



## Expansion Compensators

**TWIN CITY HOSE** Expansion Compensators are the perfect solution to absorb thermal expansion. **TCH** Expansion Compensators can be utilized in piping for domestic hot water, chilled water, heating water, steam and steam condensate as well as for other equipment as indicated within the specifications, drawings, and equipment schedules to compensate for thermal pipeline growth. **TCH** Expansion Compensators are designed with external pressure to the bellows which eliminates bellows squirm. They are compact, which saves space. Simplicity of this proven design eliminates packing, requires no maintenance and assures long-life and dependability.



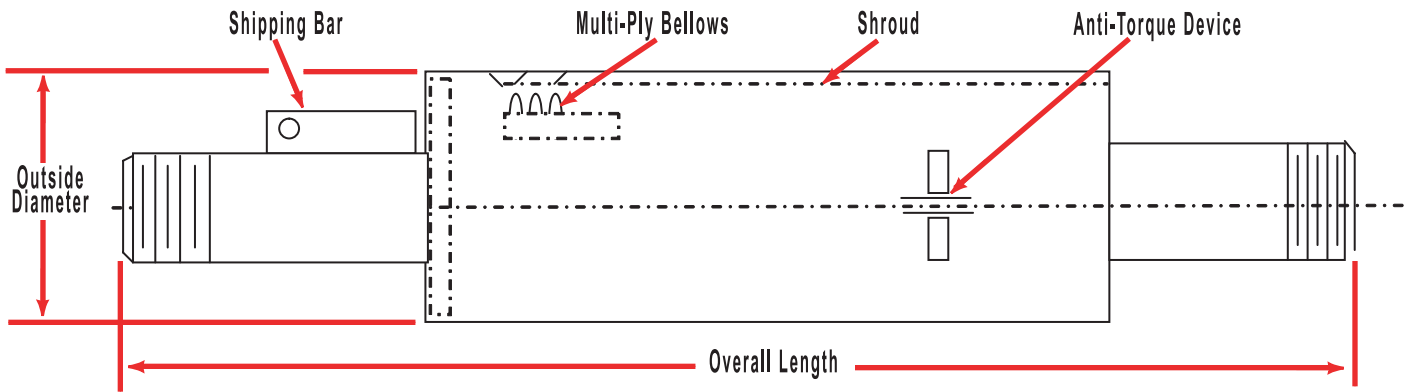
**Construction:** Constructed with two-ply Series 300 stainless steel bellows and carbon steel or Stainless Steel shroud (depending on series), internal liner, and end fittings. **TCH** Expansion Compensators are provided with internal positive anti-torque device. All connections shall have ends to match piping system. Available designs are listed below:

- TWIN CITY HOSE** "EXCS" for copper sweat piping ends
- TWIN CITY HOSE** "EXCW" for welded piping ends
- TWIN CITY HOSE** "EXCM" for threaded piping ends
- TWIN CITY HOSE** "EXCF" for flanged piping ends
- TWIN CITY HOSE** "EXCG" for grooved piping ends

**Design Information:** Joints have a rating of 200 PSIG working pressure and axial movements of 1-3/4" compression and 1/4" extension. Maximum temperature: 750° F.

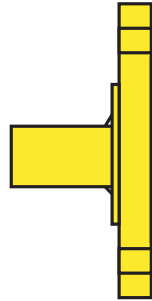
**Installation Information:** Carefully align joint and make proper allowance for temperature of pipe at time of installation. Pipe guides should be placed as per EJMA standards (refer to table 2, page 3).

# Expansion Compensators



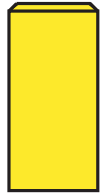
## EXCF FLANGE END

| MODEL NUMBER | PIPE SIZE | OVERALL LENGTH | OUTSIDE DIAMETER | EFFECTIVE AREA $\text{inch}^2$ |
|--------------|-----------|----------------|------------------|--------------------------------|
| EXCF075      | 3/4"      | 12-5/8"        | 3-7/8"           | 2.2"                           |
| EXCF100      | 1"        | 12-5/8"        | 4-1/4"           | 3.5"                           |
| EXCF125      | 1-1/4"    | 14-5/8"        | 4-5/8"           | 4.8"                           |
| EXCF150      | 1-1/2"    | 14-5/8"        | 5"               | 6.5"                           |
| EXCF200      | 2"        | 14-5/8"        | 6"               | 7.6"                           |
| EXCF250      | 2-1/2"    | 16"            | 7"               | 12.9"                          |
| EXCF300      | 3"        | 15-3/4"        | 7.5"             | 16.1"                          |
| EXCF400      | 4"        | 15-3/4"        | 9"               | 24.2"                          |



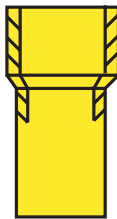
## EXCW WELD END

| MODEL NUMBER | PIPE SIZE | OVERALL LENGTH | OUTSIDE DIAMETER | EFFECTIVE AREA $\text{inch}^2$ |
|--------------|-----------|----------------|------------------|--------------------------------|
| EXCW075      | 3/4"      | 12-1/8"        | 3"               | 2.2"                           |
| EXCW100      | 1"        | 12-1/8"        | 3-1/2"           | 3.5"                           |
| EXCW125      | 1-1/4"    | 14-1/8"        | 4"               | 4.8"                           |
| EXCW150      | 1-1/2"    | 14-1/8"        | 4-1/2"           | 6.5"                           |
| EXCW200      | 2"        | 14-1/8"        | 4-1/2"           | 7.6"                           |
| EXCW250      | 2-1/2"    | 15-1/2"        | 5-1/2"           | 12.9"                          |
| EXCW300      | 3"        | 15-3/16"       | 6-1/2"           | 16.1"                          |
| EXCW400      | 4"        | 15-3/16"       | 7-3/32"          | 24.2"                          |



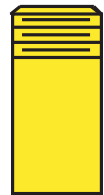
## EXCS SWEAT END

| MODEL NUMBER | PIPE SIZE | OVERALL LENGTH | OUTSIDE DIAMETER | EFFECTIVE AREA $\text{inch}^2$ |
|--------------|-----------|----------------|------------------|--------------------------------|
| EXCS075      | 3/4"      | 12-1/2"        | 2-3/8"           | 2.2"                           |
| EXCS100      | 1"        | 12-1/2"        | 2-3/8"           | 2.2"                           |
| EXCS125      | 1-1/4"    | 13-13/16"      | 2-3/4"           | 3.5"                           |
| EXCS150      | 1-1/2"    | 13-13/16"      | 2-3/4"           | 3.5"                           |
| EXCS200      | 2"        | 13-13/16"      | 2-3/4"           | 6.5"                           |
| EXCS250      | 2-1/2"    | 14-7/16"       | 4-3/8"           | 9.6"                           |
| EXCS300      | 3"        | 14-7/16"       | 5"               | 12.9"                          |



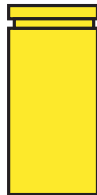
## EXCM MALE END

| MODEL NUMBER | PIPE SIZE | OVERALL LENGTH | OUTSIDE DIAMETER | EFFECTIVE AREA $\text{inch}^2$ |
|--------------|-----------|----------------|------------------|--------------------------------|
| EXCM075      | 3/4"      | 12-1/8"        | 3"               | 2.2"                           |
| EXCM100      | 1"        | 12-1/8"        | 3-1/2"           | 3.5"                           |
| EXCM125      | 1-1/4"    | 14-1/8"        | 4"               | 4.8"                           |
| EXCM150      | 1-1/2"    | 14-1/8"        | 4-1/2"           | 6.5"                           |
| EXCM200      | 2"        | 14-1/8"        | 4-1/2"           | 7.6"                           |
| EXCM250      | 2-1/2"    | 15-1/2"        | 5-1/2"           | 12.9"                          |
| EXCM300      | 3"        | 15-3/16"       | 6-1/2"           | 16.1"                          |
| EXCM400      | 4"        | 15-3/16"       | 7-3/32"          | 24.2"                          |



## EXCG GROOVED END

| MODEL NUMBER | PIPE SIZE | OVERALL LENGTH | OUTSIDE DIAMETER | EFFECTIVE AREA $\text{inch}^2$ |
|--------------|-----------|----------------|------------------|--------------------------------|
| EXCG075      | 3/4"      | 18-1/8"        | 3"               | 2.2"                           |
| EXCG100      | 1"        | 18-1/8"        | 3-1/2"           | 3.5"                           |
| EXCG125      | 1-1/4"    | 20-1/8"        | 4"               | 4.8"                           |
| EXCG150      | 1-1/2"    | 20-1/8"        | 4-1/2"           | 6.5"                           |
| EXCG200      | 2"        | 20-1/8"        | 4-1/2"           | 7.6"                           |
| EXCG250      | 2-1/2"    | 21-1/2"        | 5-1/2"           | 12.9"                          |
| EXCG300      | 3"        | 21-3/16"       | 6-1/2"           | 16.1"                          |
| EXCG400      | 4"        | 21-3/16"       | 7-3/32"          | 24.2"                          |



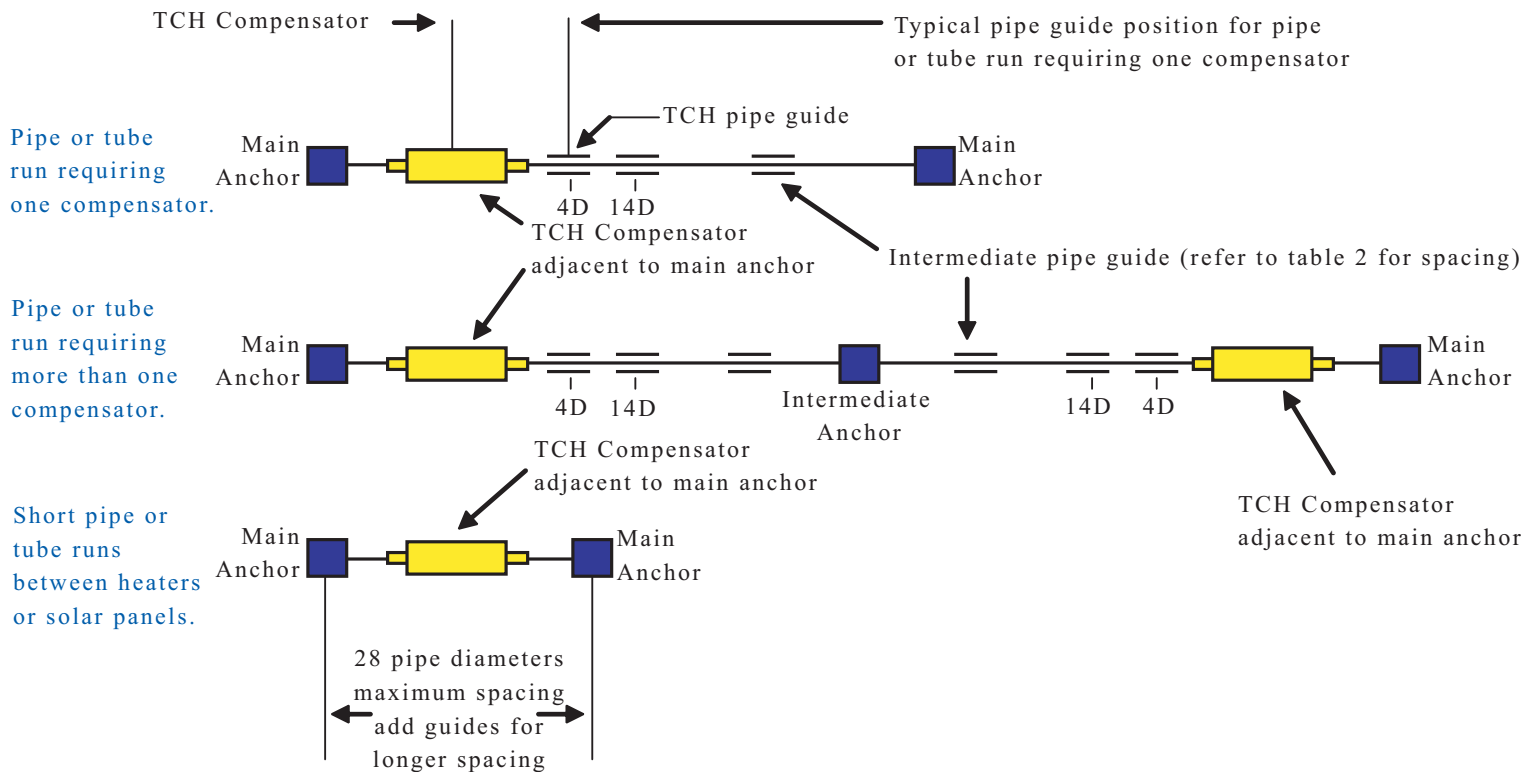
**Working Pressure: 200 PSIG**

**Test Pressure: 300 PSIG**

**Movements:  
1-3/4" Compression  
1/4" Extension**



**Note: Pressure Thrust = Effective Area X Maximum Working Pressure**



**TABLE 1 THERMAL EXPANSION**

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

| Saturated Steam Pressure      | Temperature |       | Copper Tube | Carbon Steel Pipe |       |
|-------------------------------|-------------|-------|-------------|-------------------|-------|
|                               | DEG F       | DEG C |             |                   |       |
| Vacuum<br>(inches of mercury) | 29.7        | 32    | 0           | -0.39             | -0.27 |
|                               | 29.6        | 50    | 10          | -0.19             | -0.14 |
|                               | 29.2        | 70    | 21          | 0                 | 0     |
|                               | 28.0        | 100   | 38          | 0.38              | 0.23  |
|                               | 26.0        | 125   | 52          | 0.66              | 0.42  |
|                               | 22.4        | 150   | 66          | 0.94              | 0.61  |
|                               | 16.3        | 175   | 80          | 1.23              | 0.80  |
| Pressure<br>(PSIG)            | 6           | 200   | 93          | 1.51              | 0.99  |
|                               | 0           | 212   | 100         | 1.65              | 1.10  |
|                               | 4           | 225   | 107         | 1.80              | 1.21  |
|                               | 5           | 250   | 121         | 2.09              | 1.40  |
|                               | 31          | 275   | 135         | 2.38              | 1.61  |
|                               | 52          | 300   | 149         | 2.67              | 1.82  |
|                               | 82          | 325   | 163         | 2.97              | 2.04  |
|                               | 120         | 350   | 177         | 3.27              | 2.26  |
|                               | 150         | 358   | 181         | 3.37              | 2.33  |
|                               | 169         | 375   | 191         | 3.57              | 2.48  |
|                               | 232         | 400   | 205         | 3.88              | 2.70  |
|                               | 300         | 417   | 214         | 4.09              | 2.86  |
|                               | 311         | 425   | 219         | 4.18              | 2.93  |
| 407                           | 450         | 232   | 4.48        | 3.16              |       |
| 525                           | 475         | 246   | 4.79        | 3.39              |       |
| 666                           | 500         | 260   | 5.09        | 3.62              |       |

**TABLE 2 INTERMEDIATE GUIDE SPACING**

(Center to Center, feet)

| Nominal Size             | Pressure (PSIG) |      |      |      |      |      |
|--------------------------|-----------------|------|------|------|------|------|
|                          | 50              | 75   | 100  | 150  | 200  |      |
| Model EXC-M,W,G,F        | 3/4"            | 7.7  | 7.3  | 6.9  | 6.3  | 5.8  |
|                          | 1"              | 11.9 | 11.0 | 10.3 | 9.2  | 8.4  |
|                          | 1-1/4"          | 16.3 | 14.7 | 13.5 | 11.7 | 10.5 |
| SCH 40 Carbon Steel Pipe | 1-1/2"          | 19.4 | 17.2 | 15.6 | 13.4 | 11.9 |
|                          | 2"              | 26.8 | 23.2 | 20.7 | 17.5 | 15.4 |
|                          | 2-1/2"          | 31.3 | 27.5 | 24.8 | 21.2 | 18.8 |
|                          | 3"              | 38.8 | 33.5 | 29.9 | 25.2 | 22.0 |
| Copper Tubing            | 4"              | 47.7 | 40.7 | 36.4 | 30.8 | 27.0 |
|                          | 3/4"            | 2.4  | 2.3  | 2.2  | 2.1  | 1.9  |
|                          | 1"              | 4.0  | 3.7  | 3.5  | 3.2  | 2.9  |
| Model EXCS               | 1-1/4"          | 5.7  | 5.2  | 4.9  | 4.3  | 3.0  |
|                          | 1-1/2"          | 7.5  | 6.8  | 6.2  | 5.4  | 4.9  |
|                          | 2"              | 10.0 | 9.0  | 8.3  | 7.2  | 6.5  |
| Copper Tubing            | 2-1/2"          | 13.9 | 12.2 | 10.9 | 9.4  | 8.3  |
|                          | 3"              | 16.8 | 14.7 | 13.2 | 11.2 | 9.9  |





## Expansion Compensators

### SPECIFICATION GUIDE FOR ENGINEERS

#### Expansion Compensators

Expansion compensators shall be utilized on heat transfer piping, tubing, heaters, radiators, and other equipment as indicated within the specifications, drawings, and equipment schedules to compensate for thermal pipeline growth. Vertical piping for domestic hot water, chilled water, heating water, steam, and steam condensate shall be provided with expansion compensators at each floor.

Joints shall be constructed with two-ply Series 300 stainless steel bellows and carbon steel shroud, internal liner, and end fittings. Joints shall be provided with internal positive anti-torque device. All connections shall have ends to match piping system. Joints for steel piping shall have plain weld ends or male NPT threaded ends, grooved ends or flanged ends. Copper tube ends shall be provided on joints for copper piping.

Joints to have a minimum rating of 200 PSIG working pressure and axial movements of 1-3/4" compression and 1/4" extension.

Carefully align joint and make proper allowance for temperature of pipe at time of installation. Pipe guides should be placed as per EJMA standards

Expansion compensators shall be:

- TWIN CITY HOSE "EXCS" for copper sweat piping ends
- TWIN CITY HOSE "EXCW" for welded piping ends
- TWIN CITY HOSE "EXCM" for threaded piping ends
- TWIN CITY HOSE "EXCF" for flanged piping ends
- TWIN CITY HOSE "EXCG" for grooved piping ends



### INSTALLATION PROCEDURE FOR

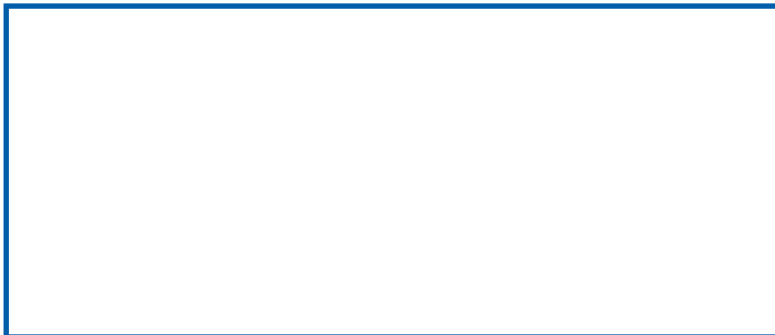
#### Expansion Compensators

All compensators include labels identifying the rated pressure, temperature, and specific installation instructions. Be certain the system design includes adequate anchors, guides and supports - refer to application diagrams on Page 3.

Female copper tube model "EXCS" is manufactured with high temperature brazed joints. Protect these models to ensure the temperature does not exceed 1000°F during installation.

Be certain that the piping configuration or the installation method does not subject the bellows to twisting or torque for any model. Bellows can be damaged by excessive torsion. All TWIN CITY HOSE Expansion Compensators include anti-torque devices.

A shipping restraint is tack welded or soldered in place at the factory to insure the rated travel. DO NOT REMOVE THIS DEVICE UNTIL INSTALLATION IS COMPLETE (all anchors, guides and supports are adjusted). REMOVE THE RESTRAINT PRIOR TO PRESSURE TESTING AND REMOVE THE TACK WELD OR SOLDER FLASH. The restraint is not designed to react to pressure thrust.



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