5/5/16
ERRATA SHEET
Polyethylene Piping Systems Field Manual

P. 4, Table 1: Delete 2 columns with these heading: HDS = 630psi and HDS = 800 psi

P. 5, Fig. 2: **Pipe**: edit as follows: …… ~~PE3408/~~PE4710 AWWA C906/ASTM F714
…

P. 6: **Contaminated Soils**: Update the AWWA PE standards to AWWA C901-08 and C906-15

P. 56: Electrofusion

Installation Guidelines for Electrofusion Couplings.

Refer to Municipal Advisory Board document titled: MAB Generic Electrofusion Procedure for Field Joining of 12 Inch and Smaller Polyethylene (PE) Pipe; the document is available online at http://www.plasticpipe.org/pdf/mab-generic-ef-110515.pdf

Safety ….

P. 81 – 83: Design of Anchors and Thrust Blocks (note some text was relocated for clarity; for simplicity, change was not hi-lited)

Thrust blocks are not required at restrained connections. Butt fusion welds, electrofusion welds, side wall fusion welds, mechanical joint connections and flanged connections are considered restrained connections.

Thrust blocks shall be used to support fire hydrants. Concrete pads shall be used under metal valves to reduce settlement.

Anchor blocks shall be used when PE pipe connects to other pipe materials that use bell and spigot connections unless these connections are restrained for a sufficient number of joints to prevent pullout. See Figures 88 and 89 for typical connections.

The stress / force required to resist the longitudinal shortening caused by the Poisson effect during pressure testing of Polyethylene pipe, and caused by surge pressures, is based on the short term material properties of the pipe. The long term properties should be used when considering the Poisson effect associated with normal working pressures.

The design of an anchor is based on the force at the end of the PE pipe. The force can be caused by changes in temperature, soil movement or Poisson Effect. The Poisson Effect occurs when the pipeline is pressurized causing the PE pipe to contract in length. Restraining the pipe with an anchor causes a thrust force to occur on the anchor. ~~The~~ Table 10 ~~below~~ gives the

thrust force when the pipe is pressurized to 1.5 times its rated pressure. The 1.5 overpressure could occur due to surge or pressure testing.

Table 10~~4~~: Longitudinal Thrust Forces* Caused by Poisson Effect for PE4710 Pipe Pressurized to 1.5 times its Pressure Class (1.5 x PC)

Pipe Size, Inches	Actual DIPS Size, Inches	PE4710 DR 17 PC 125	PE4710 DR 13.5 PC 160	PE 4710 DR 11 PC 200
4	4.8	2,104	2,606	3,141
6	6.9	4,347	5,386	6,490
8	9.05	7,479	9,265	11,164
10	11.1	11,251	13,938	16,795
12	13.2	15,910	19,711	23,750

Note: Poisson force based on a pressure test or surge pressure to 1.5 times the pipe pressure rating

* Refer to www.HDPEAPP.com for additional calculations of thrust force and anchor block.

See Chapter 7, Appendix 3 of the PPI Handbook of Polyethylene Pipe for more discussion on the Poisson Effect; the equation in the Handbook for Pullout force should be revised to use the pipe outside diameter(OD), instead of pipe mean diameter (DM).

The size of an anchor block required to resist longitudinal thrust may be determined by dividing the anticipated longitudinal thrust force, by the Soil Bearing Strength, applying adequate safety factors and accounting for the area of the pipe. Approximate values of Soil Bearing Strengths are shown in Table 11

Table 11~~0~~: Approximate Soil Bearing Strengths

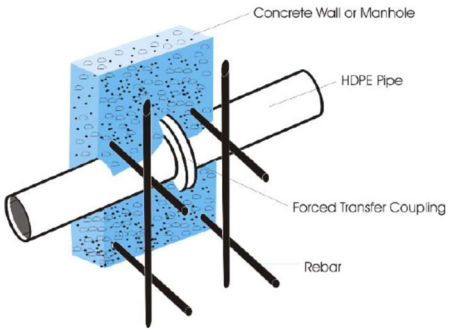
Soil Type	lbs/sq ft
Muck	0
Wet Clay/Soft Clay	500
Sand	1,000
Hard Clay	1,500
Sand and Gravel	1,500
Sand and Gravel Compacted	2,000
Crushed Stone	2,000
Hard Pan	4,000

For additional presumptive bearing capacities, see the Uniform Building Code (USA, 1997). Caution! Soil support strength varies greatly. Actual geotechnical measurements are needed to determine actual support strength.

An anchor block stops the movement of the pipe end by transferring the force from the PE pipe to the soil. To determine the size of an anchor block, first determine the soil bearing strength. From ~~the~~ Table 11 "Approximate Soil Bearing Strengths", assume that the sand on the project has a bearing strength of 1,000 per square foot. If we are working with a 12" PE 4710 DIPS DR 11 pipe and will be operating the pipe at 200 psi and hydrotesting the pipe at 300 psi, then the Poisson Effect force is calculated to be 23,750 lbs (see Table 10). The calculation of block size is: 23,750 lbs/1000 lbs/sq foot =23.75 sq feet of area in contact with the soil. Apply a safety factor of 1.5 to the block, 23.75 x 1.5 = 35.6 sq ft of contact area required. The safety factor accounts for variations in the presumptive soil values, construction, and temperature forces.

To size the block, the area of the pipe must be subtracted from the from the block size. If a 6.1 ft by 6.1 ft block is used, the area is 37.21 sq ft. The area of the pipe is 0.95 sq ft. The effective area of the block less the area of the pipe is: 37.21 - 0.95 = 36.26 sq ft. This is more than the 35.6 sq feet needed and is acceptable. The block size has a safety factor of 1.5 as indicated. A drawing of a typical anchor block is shown in Figure 91.

Figure 91: Reinforced Anchor Configuration



When a pipeline is properly installed, soil movement is usually a minor force and can be ignored.

The temperature of water in most pipelines changes seasonally and the resulting force is low. For example, most pipelines see a maximum temperature change of less than 20 degrees in a month. This will result in a thrust force of less than 25% of the value for any given pipe/DR in Table 10. In fact, for small thermal changes the soil friction is often sufficient to restrain contraction.