

FAQs about PE Pipe in Water Distribution

1. What is a Design Factor? Is it really the reciprocal of the Safety Factor?

For plastic piping systems, a Design Factor is not the reciprocal of a Safety Factor and these factors are not related in any way. For plastic materials, the Safety Factor addresses short-term load performance and the Design Factor addresses performance under the intended long-term operational loads expected in service.

For a concise technical explanation of Design and Safety Factors, go to this link and read a paper by Jana on this topic:

DESIGN AND SAFETY FACTORS FOR PE4710 MATERIALS UNDER THE
PROPOSED REVISION TO A WWA C906
http://www.janalab.com/technical_reports.php

2. Is polyethylene pipe a good product for water distribution?

Polyethylene (PE) pipe is an excellent pipe for water distribution. It has leak-free joints and a proven history of performance in water.

PE pipe is used in water distribution mains and service lines in the UK for 85% of new installations. A similar usage level is found in Italy. Overall in Europe, PE pipe is the favorite pipe material choice for water mains and service lines.

This is true for all first world nations except for the United States and Canada.

3. Some may suggest that PE pipe fails when used in water distribution. Is that true?

No. PE pipe does not fail when properly designed and installed in water distribution. PE pipe is an excellent solution for water distribution. Early generation PE pipe in specific, very aggressive conditions have had reduced service lifetimes. These conditions are found in less than 3% of the United States water utilities. Further, they are known areas and all piping materials are challenged in these areas.

4. Are utilities that use PE pipe happy with it?

End users that use PE pipe for Mains and Service Lines are very happy with it. A statistically significant survey of over 200 water utilities in the United States showed that 95% of the utilities using PE pipe for Mains were very pleased with its performance and 93% were very pleased with its performance in Service Lines.

As a reference, refer the paper at the following link to learn more about the real performance of PE in water distribution and what other utilities think about PE pipe:

PE Pipe Performance in Potable Water Distribution Systems - Past, Present & Future
http://www.janalab.com/file_provider.php?file=HDPE_Final_Report.pdf

5. How can we just change the Design Factor of PE Pipe after all these years?

There is no change in Design Factor for existing A WW A PE Pipe. There is a new class of PE materials (PE 4710) that are being added to the standard which have improved performance over the standard PE

Pipe. This will make the performance of PE Pipe in this application even better. As with any new material, a Design Factor must be developed that is appropriate to its performance capability.

There are 2 key items to understand here:

1. The design factor for existing PE materials was not changed (it remains at 0.5).
2. A new class of high performance HDPE materials, with its own specific elevated requirements and design criteria, is being added to the standard.

6. Some may suggest that this newer PE 4710 Pipe material is unproven and should not be used because it does not have a 5 year history. Is that true?

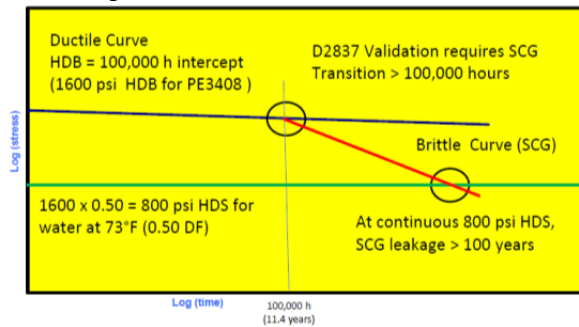
It is not true at all. This newer PE Pipe material has been used in North America for many years and has been used in Europe and the UK for over a decade. Refer to the PPI Case Study web site for more details http://www.plasticpipe.org/municipal_pipe/pe4710-pe100.html

7. Some may ask whether the performance of this newer PE 4710 has been assessed. Is this true?

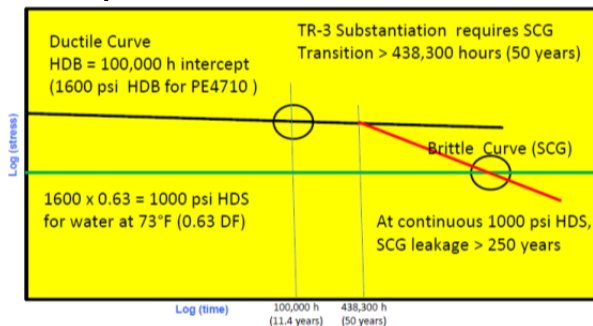
No. The product has been used extensively in Europe for over 20 years of actual successful installations.

As shown in the following charts, the performance requirements for PE4710 materials have been increased over those for PE3408 pipe materials. The net result of these performance requirements is that there is an even greater margin of safety in assuring that PE4710 materials remain in the ductile regime throughout their design life then previously existed for PE3408 materials. The requirements for PE4710 materials effectively ensures that ductile/brittle transition will not occur before a minimum of 250 years at the full 1000 psi design stress, a two and a half times increase in the margin of safety over the current design approach for PE3408 materials (100 years).

Stress Rupture Curve for PE3408 for Water at 73°F



Stress Rupture Curve for PE4710 for Water at 73°F



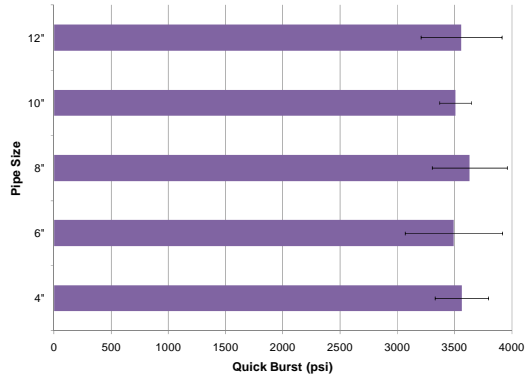
8. Can PE 4710 be used for large diameter pipe applications?

Yes, PE 4710 has been used in large diameter applications. The PE4710 case studies shown in the website are for HDPE pipe up to 55” and have been in service for over a decade.

http://www.plasticpipe.org/municipal_pipe/pe4710-pe100.html

As shown in the following charts, production test data for over 3,000 samples of the same PE4710 material were analyzed for pipes ranging from 4” through 54”. The data clearly demonstrate that the premise that the ductile strength of PE pipe materials is not impacted by pipe diameter holds across a very broad range of pipe diameters.

Average Quick Burst Data for Different Pipe Sizes



Test Results: Average Ring Tensile

