<td>1,200</td>
<td>1,200</td>
<td>4,500</td>
<td>75</td>
<td>8.2</td>
<td>.198</td>
</tr>
<tr>
<td>TCR-115-12T *</td>
<td>3/4</td>
<td>.755</td>
<td>.886</td>
<td>1,000</td>
<td>1,000</td>
<td>3,800</td>
<td>60</td>
<td>9</td>
<td>.273</td>
</tr>
<tr>
<td>TCR-115 / 122-16</td>
<td>1</td>
<td>.875</td>
<td>1.030</td>
<td>1,000</td>
<td>1,000</td>
<td>3,000</td>
<td>60</td>
<td>10</td>
<td>.305</td>
</tr>
<tr>
<td>TCR-115-16T *</td>
<td>1</td>
<td>1.000</td>
<td>1.135</td>
<td>900</td>
<td>900</td>
<td>2,800</td>
<td>60</td>
<td>9</td>
<td>.409</td>
</tr>
<tr>
<td>TCR-119-16Z 1</td>
<td>1</td>
<td>.875</td>
<td>1.065</td>
<td>1,250</td>
<td>1,250</td>
<td>2,000</td>
<td>60</td>
<td>16</td>
<td>.540</td>
</tr>
<tr>
<td>TCR-122-20</td>
<td>1¼&quot;</td>
<td>1.125</td>
<td>1.315</td>
<td>800</td>
<td>800</td>
<td>3,200</td>
<td>40</td>
<td>16</td>
<td>.580</td>
</tr>
</tbody>
</table>

* True Bore. NOTE: Standard fittings are not available for true bore hoses.

Double braid.
PTFE HOSE
PERMANENTLY ATTACHED FITTINGS
FOR TCR-115 AND TCR-122 HOSE

The PTFE inner-core and over-braid are firmly locked between the fitting collar and insert for a permanent, leak-proof assembly. The positive braid lock assures that strain is absorbed by the braid, not the PTFE hose. TCH has the capability to manufacture custom end fitting terminations. For special requirements, consult the factory.

**MATERIALS**

Fittings are available in carbon steel, brass, a combination of carbon steel and brass, or stainless steel, according to the specification table for each fitting. The wet surfaces of stainless steel fittings are type 303; other parts are type 304.

**END FITTINGS**

### STAINLESS STEEL

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>SIZE IN.</th>
<th>THREAD</th>
<th>LENGTH A IN.</th>
<th>LENGTH B IN.</th>
<th>NOMINAL ID IN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC 10003</td>
<td>3/16&quot;</td>
<td>1/8 - 27</td>
<td>1.155</td>
<td>0.767</td>
<td>.095</td>
</tr>
<tr>
<td>TC 10004</td>
<td>1/4&quot;</td>
<td>1/8 - 27</td>
<td>1.265</td>
<td>0.767</td>
<td>.156</td>
</tr>
<tr>
<td>TC 10005</td>
<td>1/4&quot;</td>
<td>1/4 - 18</td>
<td>1.472</td>
<td>0.984</td>
<td>.156</td>
</tr>
<tr>
<td>TC 10006</td>
<td>5/16&quot;</td>
<td>1/4 - 18</td>
<td>1.472</td>
<td>0.984</td>
<td>.207</td>
</tr>
<tr>
<td>TC 10008</td>
<td>3/8&quot;</td>
<td>1/4 - 18</td>
<td>1.602</td>
<td>0.984</td>
<td>.277</td>
</tr>
<tr>
<td>TC 10010</td>
<td>3/8&quot;</td>
<td>3/8 - 18</td>
<td>1.632</td>
<td>1.014</td>
<td>.277</td>
</tr>
<tr>
<td>TC 10012</td>
<td>1/2&quot;</td>
<td>3/8 - 18</td>
<td>1.684</td>
<td>1.014</td>
<td>.358</td>
</tr>
<tr>
<td>TC 10008</td>
<td>1/2&quot;</td>
<td>1/2 - 14</td>
<td>1.932</td>
<td>1.262</td>
<td>.358</td>
</tr>
<tr>
<td>TC 10010</td>
<td>5/8&quot;</td>
<td>1/2 - 14</td>
<td>2.049</td>
<td>1.282</td>
<td>.469</td>
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<tr>
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<td>3/4&quot;</td>
<td>3/4 - 14</td>
<td>2.214</td>
<td>1.374</td>
<td>.594</td>
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<tr>
<td>TC 10008</td>
<td>1&quot;</td>
<td>1 - 11/16&quot;</td>
<td>2.562</td>
<td>1.583</td>
<td>.812</td>
</tr>
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</table>

### BRASS

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>SIZE IN.</th>
<th>THREAD</th>
<th>LENGTH A IN.</th>
<th>LENGTH B IN.</th>
<th>NOMINAL ID IN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC 10003</td>
<td>3/16&quot;</td>
<td>3/8 - 24</td>
<td>.850</td>
<td>.467</td>
<td>.095</td>
</tr>
<tr>
<td>TC 10004</td>
<td>1/4&quot;</td>
<td>7/16 - 20</td>
<td>.950</td>
<td>.467</td>
<td>.156</td>
</tr>
<tr>
<td>TC 10005</td>
<td>5/16&quot;</td>
<td>1/2 - 20</td>
<td>1.010</td>
<td>.526</td>
<td>.207</td>
</tr>
<tr>
<td>TC 10006</td>
<td>3/8&quot;</td>
<td>9/16 - 18</td>
<td>1.185</td>
<td>.572</td>
<td>.277</td>
</tr>
<tr>
<td>TC 10008</td>
<td>3/8&quot;</td>
<td>5/8 - 18</td>
<td>1.185</td>
<td>.572</td>
<td>.277</td>
</tr>
<tr>
<td>TC 10010</td>
<td>5/8&quot;</td>
<td>7/8 - 14</td>
<td>1.470</td>
<td>.708</td>
<td>.469</td>
</tr>
<tr>
<td>TC 10012</td>
<td>3/4&quot;</td>
<td>11/16&quot; - 12</td>
<td>1.560</td>
<td>.725</td>
<td>.594</td>
</tr>
<tr>
<td>TC 10016</td>
<td>1&quot;</td>
<td>15/16 - 12</td>
<td>1.750</td>
<td>.776</td>
<td>.812</td>
</tr>
</tbody>
</table>

### SAE Thread Only

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>SIZE IN.</th>
<th>THREAD</th>
<th>LENGTH A IN.</th>
<th>LENGTH B IN.</th>
<th>NOMINAL ID IN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC 10040</td>
<td>5/16&quot;</td>
<td>1/4 - 18</td>
<td>1.421</td>
<td>1.932</td>
<td>.207</td>
</tr>
</tbody>
</table>

* All sizes except -6 and -12 are interchangeable

---

**Male Pipe NPT**

**Female Swivel JIC (37° SEAT) SAE (45°)**

* SAE Thread Only
CONVOLUTED PTFE HOSE
TCR-272 HOSE ASSEMBLIES
TCR-276 CONDUCTIVE ASSEMBLIES

TCR-272 transfer hose is the most broadly applied convoluted PTFE hose; a general purpose workhorse found in hundreds of chemical transfer and industrial applications. Its present uses typically include water purification systems and food processing equipment.

TCR-276 conductive transfer hose has the same general purpose usefulness as TCR-272, with special suitability where higher flow rates and the possibility of static charge accumulation are involved. Its conductive inner-core is an important provision in such applications as fuel handling. It has unusually high resistance to thermal cycling; therefore it is used extensively in tire presses, laundry presses, and other types of steam service, where on/off operating cycles cause wide temperature fluctuations inside the hose.

CONSTRUCTION

The inner-core of convoluted PTFE is externally reinforced with PTFE impregnated fiberglass and type 304 stainless steel wire braid. TCR-276 hose has precisely controlled amounts of carbon black added to the inner 15% of the PTFE inner-core. This homogeneous material provides a continuous conductive path to the metal end fittings.

Temperature Range:
-65°F to 400°F (-54°C to 204°C)

Standards:
Accepted by U.S. Coast Guard.

TCR 272 and TCR-276 Hose Specifications:

<table>
<thead>
<tr>
<th>HOSE PART NUMBER</th>
<th>NOMINAL SIZE IN.</th>
<th>NOMINAL ID IN.</th>
<th>NOMINAL OD IN.</th>
<th>OPER. PSI AT ROOM TEMP.</th>
<th>MIN. BURST PSI AT ROOM TEMP.</th>
<th>HIGH TEMP. MIN. BUST PSI</th>
<th>TYP. MAX CONTINUOUS LENGTH FT.</th>
<th>MIN. BEND RADIUS IN.</th>
<th>HOSE WEIGHT LB. / FT.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCR272 / TCR276-8</td>
<td>1/2&quot;</td>
<td>.512</td>
<td>.785</td>
<td>1,000</td>
<td>4,000</td>
<td>2,800</td>
<td>75</td>
<td>1.00</td>
<td>.16</td>
</tr>
<tr>
<td>TCR272 / TCR276-12</td>
<td>3/4&quot;</td>
<td>.750</td>
<td>1.090</td>
<td>1,000</td>
<td>4,000</td>
<td>2,500</td>
<td>50</td>
<td>2.00</td>
<td>.27</td>
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<tr>
<td>TCR272 / TCR276-16</td>
<td>1&quot;</td>
<td>.998</td>
<td>1.300</td>
<td>1,000</td>
<td>4,000</td>
<td>2,500</td>
<td>50</td>
<td>3.00</td>
<td>.36</td>
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<tr>
<td>TCR272 / TCR276-20</td>
<td>1 1/4&quot;</td>
<td>1.239</td>
<td>1.560</td>
<td>1,000</td>
<td>4,000</td>
<td>2,500</td>
<td>50</td>
<td>6.25</td>
<td>.48</td>
</tr>
<tr>
<td>TCR272 / TCR276-24</td>
<td>1 1/2&quot;</td>
<td>1.500</td>
<td>1.792</td>
<td>750</td>
<td>3,000</td>
<td>2,100</td>
<td>50</td>
<td>7.50</td>
<td>.61</td>
</tr>
<tr>
<td>TCR272 / TCR276-32</td>
<td>2&quot;</td>
<td>1.982</td>
<td>2.333</td>
<td>500</td>
<td>2,000</td>
<td>1,700</td>
<td>50</td>
<td>10.00</td>
<td>.97</td>
</tr>
</tbody>
</table>

* Maximum operating pressures shown apply to all temperatures up to 400°F
PTFE HOSE
FITTINGS FOR ALL CONVOLUTED PTFE HOSE

This expanded selection of fittings broadens the areas of application and the convenience of using convoluted hose. With these fittings you can satisfy most installation needs. Stainless steel collars are available for use where stringent FDA requirements call for all stainless construction. Convoluted hose fittings feature the exclusive TCH progressive swaging method of attachment. The inner-core and over-braid are firmly locked between the fitting collar and insert for a permanent, leak-proof assembly. The positive braid lock assures that strain is absorbed by the braid, not the hose inner-core.

Male pipe and female inserts are available in carbon steel and type 316 stainless steel. Collars for the preceding fittings are either carbon steel or type 304 stainless steel. Flange retaining inserts are available in type 316 stainless steel.

Note: Carbon steel collars may be specified with stainless steel inserts, where only wetted surfaces require corrosion resistance.

Encapsulated PTFE fittings are available, contact TCH for more information.

<table>
<thead>
<tr>
<th>STAINLESS STEEL PART NUMBER</th>
<th>BRASS PART NUMBER</th>
<th>SIZE IN.</th>
<th>THREAD</th>
<th>LENGTH A IN.</th>
<th>LENGTH B IN.</th>
<th>NOMINAL ID IN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC 103008</td>
<td>TC 123008</td>
<td>1/2&quot;</td>
<td>1/4</td>
<td>2.590</td>
<td>1.470</td>
<td>.378</td>
</tr>
<tr>
<td>TC 103012</td>
<td>TC 123012</td>
<td>3/4&quot;</td>
<td>3/4</td>
<td>2.760</td>
<td>1.640</td>
<td>.630</td>
</tr>
<tr>
<td>TC 103016</td>
<td>TC 123016</td>
<td>1&quot;</td>
<td>1 - 1 1/2</td>
<td>2.948</td>
<td>1.828</td>
<td>.849</td>
</tr>
<tr>
<td>TC 103020</td>
<td>TC 123020</td>
<td>1 1/4&quot;</td>
<td>1 1/4 - 1 1/2</td>
<td>3.570</td>
<td>2.055</td>
<td>1.069</td>
</tr>
<tr>
<td>TC 103024</td>
<td>TC 123024</td>
<td>1 1/2&quot;</td>
<td>1 1/2 - 1 1/2</td>
<td>3.620</td>
<td>2.125</td>
<td>1.306</td>
</tr>
<tr>
<td>TC 103032</td>
<td>TC 123032</td>
<td>2&quot;</td>
<td>2 - 11 1/2</td>
<td>3.840</td>
<td>2.345</td>
<td>1.756</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STAINLESS STEEL PART NUMBER</th>
<th>BRASS PART NUMBER</th>
<th>SIZE IN.</th>
<th>THREAD</th>
<th>LENGTH A IN.</th>
<th>LENGTH B IN.</th>
<th>NOMINAL ID IN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC 103208</td>
<td>TC 123208</td>
<td>1/2&quot;</td>
<td>3/4 - 16</td>
<td>2.168</td>
<td>1.073</td>
<td>.378</td>
</tr>
<tr>
<td>TC 103212</td>
<td>TC 123212</td>
<td>3/4&quot;</td>
<td>7/8 - 14</td>
<td>2.425</td>
<td>1.312</td>
<td>.630</td>
</tr>
<tr>
<td>TC 103216</td>
<td>TC 123216</td>
<td>1&quot;</td>
<td>1 5/16 - 12</td>
<td>2.371</td>
<td>1.272</td>
<td>.849</td>
</tr>
<tr>
<td>TC 103220</td>
<td>TC 123220</td>
<td>1 1/4&quot;</td>
<td>1 5/8 - 12</td>
<td>2.970</td>
<td>1.480</td>
<td>1.070</td>
</tr>
<tr>
<td>TC 103224</td>
<td>TC 123224</td>
<td>1 1/2&quot;</td>
<td>1 7/8 - 12</td>
<td>2.994</td>
<td>1.524</td>
<td>1.305</td>
</tr>
<tr>
<td>TC 103232</td>
<td>TC 123232</td>
<td>2&quot;</td>
<td>1 1/2 - 12</td>
<td>3.168</td>
<td>1.698</td>
<td>1.755</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>STAINLESS STEEL PART NUMBER</th>
<th>SIZE IN.</th>
<th>LENGTH A IN.</th>
<th>LENGTH B IN.</th>
<th>NOMINAL ID IN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>TC 103512</td>
<td>3/4&quot;</td>
<td>2.428</td>
<td>1.323</td>
<td>.630</td>
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<tr>
<td>TC 103516</td>
<td>1&quot;</td>
<td>2.894</td>
<td>1.791</td>
<td>.814</td>
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<tr>
<td>TC 102524</td>
<td>1 1/2&quot;</td>
<td>3.595</td>
<td>2.105</td>
<td>1.274</td>
</tr>
<tr>
<td>TC 103532</td>
<td>2&quot;</td>
<td>3.730</td>
<td>2.249</td>
<td>1.784</td>
</tr>
</tbody>
</table>
PTFE HOSE

TCR-58 SERIES

Spiral wrapped stainless steel braided PTFE hose is made up of a carbon black PTFE inner-core and has many layers of spiral wrap between two layers of braid, which makes this hose the premier in heavy-duty ultra high pressure PTFE hose.

All assemblies are supplied with stainless steel 37° JIC swivels and 100% tested to the test pressures shown below

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>NOMINAL SIZE IN.</th>
<th>ACTUAL I.D.</th>
<th>ACTUAL O.D.</th>
<th>WORKING PRESSURE</th>
<th>TEST PRESSURE</th>
<th>ROOM TEMP. BURST</th>
<th>HIGH TEMP. BURST</th>
<th>BEND RADIUS</th>
<th>WEIGHT PER FOOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCR-58904</td>
<td>1/4&quot;</td>
<td>.229</td>
<td>.495</td>
<td>6,000</td>
<td>9,000</td>
<td>25,500</td>
<td>12,000</td>
<td>3.00</td>
<td>.24</td>
</tr>
<tr>
<td>TCR-58906</td>
<td>3/8&quot;</td>
<td>.300</td>
<td>.617</td>
<td>6,000</td>
<td>9,000</td>
<td>25,500</td>
<td>12,000</td>
<td>5.00</td>
<td>.40</td>
</tr>
<tr>
<td>TCR-58908</td>
<td>1/2&quot;</td>
<td>.395</td>
<td>.738</td>
<td>6,000</td>
<td>9,000</td>
<td>25,500</td>
<td>12,000</td>
<td>5.75</td>
<td>.49</td>
</tr>
<tr>
<td>TCR-58910</td>
<td>5/8&quot;</td>
<td>.525</td>
<td>.885</td>
<td>4,000</td>
<td>6,000</td>
<td>16,500</td>
<td>12,500</td>
<td>6.25</td>
<td>.67</td>
</tr>
<tr>
<td>TCR-58912</td>
<td>3/4&quot;</td>
<td>.650</td>
<td>1.070</td>
<td>4,000</td>
<td>6,000</td>
<td>16,500</td>
<td>12,500</td>
<td>7.75</td>
<td>.93</td>
</tr>
<tr>
<td>TCR-58916</td>
<td>1&quot;</td>
<td>1.101</td>
<td>1.390</td>
<td>4,000</td>
<td>6,000</td>
<td>15,000</td>
<td>9,000</td>
<td>9.625</td>
<td>1.45</td>
</tr>
</tbody>
</table>

TCR-58 series comes standard with type 316 stainless steel 37° JIC swivels. When ordering place front of the part number.

<table>
<thead>
<tr>
<th>HOSE I.D.</th>
<th>DASH SIZE</th>
<th>THREAD SIZE IN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot;</td>
<td>- 4</td>
<td>7/16 - 20</td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>- 6</td>
<td>9/16 - 18</td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>- 8</td>
<td>3/4 - 16</td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>- 10</td>
<td>7/8 - 14</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>- 12</td>
<td>1-1/16 - 12</td>
</tr>
<tr>
<td>1&quot;</td>
<td>- 16</td>
<td>1-5/16 - 12</td>
</tr>
</tbody>
</table>

* A wide variety of adapters are available
PTFE HOSE

TCR-1000 SERIES

Dense-Pac stainless steel braided PTFE hose is made from carbon black PTFE inner-core and a multitude of stainless steel wires braided together, to form a single braided ultra high pressure PTFE hose.

DENSE-PAC REINFORCEMENT

PTFE INNER-CORE

TEMPERATURE RANGE
-65°F to +400°F
-54°C to +204°C

All assemblies are supplied with 37° JIC swivels and 100% tested to the test pressures shown below.

<table>
<thead>
<tr>
<th>PART NUMBER</th>
<th>NOMINAL SIZE IN.</th>
<th>ACTUAL I.D.</th>
<th>ACTUAL O.D.</th>
<th>WORKING PRESSURE</th>
<th>TEST PRESSURE</th>
<th>ROOM TEMP. BURST</th>
<th>HIGH TEMP. BURST</th>
<th>BEND RADIUS</th>
<th>WEIGHT PER FOOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>TCR-1904</td>
<td>1/4&quot;</td>
<td>.222</td>
<td>.390</td>
<td>5,000</td>
<td>10,000</td>
<td>18,500</td>
<td>12,000</td>
<td>1.50</td>
<td>.10</td>
</tr>
<tr>
<td>TCR-1906</td>
<td>3/8&quot;</td>
<td>.308</td>
<td>.490</td>
<td>5,000</td>
<td>10,000</td>
<td>18,000</td>
<td>12,000</td>
<td>2.50</td>
<td>.16</td>
</tr>
<tr>
<td>TCR-1908</td>
<td>1/2&quot;</td>
<td>.401</td>
<td>.615</td>
<td>5,000</td>
<td>10,000</td>
<td>18,000</td>
<td>12,000</td>
<td>2.88</td>
<td>.23</td>
</tr>
<tr>
<td>TCR-1910</td>
<td>5/8&quot;</td>
<td>.495</td>
<td>.730</td>
<td>5,000</td>
<td>10,000</td>
<td>17,500</td>
<td>12,500</td>
<td>3.25</td>
<td>.32</td>
</tr>
<tr>
<td>TCR-1912</td>
<td>3/4&quot;</td>
<td>.617</td>
<td>.990</td>
<td>5,000</td>
<td>10,000</td>
<td>17,500</td>
<td>12,500</td>
<td>3.88</td>
<td>.66</td>
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<tr>
<td>TCR-1916</td>
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<td>.867</td>
<td>1.270</td>
<td>5,000</td>
<td>10,000</td>
<td>17,000</td>
<td>9,000</td>
<td>5.00</td>
<td>1.02</td>
</tr>
<tr>
<td>TCR-1920</td>
<td>1 1/4&quot;</td>
<td>1.118</td>
<td>1.660</td>
<td>5,000</td>
<td>10,000</td>
<td>16,500</td>
<td>9,500</td>
<td>12.00</td>
<td>1.85</td>
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<tr>
<td>TCR-1924</td>
<td>1 1/2&quot;</td>
<td>1.375</td>
<td>1.900</td>
<td>4,000</td>
<td>9,000</td>
<td>15,000</td>
<td>9,000</td>
<td>14.00</td>
<td>1.91</td>
</tr>
</tbody>
</table>

Working pressure is for non-impulse service. For impulse applications reduce the operating pressure by 1000 PSI, if temperature reaches 400°F all of the above working pressures are 3,000 PSI.

TCR-1000 series gives you the choice of stainless steel or carbon steel JIC swivels. When ordering assemblies place a “C” for carbon steel or “S” for stainless steel in front of the part number to ensure proper fitting material.

<table>
<thead>
<tr>
<th>HOSE I.D.</th>
<th>DASH SIZE</th>
<th>THREAD SIZE</th>
<th>IN.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot;</td>
<td>-4</td>
<td>7/16 - 20</td>
<td></td>
</tr>
<tr>
<td>3/8&quot;</td>
<td>-6</td>
<td>9/16 - 18</td>
<td></td>
</tr>
<tr>
<td>1/2&quot;</td>
<td>-8</td>
<td>3/4 - 16</td>
<td></td>
</tr>
<tr>
<td>5/8&quot;</td>
<td>-10</td>
<td>7/8 - 14</td>
<td></td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>-12</td>
<td>1-1/16 - 12</td>
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</tr>
<tr>
<td>1&quot;</td>
<td>-16</td>
<td>1-5/16 - 12</td>
<td></td>
</tr>
<tr>
<td>1 1/4&quot;</td>
<td>-20</td>
<td>1-5/8 - 12</td>
<td></td>
</tr>
<tr>
<td>1 1/2&quot;</td>
<td>-24</td>
<td>1-7/8 - 12</td>
<td></td>
</tr>
</tbody>
</table>
PTFE HOSE
PROTECTIVE HOSE COVERINGS

SPRING GUARD
Prolongs the life of hose lines that are exposed to rugged operating conditions, such as severe flexing. Spring guard prevents kinking and protects the hose from abrasion and rough handling.

SILICONE FIRE SLEEVE
This fiberglass sleeving has a coating of silicone rubber bonded to it, which offers temporary flame resistance, that will protect the hose from extreme temperature conditions.

ARMOR GUARD
A highly flexible heavy-duty metal casing to protect the hose against severe handling abuse and over-bending. This can be applied over the entire length or in short sections at the connection.

HEAT SHRINK TUBING
To minimize hose O.D. heat shrinkable tubing is used in applications where cleanliness is essential, such as food and pharmaceutical processes. This provides easy cleaning of the outer hose surface.

NYLON
An abrasion resistant nylon sleeve protects and extends the service life of hoses that are subjected to severely abrasive environments.
Our reducing pump connectors are domestically fabricated. They are made from corrugated hose and surrounded with a heavy-duty woven wire braid. This combination provides a highly flexible braided pump connector with a long service life. Reducers can absorb pump vibration and reduce piping stress due to minor misalignment and pressure variations. The reduction of stress on pumps and piping systems can greatly lower frequent maintenance costs and will eliminate premature system failure.

**ADVANTAGES**

- Fabricated in the U.S.A.
- In-stock, ready to ship
- Extends service life
- Eliminates pressure stress
- Compensates for misalignment up to 1/8”
- Elevated temperature capacity

**APPLICATIONS**

- Boiler Systems
- Pump Systems
- Mechanical Rooms
- Return and Discharge Lines

Accessory adapter ports can be included on your reducer allowing up to four ports for drains, P/T ports, gauge cocks and thermo wells.

**Note:** Standard port size offering 1/4”, 1/2”, 3/4” and 1” will increase overall length by 2”
RUBBER EXPANSION JOINTS

Our rubber expansion joints are fabricated of natural or synthetic elastomers and fabrics including Neoprene, EPDM, Butyl and Nitrile. They compensate for system pressure spikes, and they accommodate for axial, angular, and lateral movements. Control rods can be provided to accommodate extreme piping system stress.

MATERIALS

Materials:
- Neoprene
- EPDM
- Nitrile
- Chlorobutyl
- Viton
- Kevlar

Types:
- Molded Type
- Spool Type
- Eccentric
- Concentric
- Single Sphere
- Double Sphere
- Custom

End Fittings:
- 150# Carbon Steel Flanges Standard
- 300# Carbon Steel Flanges Optional
- 150# Stainless Steel Flanges Optional
- Female Union Standard

*Other elastomers and types are available

ADVANTAGES

- Vibration isolation
- Multiple elastomers available
- Small face-to-face dimensions
- Single or multi sphere configurations
- Reduces pipeline harmonics

APPLICATIONS

- Blowers
- Fracking
- Air Systems
- Cooling Towers
- Sewer Systems
- Vacuum Pumps
- Discharge Lines
- Hydro-Electric Plants
- Refineries/Oil Extraction
- Process Piping Systems
- Power Plant Pump Systems
- Waste Water Treatment Plants
- Supply and Collecting Systems

- Piping Misalignment
- Vibration Compensation
- Expansion/Contraction of Piping

INSTALLATION

See rubber expansion joint installation instructions per FSA on our website or on FSA’s website:
- twincityhose.com/references
RUBBER EXPANSION JOINTS

MS1

The MS1 is the most widely used rubber expansion joint and is very reasonably priced. Solid plate flanges on each end are floating.

I.D. up to 24"

Materials
- EPDM
- Nitrile
- Neoprene
- Chlorobutyl
- Custom

End Fittings
- 150# CS Flange (Standard)
- 150# SS Flange
- 300# CS Flange

MS2

The MS2 allows greater movement than the MS1 and is used in exactly the same way. Solid plate flanges on each end are floating.

I.D. up to 24"

Materials
- Neoprene
- EPDM

End Fittings
- 150# CS Flange (Standard)
- 150# SS Flange
- 300# CS Flange

S1

Spool type expansion joints utilize a single low profile wide arch. The construction combines woven polyester fabric and elastomer reinforced with wire to create a product with superior performance. Rubber flanges are integral with the body and utilize split metal retaining rings.

I.D. up to 64"

Custom Options:
- Filled Arch
- Multi Arch
- Alternative Drilling
- Full Range of Retaining Rings

Materials
- EPDM
- Nitrile
- Neoprene
- Chlorobutyl
- Custom

MS1-MS2-MSFU DATA

- Max negative pressure 26" HG Vacuum
- For listed movements reference submittals

<table>
<thead>
<tr>
<th>BODY CONSTRUCTION</th>
<th>TEMPERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>NEOPRENE NYLON</td>
<td>up to 230° F</td>
</tr>
<tr>
<td>EPDM NYLON</td>
<td>up to 230° F</td>
</tr>
<tr>
<td>BUTYL NYLON</td>
<td>up to 230° F</td>
</tr>
<tr>
<td>NITRILE NYLON</td>
<td>up to 230° F</td>
</tr>
</tbody>
</table>
The MSFU is used for threaded union connections and has the same characteristics as the MS1 and MS2 but is for smaller I.D.'s of ¾” up to 2½”.

**Materials**

- EPDM

* All with control cables

---

**MRCE**

- Concentric reducing expansion joints connect unequal pipe sizes that share the same center line. Solid plate flanges on each end are floating
- Stainless steel 150# flanges are available
- Standard and custom sized I.D. and OAL are available upon request
CONTROL RODS

Control rods are designed to limit excessive movement to an expansion joint. When used they are an additional safety factor, minimizing possible failure of the expansion joint or damage to equipment. They must be used in any unanchored system or where pressures exceed stated pressure in chart #1.

CHART #1

Control Units must be installed when pressure (working, test, surge) exceed rating below:

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>MS1 P.S.I.G</th>
<th>MS2 P.S.I.G</th>
</tr>
</thead>
<tbody>
<tr>
<td>1”-4”</td>
<td>180</td>
<td>135</td>
</tr>
<tr>
<td>5”-10”</td>
<td>135</td>
<td>135</td>
</tr>
<tr>
<td>12”-14”</td>
<td>90</td>
<td>90</td>
</tr>
<tr>
<td>16”-24”</td>
<td>45</td>
<td>45</td>
</tr>
</tbody>
</table>

View from the top of flange with attached control rods
SPECIALTY APPLICATION HOSE ASSEMBLIES
JACKETED AND TRACED HOSE ASSEMBLIES

We specialize in fabricating custom and specialty application metal hose assemblies. TCH can fabricate jacketed and traced assemblies built to exact specifications that are available in an assortment of materials and end fittings. Jacketed and traced hose assemblies are used to convey a variety of viscous products including resins, polymers, sulfur and asphalt. Both types of assemblies will have ports at either end to hook up steam or hot oil to heat the media being conveyed.

Flexible Metal Jacketed & Traced Hose Assemblies:

ADVANTAGES
• Increase flow of viscous media
• Pipe system misalignment
• Media safety containment
• High PSI and temperature capacity

APPLICATIONS
• Tanker or Rail Car Unloading
• ASPHALT / Hot Mix Plants
• Food / Beverage Industries
• Cosmetic Manufactures
• Chemical / Pharmaceutical Use

MATERIALS
• Stainless Steel Hose and Braid
• Carbon Steel or Stainless Steel Fittings

SIZES
• Stock and custom lengths and diameters
• Single or double braid configurations

END FITTINGS
• Variety of end fittings (male and female pipe threads, unions, flanges, etc.)

Jacketed Hose Assemblies:
Jacketed assemblies consist of a flexible metal inner (core) hose and a larger diameter flexible metal jacket (outer core) hose.

Traced Hose Assemblies:
A traced hose assembly is a hose built to the mating pipe size or larger with a smaller hose(s) running through it, to convey heat to the media of the center hose.

THESE ASSEMBLIES ARE MANUFACTURED TO YOUR SPECIFICATIONS. WORKING PRESSURES VARY PER APPLICATION. CONSULT FACTORY FOR DETAILS.
SPECIALTY APPLICATION HOSE ASSEMBLIES
INTERLOCK, LINED AND GUARDED TRANSFER HOSE ASSEMBLIES

Interlock strip-wound metal hose is a heavy-duty hose made from strip of galvanized or stainless steel. The strip is profiled and helically wound around a mandrel. The helical coils are interconnected but flexibility is maintained, creating a durable yet flexible hose. Interlock strip-wound hoses are not only extremely flexible and strong, but also offer pressure resistance as well as excellent chemical and thermal stability. Interlock strip-wound hose can be used as a guard, lining, exhaust hose or for the transfer of dry bulk materials. It can also be used for high temperature viscous applications. Please advise that due to their loose interlock structure, interlock strip-wound hoses are leak resistant but not 100% leak-tight. Because of this, they are often used as an inner lining hose within another hose or as a protective guard shielding an inner hose.

Guarded Hose:
Guarded hose assemblies consist of an external interlock flexible metal armor cover and an inner media-carrying metal hose. The protective covering guards the inner hose against premature failure due to rough handling, external abrasion and over-bending.

Strip-Wound Interlock Hose:
- Galvanized steel
- 300 series stainless steel
* Packed or unpacked option available

Wire Braided Hose:
- Stainless steel (304, 321, or 316)
- Bronze

Line Transfer Hose:
Lined transfer hose is comprised of a heavy duty strip-wound interlock inner hose and an outer flexible braided metal hose. This hose assembly is designed for high temperature viscous fluid applications and media being conveyed at a high velocity. The flexibility of the hose is designed to withstand premature failure due to excessive vibration caused by rapid media flow. End fittings are expertly welded on to allow for easy installation.

MATERIALS

SIZES

END FITTINGS
Our product line of V and U flex connectors provide superior protection against any unpredictable seismic or thermal pipe expansion or compression movement. These flex connectors are durably constructed to maintain flexibility under pressure without compromising strength. In contrast to traditional metal bellows, our V and U connectors impose NO pressure thrust load on the piping system. This eliminates the need for expensive thrust blocks or heavy-duty anchors.

**ADVANTAGES**

- No pressure thrust
- Nominal spring rates
- System and equipment protection
- Meets the Buy American Act and a complete domestic product is available
- Cost Savings - reduced anchor cost, guiding cost and construction material cost

**APPLICATIONS**

- Steam (Double Braided)
- Chemical Products
- Petroleum Products
- Hot or Chilled Water
- Natural and Medical Gas

**THERMAL / SEISMIC SOLUTIONS**

**SINCE 1977, TCH HAS SERVED AS A LEADING INDUSTRY RESOURCE FOR SEISMIC & THERMAL GROWTH SOLUTIONS.**

**V AND U CONNECTOR MOVEMENT & FLEXIBILITY:**

More flexibility than standard metal and rubber expansion joints

For all movements, each hose leg of the V and U connector moves in lateral directions, minimizing weld attachment stresses. Weld attachment stresses are a high cause of failure on deflected braided metal hose connectors. The V and U shaped connector configuration reduces pipe intrusion into adjacent spaces.

**TCH V connector's six independent planes of movement**

- V and U connectors allow movement along the 6 planes of the X, Y and Z axis.

- V and U connectors can be constructed to accommodate standard 2", 3", 4" or greater movements on all planes.

- Movements are primarily in lateral directions minimizing weld attachment stresses.
The V flex connector uses two 45 degree elbows and one 90 degree elbow for a total of 180 degrees in pipe change, compared to the U flex connector, which has a 360 degree pipe change.

**Ability to nest within itself, taking up less valuable space**

The design of the V allows for easy configuration. The V can be nested within additional V’s, taking up less valuable space and does not require additional pipe extensions. Nesting V configurations do not require any special order components. Ordering in stock connectors saves you both time and money.

TCH U CONNECTORS

The U flex connector has a larger nesting footprint than that of the V connector. Just like the V connector, the U flex moves in all directions while absorbing thermal or seismic energy. The U flex consists of two flexible sections of hose and braid, two 90 degree elbows, and a 180 degree return equaling a 360 degree pipe change.

**Nested Configurations**

Nested U flex connectors can be used in parallel pipe runs to keep all the expansion devices at one location and to save space. They can also be nested in any number of sequences and with any number of pipes. Nested U flexes can be positioned up, down or sideways. Just specify pipe diameter sequence and the corresponding distance between pipe center lines when ordering.

### MATERIALS

<table>
<thead>
<tr>
<th>Hose:</th>
<th>Braid:</th>
<th>Braid Collar:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bronze</td>
<td>• Bronze</td>
<td>• Stainless Steel</td>
</tr>
<tr>
<td>• Copper</td>
<td>• Exotic Alloys</td>
<td></td>
</tr>
<tr>
<td>• Carbon Steel</td>
<td>• Stainless Steel</td>
<td></td>
</tr>
<tr>
<td>• Exotic Alloys</td>
<td></td>
<td></td>
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<tr>
<td>• Stainless Steel</td>
<td></td>
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</tr>
</tbody>
</table>

**Pressure Ratings:**

- Single braid - standard pressure
- Double braid - higher pressures

*All steam application assemblies are double braided

**SIZES**

- Sizes: ½” I.D. - 24” I.D.

**Movements:**

- Specify 2”, 3”, 4” in all planes

* Custom movements available

**Nested Loops:**

- Specify the sequence of connectors, sizes and centering
- Contact TCH for pipe extension data

**END FITTINGS**

- **Weld**
- **Groove**
- **Sweat**
- **Male NPT**
- **Flange**

* Custom end fittings are available

**Drain ports:**

- Required for steam systems, specify size and material

**Hanger:**

- Available upon request

*IN STEAM APPLICATIONS, HORIZONTAL INSTALLATION IS RECOMMENDED TO AVOID CONDENSATE BUILDUP*
THERMAL / SEISMIC SOLUTIONS
90 DEGREE L SHAPED CONNECTORS

- Saves space with the nesting configuration option
- Available in a wide variety of materials and end fittings
- Saves money because it requires less guides and anchors
- Protect equipment from thermal expansion and seismic activity

V AND U CONNECTORS CAN BE INSTALLED IN A VARIETY OF POSITIONS

- The standard position of the V or U is with the 90 or 180 degree elbow hanging down.
- Horizontal and vertical mounting yields the same allowance for motion as long as the 90 or 180 degree elbow is supported properly to avoid sagging or torquing.
- V or U connectors larger than 1 ½” diameter must be supported if installed in any other position than the standard position. Supporting cable or pipe hanger rod should be attached to an eyelet located at the bottom of the 90 or 180 degree elbow.

DON’T FORGET TO ORDER YOUR PIPE GUIDES, PIPE HANGERS AND SUPPORT BRACKETS

<table>
<thead>
<tr>
<th>MATERIALS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hose:</strong></td>
</tr>
<tr>
<td>• Bronze</td>
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<tr>
<td><strong>Braid:</strong></td>
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</tr>
<tr>
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</tr>
<tr>
<td><strong>Braid Collar:</strong></td>
</tr>
<tr>
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<tr>
<td>• Exotic Alloys</td>
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<tr>
<td>• Stainless Steel</td>
</tr>
<tr>
<td><strong>Pressure Ratings:</strong></td>
</tr>
<tr>
<td>• Single braid - standard pressure</td>
</tr>
<tr>
<td>• Double braid - higher pressures</td>
</tr>
</tbody>
</table>

* All steam application assemblies are double braided

<table>
<thead>
<tr>
<th>SIZES</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sizes:</strong> ½” I.D. - 24” I.D.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Movements:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Specify 2”, 3”, 4” in all planes</td>
</tr>
</tbody>
</table>

* Custom movements available

<table>
<thead>
<tr>
<th>Nested Loops:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Specify the sequence of connectors, sizes and centering</td>
</tr>
<tr>
<td>• Contact TCH for pipe extension data</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>END FITTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Drain Ports:</strong></td>
</tr>
<tr>
<td>• Required for steam systems, specify size and material</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Hanger:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Available upon request</td>
</tr>
</tbody>
</table>

ELBOW WITH DRAIN AND HANGER
Pipe guides are always recommended in applications involving pipe movement:
- Pipe guides are needed to facilitate the thermal expansion of a pipeline so that the movement is properly directed to the expansion joint.
- Pipe guides are designed to prevent buckling or squirming of the pipe.
- Proper guiding and anchoring are essential to the correct installation of expansion joints.
- Axial movement 4", 8" and 12"
- Pre-insulated guides are available
- Available in 1/2" through 24" I.D. pipe diameters

* Custom sizes available
- Provides protection for expansion joints, piping system and vital equipment from shearing and lateral forces.

**SEISMIC CONNECTORS MUST BE REPLACED AFTER ANY SEISMIC ACTIVITY**

![Spider Guide](image)

**ANCHORING CONSIDERATIONS**

Anchors are required on either side of the V or U connector to react to the spring forces of the connector. Pressure thrust loads are not a consideration because the V or U connector will not impose pressure thrust onto the system. Anchors should be of sufficient strength to withstand the spring forces of the loops and the frictional forces of the pipe sliding through any pipe alignment guides.

<table>
<thead>
<tr>
<th>Pipe Size</th>
<th>Approximate Spring Force</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/2&quot;</td>
<td>35 lbs</td>
</tr>
<tr>
<td>3/4&quot;</td>
<td>41 lbs</td>
</tr>
<tr>
<td>1&quot;</td>
<td>46 lbs</td>
</tr>
<tr>
<td>1-1/4&quot;</td>
<td>65 lbs</td>
</tr>
<tr>
<td>1-1/2&quot;</td>
<td>68 lbs</td>
</tr>
<tr>
<td>2&quot;</td>
<td>62 lbs</td>
</tr>
<tr>
<td>2-1/2&quot;</td>
<td>87 lbs</td>
</tr>
<tr>
<td>3&quot;</td>
<td>83 lbs</td>
</tr>
<tr>
<td>4&quot;</td>
<td>127 lbs</td>
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<tr>
<td>5&quot;</td>
<td>214 lbs</td>
</tr>
<tr>
<td>6&quot;</td>
<td>228 lbs</td>
</tr>
<tr>
<td>8&quot;</td>
<td>312 lbs</td>
</tr>
<tr>
<td>10&quot;</td>
<td>399 lbs</td>
</tr>
</tbody>
</table>

The figures above reflect the total force required to deflect the V and U connector to full revenue movement, pressurized to 150 PSI for V" through 10" and 100 PSI for 12".
UL CLASSIFIED LEAD-FREE* PRODUCTS
TCH'S LINE OF LEAD-FREE* UL CLASSIFIED FOR WATER QUALITY V'S, U'S, AND STRAIGHT FLEXIBLE CONNECTORS

We domestically fabricate UL Classified lead-free* V's, U's, and straight flexible connectors. These products are fabricated using only lead-free* bronze, copper, carbon steel and stainless steel materials. Our Lead-Free Flex™ provides absolute certainty that our products are tested and in compliance with UL's strict standards.

*LEAD FREE REFERS TO <0.25% WEIGHTED AVERAGE LEAD CONTENT IN RELATION TO WETTED SURFACE OF PIPE, FITTINGS AND FIXTURES IN SYSTEMS DELIVERING WATER FOR HUMAN CONSUMPTION.

ADVANTAGES
- Fabricated in the U.S.A.
- Third party verified
- NSF/ANSI 61 and 372
- All documents and certifications
- UL tested and classified lead free

APPLICATIONS
- Potable Water
- Domestic Piping Systems
- Beverage & Food Industries
- Domestic Plumbing Systems

*All stainless steel construction available

<table>
<thead>
<tr>
<th>Hose:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Corrugated Bronze</td>
</tr>
<tr>
<td>• Corrugated Stainless Steel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Braid:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bronze Wire Braid</td>
</tr>
<tr>
<td>• Stainless Steel Wire Braid</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Braid Collar:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Bronze</td>
</tr>
<tr>
<td>• Stainless Steel</td>
</tr>
</tbody>
</table>

MATERIALS

<table>
<thead>
<tr>
<th>END FITTINGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Weld</td>
</tr>
<tr>
<td>• Sweat</td>
</tr>
<tr>
<td>• RFSO Flange</td>
</tr>
<tr>
<td>• Groove</td>
</tr>
<tr>
<td>• Male NPT</td>
</tr>
</tbody>
</table>

Materials:
- Copper
- Carbon Steel
- Stainless Steel

TCH’s UL Assemblies Comply With The Buy American Act.
UL LISTED FIRE SAFE FLEX CONNECTORS
TCH’S LINE OF UL LISTED FLEXIBLE JOINT FITTINGS FOR FIRE SUPPRESSION SPRINKLER SYSTEMS

Our product line of Fire SafeFlex™ V and U connectors provide solutions to safeguard fire suppression sprinkler systems against any unpredictable seismic, thermal, or random piping system motions. Fire SafeFlex™ connectors are constructed to maintain their flexibility under pressure without compromising strength or movement capabilities. Listed to applicable UL Standards and requirements, these connectors have been tested and determined that they meet UL’s published and nationally recognized Standards for Safety.

ADVANTAGES
• No pressure thrust
• No guiding needs
• X, Y, Z planes of motion
• Fabricated in the U.S.A.
• In accordance with NFPA 13
• Listed to applicable UL standards & requirements

APPLICATIONS
• Wet and Dry Sprinkler Systems
• Fire Suppression Systems
• Fire Sprinkler Systems
• Fire Protection Systems
• Installations requiring flexible attachments to sprinkler system piping

MATERIALS
Hose:
• Corrugated Stainless Steel
Braid:
• Stainless Steel Wire Braid
Braid collar:
• Stainless Steel
Elbows:
• Carbon Steel
• Stainless Steel

SIZES
• ½” I.D. - 4” I.D. with male end fittings
• 2” I.D. - 10” I.D. with grooved or raised face slip on flange end fittings
• Up to 24” of motion

END FITTINGS
• RFSO Flange
• Groove
• Male NPT

Materials:
• Carbon Steel
• Stainless Steel