



NSF CERTIFICATION OF POLYETHYLENE GAS PIPE

Third-party certification of gas piping and distribution systems provides utility engineers, regulators, manufacturers and communities the assurance that products are independently certified to meet specific industry standards. Testing and certification of these products can help reduce liability, increase confidence and product acceptance, and help guarantee product consistency by meeting all applicable requirements.

In many regulatory schemes such as waterworks regulations, plumbing and mechanical codes, third-party testing and certification is a requirement for plastic piping. Currently there are no regulations that require independent verification that utility gas piping and other distribution components meet required safety standards. Quite often, gas utilities only require that manufacturers independently declare that their products meet appropriate standards.

NSF International's testing and certification process for polyethylene gas piping to ASTM D2513 - *Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings*, CSA B137.4, *Polyethylene (PE) piping systems for gas services* and NSF/ANSI 14: *Plastics Piping System Components and Related Materials* helps ensure the quality and safety of gas piping and distributions systems. NSF/ANSI 14 is a broad-based standard that establishes the basic requirements and structure for the listing of plastic piping for a variety of end uses such as gas, potable water, geothermal, drain, waste, vent, industrial, fire safety, and heating and cooling applications. Obtaining certification to NSF/ANSI 14 requires product formulation registration, facility inspections, materials and product testing, quality control testing and annual reviews. Certified products appear in NSF's official listings at www.nsf.org/certified-products-systems.

FORMULATION REGISTRATION

NSF obtains the full formulation of any product submitted for certification including the trade name, supplier and quantity of each ingredient. Once this information is deemed to comply with the standard, NSF registers the formulation as belonging to the company. The manufacturer cannot deviate from the registered formulation without obtaining prior approval for a change to the registered formulation. NSF keeps the formulations confidential.



FACILITY INSPECTIONS

NSF requires three unannounced inspections annually for each certified production location. The inspections include verification that the products continue to be produced using the same formulation and suppliers as submitted during the formulation registration. NSF inspectors verify quality control testing is conducted by the manufacturer at the frequencies outlined in NSF/ANSI 14. Samples of products are collected for independent annual monitoring testing.



MATERIALS TESTING

Materials for use in polyethylene gas systems must meet the following requirements:

- > Hydrostatic design stress and hydrostatic design basis rating with the Plastics Pipe Institute (PPI)
- > Hydrostatic design basis (HDB) substantiation of 50 years
- > Material properties test according to ASTM D3350 for density, melt index, flexural modulus, tensile strength at yield, slow crack growth resistance, hydrostatic strength classification, color and UV stabilization
- > Rapid crack propagation (RCP) resistance in accordance with ISO 13477 or ISO 13478

PRODUCT TESTING

Polyethylene pipe is independently tested for:

- > Diameter, wall thickness, ovality and eccentricity
- > Chemical resistance to mineral oil, tert-butyl mercaptan (5 percent in mineral oil), toluene (15 percent in methanol) and antifreeze agents such as methanol or ethylene glycol
- > Minimum hydrostatic burst pressure
- > Apparent ring tensile strength (replaces burst testing for sizes greater than 4")
- > Short-term pressurization for sizes above 12"
- > HDB validation
- > 1,000 hours sustained pressure test at 73° F
- > Elevated temperature service
- > Melt index
- > Environmental stress crack resistance (ESCR)
- > 1,000 hours sustained pressure test after pipe squeeze off
- > Thermal stability
- > Bend back or elongation at break test
- > Marking

FORMULATION CHANGES

Manufacturers are always trying to find cost-competitive alternative ingredients for use in their products. Prior to a manufacturer making a change to its certified products, it must submit the change to NSF for approval. NSF will then make a determination on whether the change will have any effect on the long-term strength or other performance requirements. Testing may be required prior to authorizing the change in ingredients or processing. It is not common for a certifier to receive several formulation changes in the course of a year.



QUALITY CONTROL TESTING

NSF/ANSI 14 and ASTM D2513 require manufacturers to perform critical quality control testing at each production facility at specified frequencies. Table 1 on the next page shows the quality control testing required for polyethylene gas piping. NSF inspectors ensure the plant quality program includes quality testing at required frequencies, that records are retained and that non-compliant products are scrapped.



Table 1. Required Quality Control Testing of Polyethylene Gas Piping for ASTM D2513 and CSA B137.4

TEST	FREQUENCY
Dimension	According to ASTM D2513 Annex A1 and CSA B137.4 Table 4.
Burst Pressure/ Ring Tensile	Every 8 hours or multi-level plan per ASTM D2513 Annex A1 and CSA B137.4, Table 4.
Chemical Resistance	Annually
Elevated Service Temperature	Annually
Sustained Pressure Test	Annually
Melt Index	Annually
Squeeze Off	Annually
Thermal Stability	Annually
Inside Surface Ductility	Annually

PRODUCT LISTING

Once a manufacturer has met all testing, inspection and policy requirements, it may print the NSF mark on its product. This mark demonstrates that NSF has independently certified the product to the applicable standards. NSF also publishes the name of the manufacturer, products, sizes and other applicable information in its official listings at www.nsf.org/certified-products-systems.

ANNUAL TESTING

To maintain certification, NSF tests collected samples each year to ASTM D2513. Manufacturers are provided a test report with the results. If the product continues to meet the requirements of the standard, the product can continue to bear the NSF mark.

FAILURES

Manufacturers sign a contract with NSF that allows them to only mark products that meet all standard and policy requirements. If a product fails testing, the manufacturer is then obligated to place a hold on the production of any product with the NSF mark. NSF will report the failure and ask the manufacturer to implement corrective action. Once the manufacturer provides a corrective action plan, NSF will re-inspect the production location and re-collect samples for laboratory testing. If the re-testing supports successful corrective action, the manufacturer may continue production. If the re-test sample also fails, the product is removed from NSF listings. NSF also has the authority via contract to issue public notice or request product recall on non-compliant products.

ACCREDITATION

NSF is accredited by the American National Standards Institute (ANSI) and Standard Council of Canada (SCC). ANSI and SCC attest that NSF is qualified and competent to conduct testing, perform inspections and make decisions on listing products specific to the industry they serve. In addition, NSF's test labs are accredited to ISO/IEC 17025 and NSF's U.S. lab is an OSHA Nationally Recognized Testing Laboratory.

CERTIFICATION

Utilities specifying product certification by NSF can derive the benefit of an independent evaluation of product performance. These independent services come at no cost to the utility and may be the best way to ensure quality in products purchased.

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Cite as: NSF International. October 2018. NSF Certification of Polyethylene Gas Pipe. NSF: Ann Arbor, MI.

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E plastics@nsf.org | www.nsf.org