Fwd: HDPE Pipeline - June Issue

1 message

The Alliance For PE Pipe's Newsletter
June 2014 Issue

Feature:

How a Cost Effective Solution to Corrosion Became the Largest Domestic Order of HDPE Pipe

The Regional Carrizo Project, San Antonio Water System.

Intro

The Alliance for PE Pipe has a very simple mission. Share the features and benefits of HDPE pipe, fittings and equipment with those of you that design, specify, install and work with our nation's water and sewer pipelines. The HDPE story is really quite compelling once you are willing to accept a different way to look at one of the more basic services we provide to our citizens.

The Regional Carrizo Project (RCP) is a water resources program implemented by the San Antonio Water System, or SAWS, with the capacity to convey 22 mgd of water through four counties. The Program was designed by five firms and was built with seven different construction contracts. The SAWS Buckhorn Wellfield pumps water from the Carrizo Aquifer and sends it via an 8 mile supply pipeline to a Water Treatment Plant owned and operated by a neighboring water utility, the Schertz Seguin Local Government Corporation (SSLGC). SSLGC is then responsible for treating SAWS water to potable water standards and conveying it through 45 miles of existing SSLGC infrastructure to SAWS' Schertz Parkway Pump Station. The Carrizo Aquifer water is then transmitted through an 11-mile pipeline to the Nacogdoches Pump Station located within SAWS service area. The water is blended with Edwards Aquifer water and integrated into SAWS' distribution system.

The Problem.

A critical aspect to the success of the Program was the determination of the optimal material for the 120,000 feet of pipe in the Buckhorn Wellfield and Water Supply Pipeline. Because the wellfield and supply pipeline are located in western Gonzales County, approximately an hour and a half outside of San Antonio, it was important to choose a material that would require as little maintenance as possible. Raw water from nearby wells and the soil present in that region were known to be corrosive and had potential to damage standard piping materials. Additionally, the water temperature was anticipated to be in excess of 100˚F.

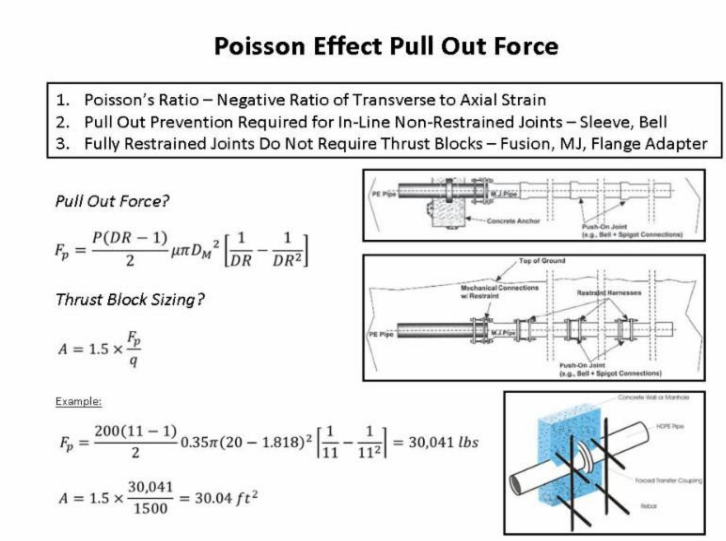
In our next edition...Evaluating competing pipe materials to find the best solution.

Thanks to Black and Veatch for this PE Pipe Case Study

I had a chance to catch up with an engineer from Performance Pipe this past week. You may remember him from the Palo Alto roadshow video we shared a couple of months ago. Chase Auansakul (On-Sa-Cool) graduated from the well-respected engineering program at Purdue University and serves as an HDPE expert for Performance Pipe.

The Alliance has several presentations it uses when speaking to groups about the role HDPE could play in water systems. Chase selected three slides from those presentations to share some facts.

Chase started out by saying*, "Did you know that fused HDPE pipes are considered fully-restrained joints? When properly fused to the requirements of the ASTM F2620 standards the joints become as strong as the pipe itself and provide a piping system that is leak free. This and other key benefits is what primarily distinguishes it from other traditional piping materials.*



"Lets start out with transitions. I get a lot of questions on how we connect HDPE to traditional slip jointed pipe. Due to the Poisson's effect, we have a couple of options to restrain HDPE so the downstream unrestrained pipe does not pull out. We can either use a concrete wall anchor system at the transition or use a mechanical restrain harness to restrain the bells going back into the existing system." Illustration A demonstrates the two techniques*. Sometimes we get a call from a first time user and they say, "It came apart at the transition to ductile iron." Auansakul finished by saying, "These are the easy calls we respond to."*

BLACK & VEATCH
Building a world of difference.

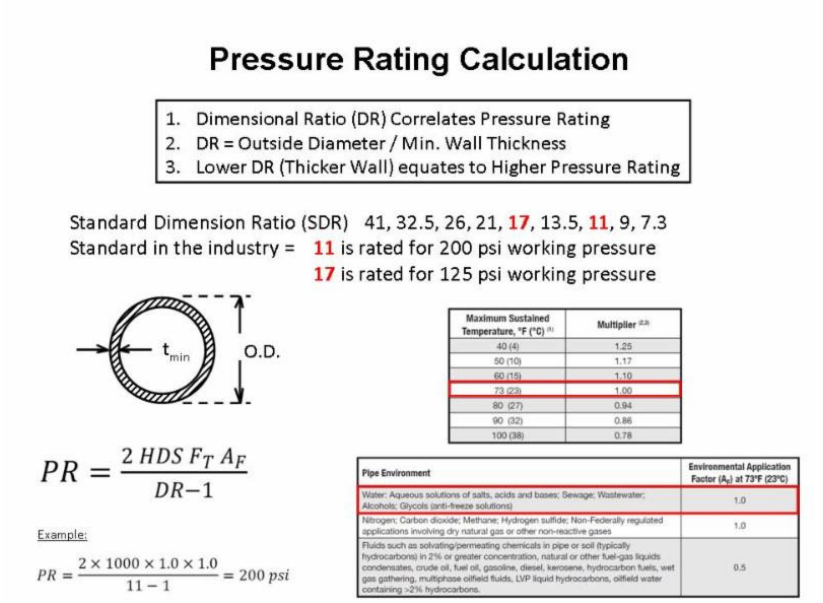
Who We Are

The mission of the Alliance for PE Pipe, Inc. is to promote smooth-wall polyethylene pipe and fittings as the material of choice for municipal water and sewer piping applications. HDPE is the responsible choice for piping systems: Environmentally-responsible due to its leak-free properties, Fiscally- responsible due to its lower life-cycle, installation and maintenance costs, Socially-responsible due to trenchless installation resulting in less disruption to traffic flow and commerce. Help your city to make the responsible choice today. Choose HDPE for water and sewer piping.

Polyethylene Pipe Offers:

- Trenchless installation
- Lowest failure rate for water mains
- Lowest life cycle costs
- Resistance to galvanic corrosion
- No gaskets to leak
- Outstanding flexibility
- Resistant to ground movement
- Excellent flow characteristics
- Low maintenance costs
- Easily repaired

The second slide he recommended was the Pressure Rating Calculation slide. There are two physical characteristics of HDPE pipe that is used to define its dimensional ratio (DR). The first is the pipe diameter and the second is the pipe's wall thickness. DR stands for dimension ratio and it has become the way the industry communicates about pipe as similar to Schedule Number or Pressure Class.Chase said, *"Guys will say that is a 12" DR 17 pipe to describe exactly what pipe they are looking for."*



"Dimension ratio is defined as the diameter divided by the minimum wall thickness. So if you have a 12" pipe and the wall thickness is .0.75 of an inch you will have a DR 17 pipe. DR 17 pipe has a working operational pressure rating of 125 psi."
When we are in the field talking to engineering groups and municipalities, we receive questions on how HDPE handles surge. With other traditional piping systems, design engineers selects the pipe based on the operational working pressure plus any anticipated surges in the system. In HDPE's case, the pipe should be selected based on the operational working pressure as reoccurring and occasional surge allowances are already built in .

Auansakul said, "If your system operational working pressure is 100 psi, you can select a 100 psi pressure rated HDPE pipe, or DR 21. Expected surges to 150 psi and 200 psi can be accommodated by a DR 21 pipe. We often see HDPE systems overdesigned due to unfamiliarity with the material."

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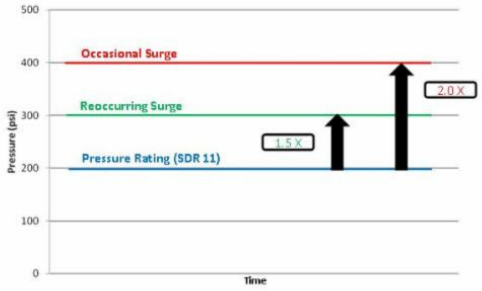
Maximum Allowable Pressure

1. Total Pressure = Working Pressure (Steady) + Surge Allowance (Anticipated)
2. Reoccurring Surge Allowance = 150% x Pressure Rating
3. Occasional Surge Allowance = 200% x Pressure Rating

SDR	Pressure Rating	Reoccurring Surge	Occasional Surge
9	250	375	500
11	200	300	400
17	125	187	250



Max Velocity Allowed?

$$\alpha = \frac{4660}{\sqrt{1+\frac{K}{E}(DR-2)}}$$

$$P_s = \pm\frac{\alpha V}{2.31g}$$

Example:

$$\alpha = \frac{4660}{\sqrt{1+\frac{300000}{150000}(11-2)}} = 1069\ ft/s \qquad 200 = \pm\frac{1069V}{2.31\times32.2} \rightarrow \boldsymbol{V = 13.9\ ft/s}$$

When we talk about overdesigned, we mean the selected pipe wall may be thicker than what is necessary. Engineers want to be safe, so they pick a DR 17 when a DR 21 is what could be necessary. The added thickness adds weight and therefore overall cost. However, it must be noted that many other factors come into play with regard to the selection of pipe such as burial considerations.

I asked Chase what the difference was between recurring and occasional surge? He responded, "Well, occasional surges are caused by emergency operations and infrequent events like pump failure or valve failure. They shouldn't happen very often. Whereas, recurring surges are daily events inherent to design where pumps turn on and off, valves open and close and normal system operations are conducted." He added, "Engineers are used to understanding surge in other systems, but often may overdesign with HDPE due to unfamiliarity. Let the HDPE do its job, I say." Thank you to Chase Auansakul.

Stay tuned to the Alliance for future discussions about HDPE basics.

See you on the Road.

Peter Dyke
Executive Director

If you are interested in bringing the Alliance's roadshow to your town, please contact the Alliance for more information.