Features & Benefits

Chlorine Resistance

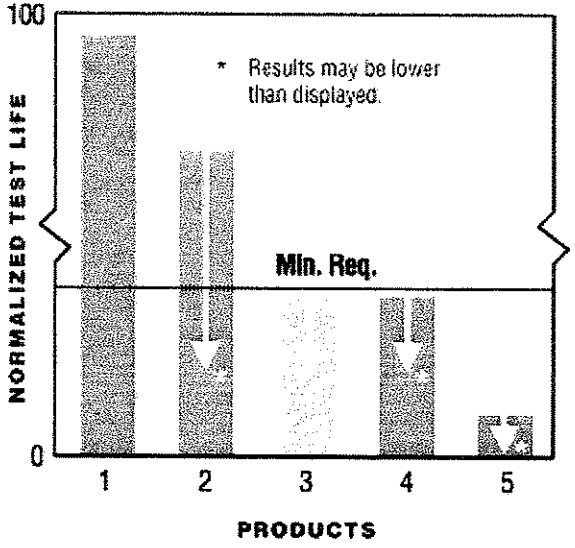
Piping products made with TempRite® PEX eliminate the variables when selecting a flexible piping product. Three major variables affecting PEX piping material used in plumbing systems today are chlorine resistance, UV degradation and a combination of the two. Noveon, however, with its extensive experience and R&D resources, has developed state-of-the-art technology to address these factors and minimize the risk of premature failure.

To help alleviate potential concerns associated with chlorine resistance, NSF International developed a test protocol to evaluate the chlorine resistance of PEX products.

This NSF Cl protocol is a voluntary program for PEX pipe manufacturers. This accelerated test evaluates PEX pipe at high temperature conditions until failure to determine a relative estimate of life expectancy. Only a few PEX products can meet both levels of this protocol testing today. Noveon's TempRite™ PEX product is one.

A more stringent level of the NSF mark is Cl-R. This

Chlorine resistance testing of pipe made with TempRite PEX



1. TempRite PEX
2. Common Silane PEX
3. Peroxide PEX
4. Irradiation PEX
5. Polybutylene

methodology assumes a constant temperature of 60 degrees C in the water system, similar to a recirculating system used in large homes or commercial buildings where the occupants want hot water instantly.

Minimum Requirement. as per NSF P171 Protocol

Noveon has committed to sell only raw materials used in the manufacturing of piping products that surpass NSF P171 Cl-R – the most stringent standard.

Protocol Standard	Service w/o Design Factor	Design Factor (a)	Service with Design Factor	Usage	Temperature
NSF P171 – Cl-TD	80 years	0.5	40 years	25%	60°C (140°F)
NSF P171 – Cl-R	80 years	0.5	40 years	100%	60°C (140°F)
ASTM F2023 / F876	50 years	None	N/A (b)	25%	60°C (140°F)

(a) Design Factor – A multiplier (<1.0) that is applied to the actual service life to take all of the variables and the degree of safety involved in a plastic pressure piping installation into consideration.

(b) Service with the Design Factor for F876 is N/A because there is no design factor

To address this same issue, the American Standard for Testing and Materials has developed ASTM-F2023 standard entitled *Chlorine Test Methodology*. Currently, there is a proposed revision to ASTM F876 entitled *Standard Specification for Crosslinked Polyethylene (PEX) Tubing and Systems to Hot Chlorinated Water* that will initiate a minimum chlorine resistance level for all PEX piping materials. The revised ASTM Standard should be available sometime in the near future.

However, the proposed revision to the ASTM F876 standard doesn't take into consideration the Design Factor as the NSF protocol does. Referring to the Protocol Standard chart, the NSF Cl-R protocol allows for 80 years of service at 100 percent hot water usage versus the ASTM F876 standard that allows for 50 years of service at 25 percent hot water usage.

What caused these historic failures? Studies show a direct correlation between chlorine and other additives in the water supply and premature failure. It has been further documented that this attack is accelerated by higher temperatures.

Testing indicates that the mode of failure for polybutylene and PEX can be similar and therefore must be

addressed through product design.

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