HOW TO ACCOUNT **FOR THERMAL EXPANSION** IN PIPING SYSTEM DESIGN

The Situation

- All piping materials expand and contract with temperature changes.
- If a run of pipe is constrained at both ends, compressive stress is likely.
- Damage results in frequent repairs, downtime and premature replacement.

DESIGN FACTORS TO CONSIDER

1. Amount of Linear Expansion

- Determined by the material's coefficient of linear expansion, the application's temperature differential and length of the pipe run.

2. Working Stress

- The maximum amount of stress a material can withstand without sacrificing its structural integrity.

3. Modulus of Elasticity

- A measure of stiffness that expresses the material's ability to elongate or compress when a force is applied.

4. Outer Diameter of the Pipe

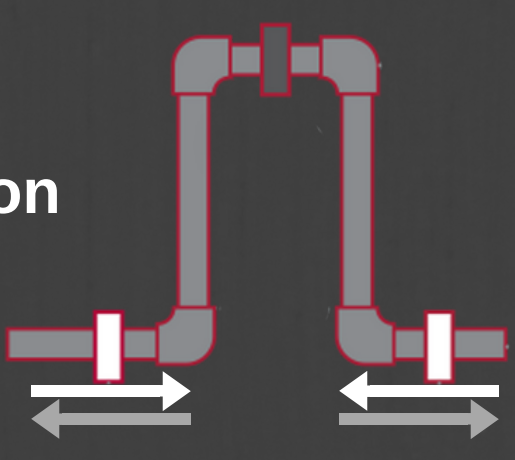
- A wider pipe requires more length over which to deflect.

THE FOUR PIPING SYSTEM **DEFLECTION MECHANISMS**

The Solution

- Engineers can use four deflection mechanisms to account for thermal expansion and contraction.
- Each allows for some degree of pipe movement to help prevent compressive stresses.

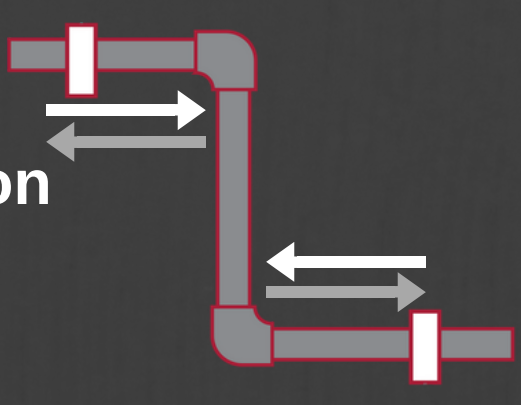
Expansion Loop



This mechanism tends to be the preferred choice of engineers.

Expansion: "U" opening narrows
Contraction: "U" opening widens

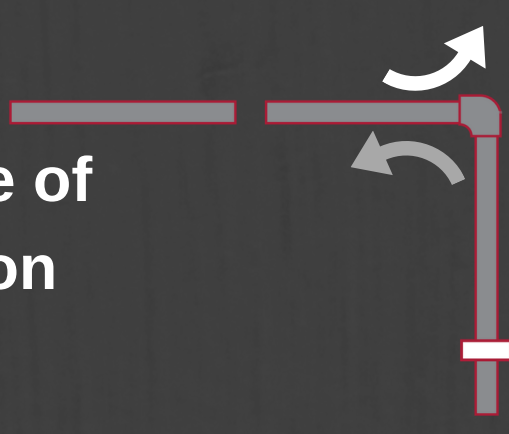
Expansion Offset



This mechanism is used when the pipe needs to avoid fixed structures.

Expansion: Both elbows push in, angling the vertical length right.
Contraction: Both elbows push out, angling the vertical length left.

Change of Direction



The corner elbow and adjoining pipe allow for some degree of movement.

Expansion: Corner moves out
Contraction: Corner moves in

Expansion Joint

This mechanism is often used in tight, enclosed areas where it is difficult to include any expansion loops or offsets.

Acts as a shock absorber, allowing the pipe to move freely within the other pipe.

*Often used as a last resort due to cost.

Calculate the Thermal Expansion Mechanism for Your System

Simply input the pipe length and diameter, as well as the system's maximum and minimum temperatures, and the calculator will provide the required dimensions for three expansion loops for Corzan CPVC pipe.

FREE EXPANSION CALCULATOR