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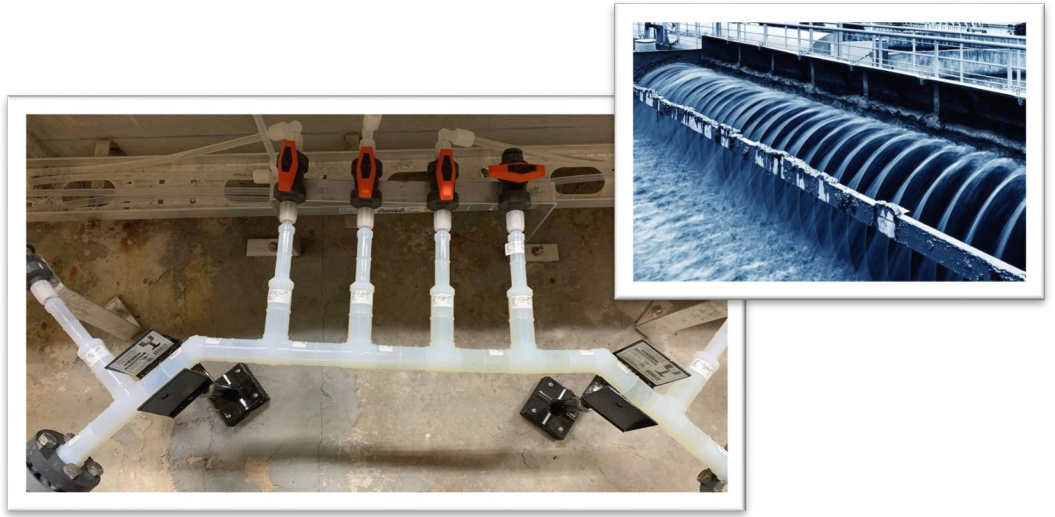


Chemical Feed Systems

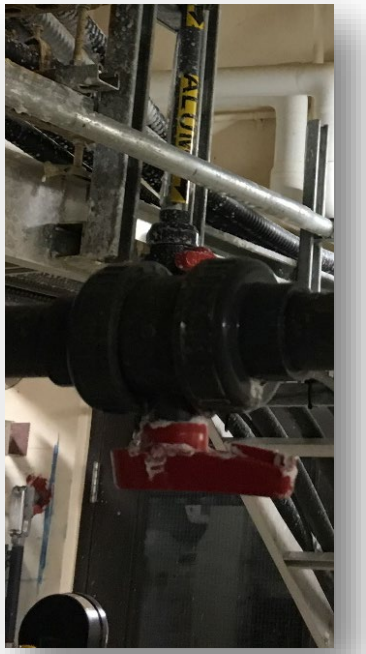
Upgrades to Prevent Leaks & Unnecessary Maintenance

Presentation Outline

- Common Problems in Chemical Piping Systems
- Sodium Hypochlorite and Other Water & Wastewater Chemicals
- Hypotech Fluoropolymer Tubing System; What, Why, How?
- Hypotech Installation method
- LOX-8 Paste Chemical Thread Sealant
- Model 586 Pressure Sustaining Valve
- Other Water and Wastewater Treatment Solutions from OPTCO Ltd
- Live Flare Demonstration

Common Problems in CHEM-FEED Systems

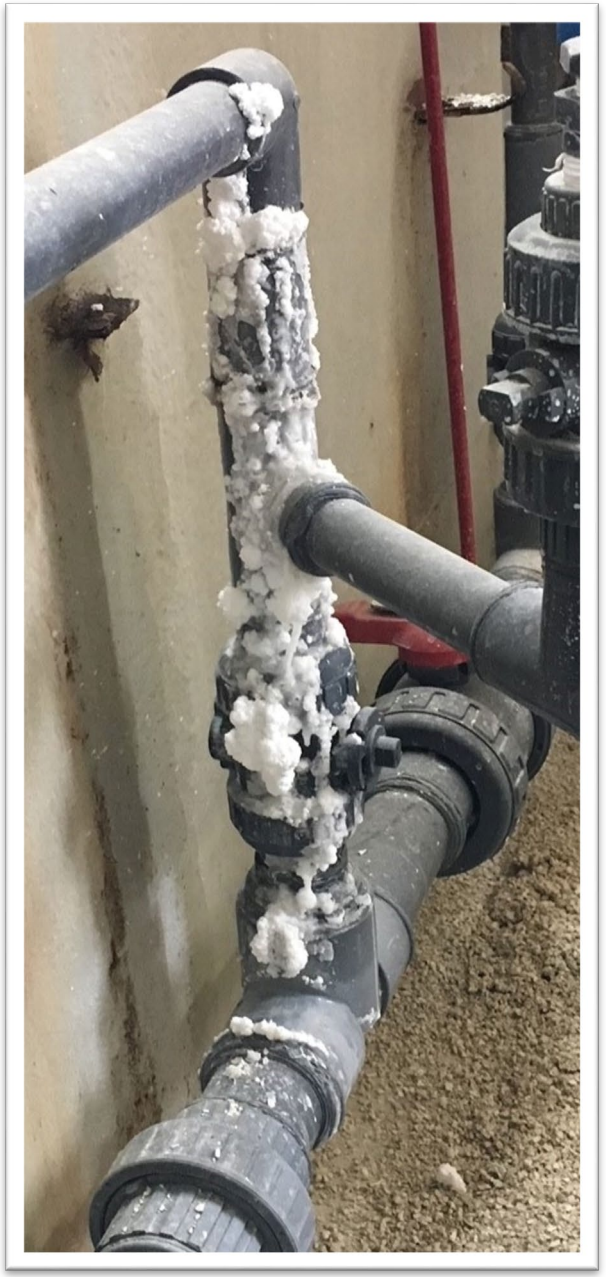
- Schedule 80 PVC pipe, valves & fittings & PE tube
- Solvent welded & threaded connections
- Pulsating flow from some injection pumps
- Solids formation



Sodium Hypochlorite

$$Cl_2\ (g) + 2\ NaOH\ (aq) \rightarrow NaCl\ (aq) + NaClO\ (aq) + H_2O\ (aq)$$

- Also commonly known as Bleach, Hypo, Chlorine, Liquid Chlorine
- Household Bleach 4%
- Municipal Sodium Hypochlorite 12% - 14%
- UV degradation
- Strong oxidiser
- Dangerous chemical when mixed
- Off gassing
- The American Industrial Hygiene Association (AIHA) recommends an exposure level for sodium hypochlorite solutions at 2 mg/m^3 as a 15-minute time weighted average, as stated in their Workplace Environment Exposure Level (WEEL) Guide



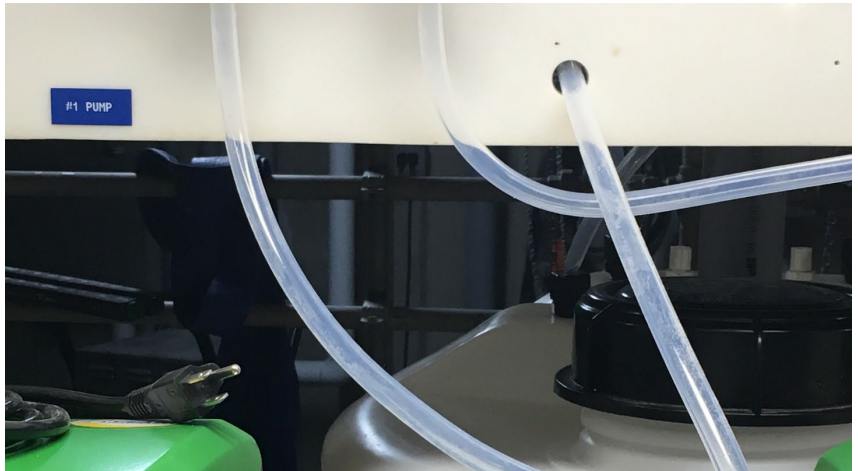
Ferric Chloride

- Ferric Chloride is a common coagulant and flocculant
- Bi-product from the steel industry
- It is very corrosive to metals, concrete, and human skin
- Similar to sodium hypochlorite, Ferric Chloride can off-gas chlorine and cause leaks in the form of a crystalline salt structure

Other Chemicals

Other chemicals that react and leak in a similar method:

- Poly Aluminum Chloride
- Alum
- Calcium Thiosulfate (Captor)
- Hydrofluorosilicic Acid (Fluoride)



Hypotech Chemical Tubing System

- Eliminates chemical leaks common in solvent welded and threaded PVC piping
- Fast and easy to install. Flare connections in less than 30 seconds rated to 100+ PSI
- Safe, reliable, & hassle free life expectancy with Sodium Hypochlorite and many other chemical systems
- Expensive tooling not required
- Compatible with all leading PVC valve manufacturers, designed for Georg Fischer valves
- Available in continuous coils of over 1000’

Installing Hypotech

- Flaring consists of widening the end of Hypotech flexible fluoropolymer-based tube, such that it can be inserted over the “shoulder” of the flare fitting. The flared tubing is then secured in place by a nut
- Flaring tube may be accomplished by several different techniques, the best practice covered in this presentation consists of hot flaring with a heat gun and a mandrel

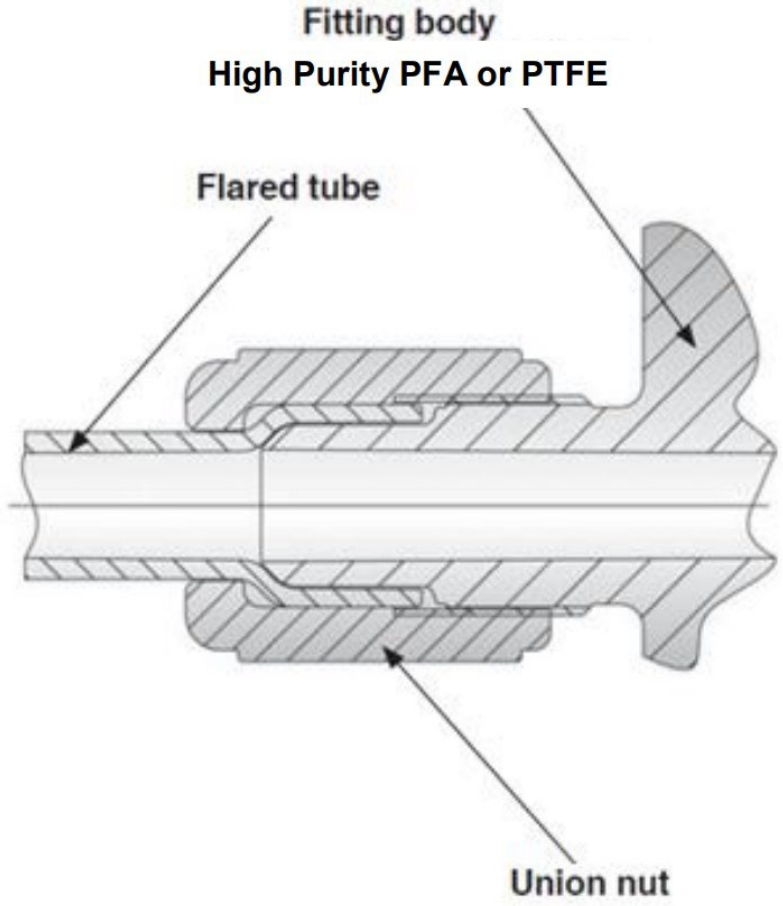


Figure 1: Flare Connection (General Description)

Tube Preparation

- Cut the end of the tube square using a tubing cutter specifically designed for such purpose. It is essential that the tube be cut as square (90° angle) as possible.

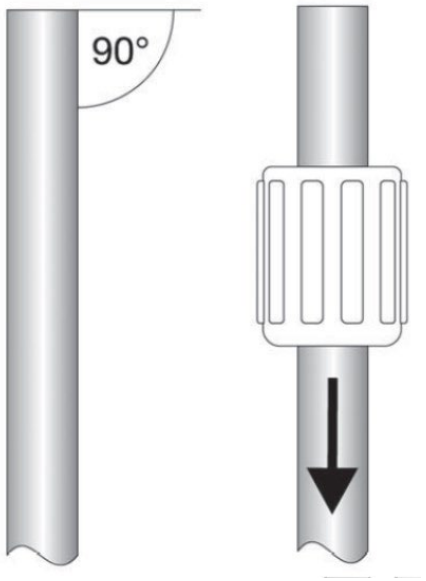


Figure 4: Tubing cut “square” and flare nut inserted over tube prior to flaring

Figure 3: Cutting the tube square

- Insert the flare nut over the tubing, paying attention to the direction of the flare nut. The threaded end of the nut must face the end of the tubing to be flared.

Hot Flaring using a Heat Gun & Mandrel

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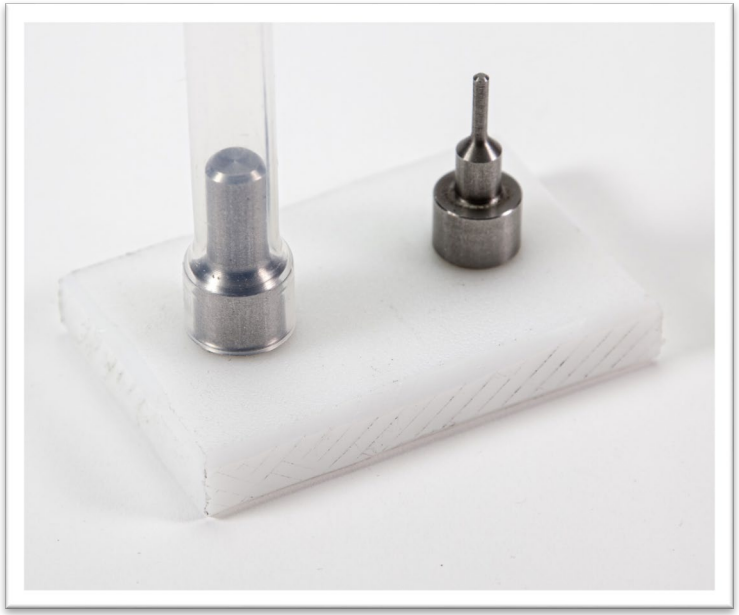
- Hot flaring requires a heat gun (any consumer grade heat gun will do) and a forming mandrel available from OPTCO Ltd. We recommend using a stainless-steel mandrel similar to the ones depicted. When using a mandrel, please assure that it is of the proper dimensions for the size of flare being completed.

- Contact the OPTCO Ltd. for details on purchasing mandrels for the various tubing sizes.



Hot Flaring Minimum Tube Wall Thickness

Part Number	Tubing ID	Tubing OD	Wall Thickness	Pressure Rating	Bend Radius
H14030	3/16”	¼”	0.030”	223 psi	1”
H38030	5/16”	3/8”	0.030”	148 psi	2-1/2”
H12062	3/8”	½”	0.062”	230 psi	2”
H34062	5/8”	¾”	0.062”	153 psi	6”
H10062	7/8”	1”	0.062”	115 psi	22”

Using a Heat Gun

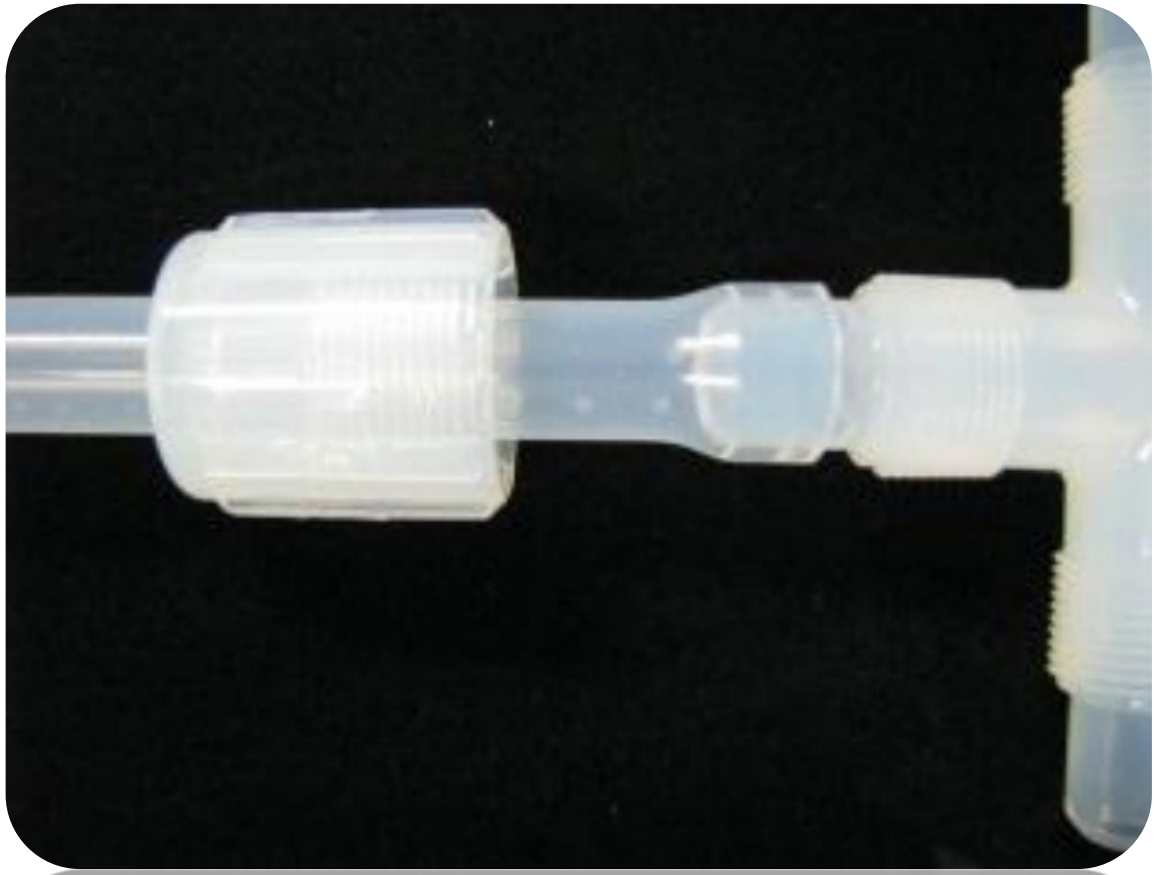
- Using the heat gun, heat up the end of the tubing, rotating it to achieve uniform heat. Continue heating the tubing until it becomes clear, which should take approximately 20 – 30 seconds.

Hot Flaring using a Heat Gun

- Quickly and before the tubing has a chance to cool down, insert the heated end onto the mandrel and hold it for 20 – 30 seconds.
- Allow the tubing to cool on the mandrel for 2 – 3 minutes before removing it.

Connect Tube to Fitting

- Insert the flare fitting into the newly flared end of the tubing. The fit should be “snug.”
- In most cases there will be a gap between the end of the tubing and the threaded portion of the fitting.
- Hand tighten to a snug fit. A torque wrench can be used following this guideline:
    - 1” Flare = 2 Nm
    - ¾” Flare = 1.2 Nm
    - ½” Flare = 1 Nm
    - ¼” Flare = 0.75 Nm



Connect Tube to Fitting

Table 2: Allowable Gap

Flare Port Size	Gap (A Dimension)		Flare Length (B Dimension)	
	MIN	MAX	MIN	MAX
¼”	0	1.3mm	7.7mm	9.0mm
3/8”	0	2.0mm	9.5mm	11.5mm
½”	0	2.0mm	11.0mm	13mm
¾”	0	2.5mm	10.5mm	13mm
1”	0	3.0mm	10.0mm	13mm

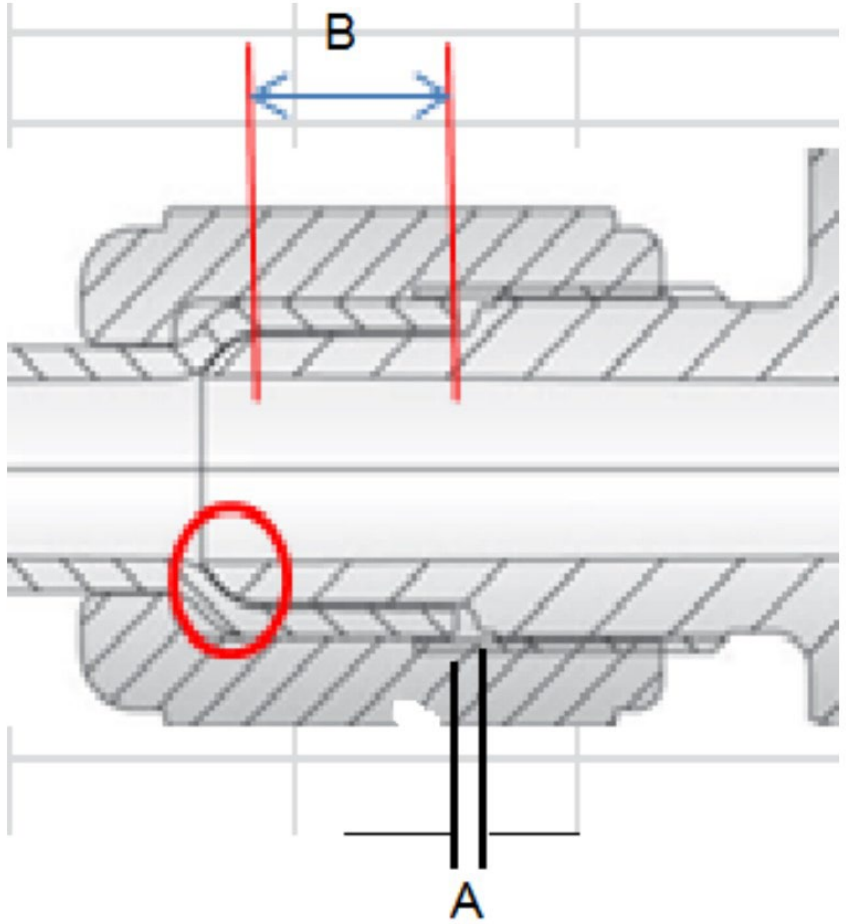


Figure 8: Gap Dimension Reference

LOX-8 Paste Thread Sealant

- High-density, inert thread sealant
- Formulated for wet conditions and dry applications
- Remains stable up to 288°C
- It is nonflammable and nontoxic
- Ultra-pure & impervious to chemical attack
- A multi-purpose, cross-functional sealant
- Used by NASA, in Nuclear applications and other extreme environments
- Recommended by the Chlorine institute

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After

Before

Custom Fusion Welded Manifold with Flare Outlets

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Before

After

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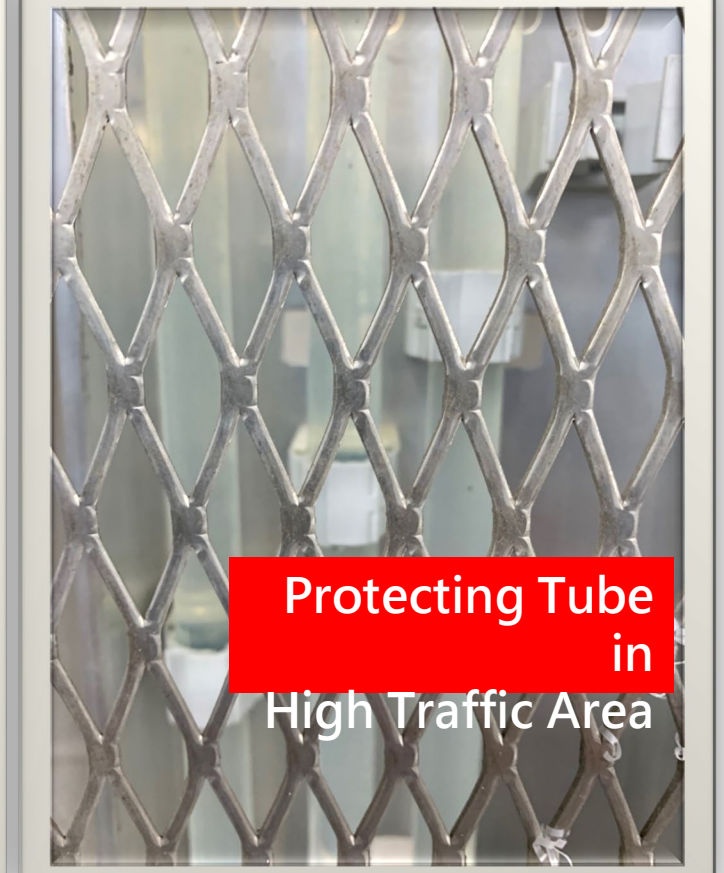
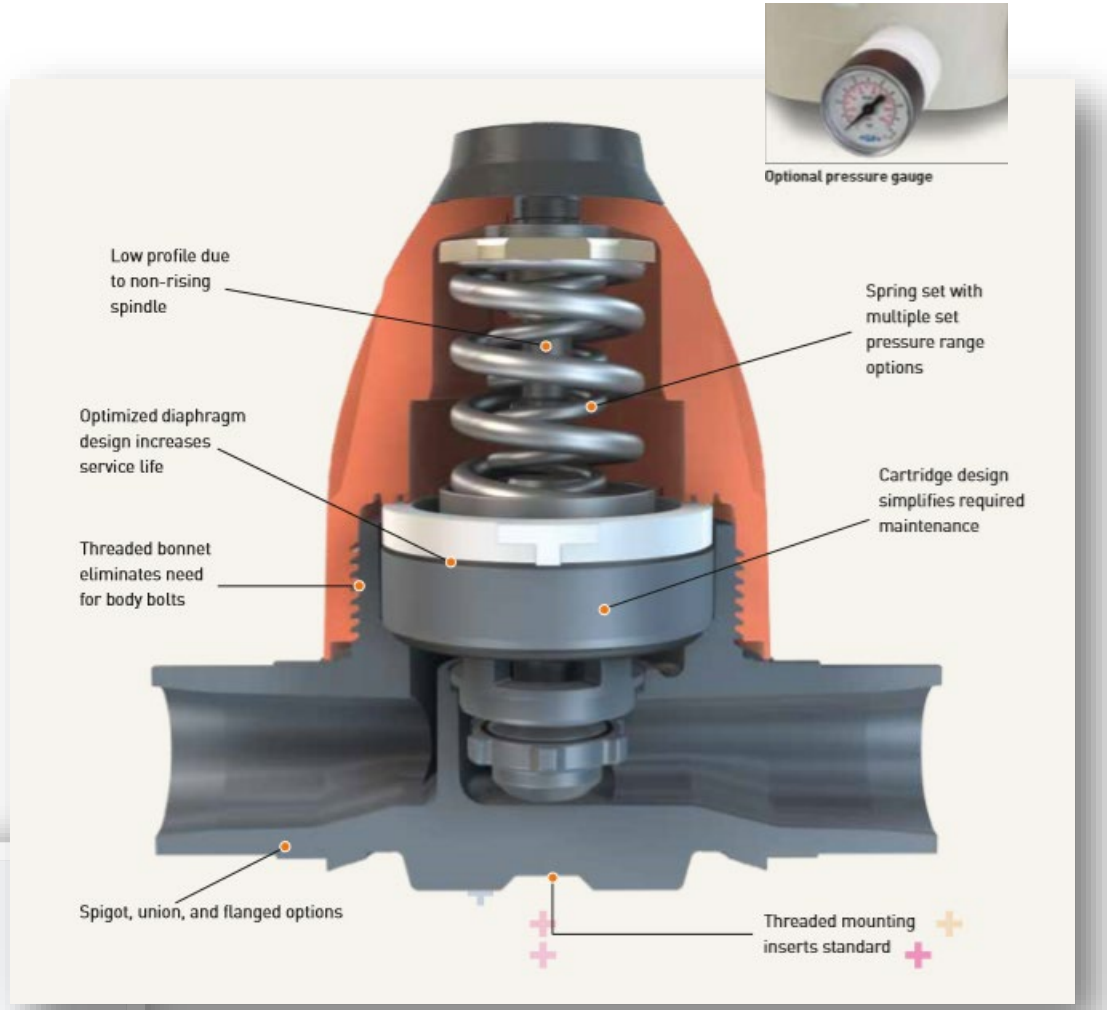
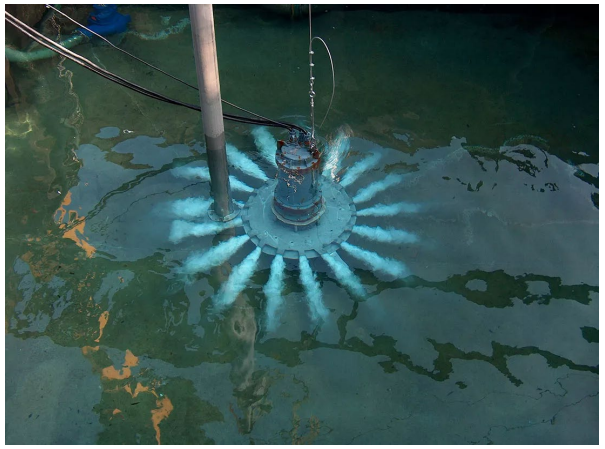


586 Pressure Sustaining Valve

- Same union nut connection and face-to-face dimensions as the leading orange top back pressure valve – direct swap out
- Simple threaded bonnet design eliminates bolts and potential leak points
- Very easy to service & maintain – cartridge design





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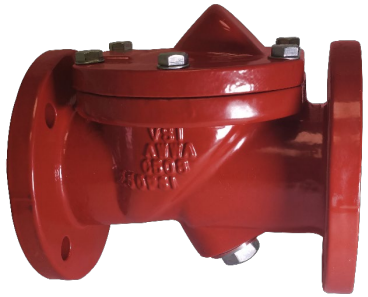

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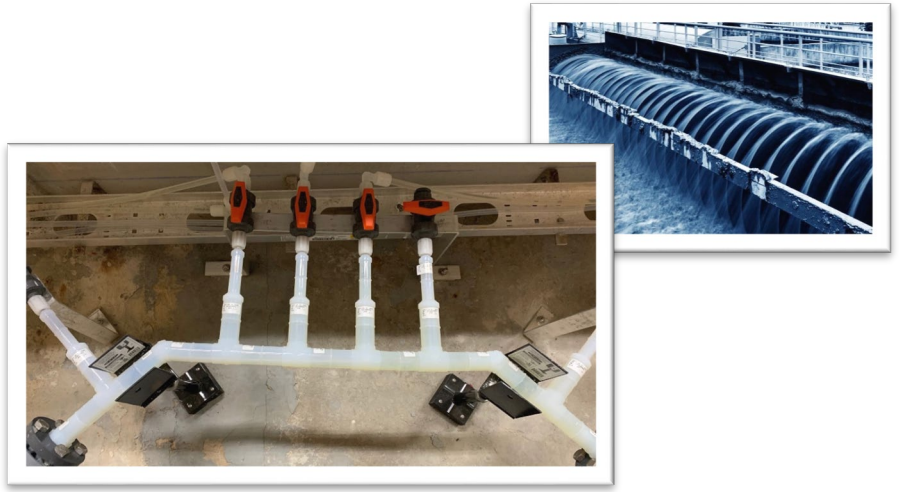

Thank-you

Live Flare Demonstration
& Questions?