

# Engineering Specifications

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## PUREFLOW PEX PRODUCTS

### PART 1 – GENERAL

#### 1.1 SUMMARY

- 1.1.1 This specification covers Branch & Main, Parallel Water Distribution Systems (MANABLOC), Cross-linked Polyethylene tubing and fittings using PEX Press and PEX Crimp technology for hot and cold water distribution systems. The system is assembled when the fitting barb is inserted fully into the tubing and either a stainless press sleeve or copper crimp ring is pressed/crimped over the tubing and fitting using the appropriate tool to create a leak proof permanent joint.

#### 1.2 REFERENCES

- 1.2.1 ASTM F876 specification for Cross-linked Polyethylene (PEX) tubing
- 1.2.2 ASTM F877 specification for Cross-linked Polyethylene (PEX) plastic hot and cold water distribution systems.
- 1.2.3 ASTM F2023 test method for evaluating the oxidative resistance of Cross-linked (PEX) tubing and systems to hot chlorinated water.
- 1.2.4 ASTM F1807 specification for metal insert fittings utilizing a copper crimp ring for SDR9 Cross-linked Polyethylene (PEX) tubing
- 1.2.5 ASTM F2159 specification for plastic insert fittings utilizing a copper crimp ring for SDR9 Cross-linked Polyethylene (PEX) tubing
- 1.2.6 CSA CAN/CSA B137.5 Cross-linked Polyethylene (PEX) tubing systems for pressure applications.
- 1.2.7 NSF 14 – plastic piping component and related materials
- 1.2.8 NSF 61 – drinking water system components – health effects
- 1.2.9 AWWA C651 standard for disinfecting water mains
- 1.2.10 IAPMO Uniform Plumbing Code
- 1.2.11 IAPMO Uniform Mechanical Code
- 1.2.12 ICC International Plumbing Code
- 1.2.13 ICC International Mechanical Code
- 1.2.14 NAPHCC National Standard Plumbing Code
- 1.2.15 cULus - UL 1821 listing for Multipurpose residential fire sprinkler systems (ViegaPEX Ultra Black and PEX Press fittings in 3/4" - 2" sizes only).

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## 1.3 QUALITY ASSURANCE

- 1.3.1 The installer shall be a qualified installer, licensed within the jurisdiction, and familiar with the installation of Cross-linked Polyethylene (PEX) tubing systems.
- 1.3.2 The installation of Cross-linked Polyethylene (PEX) tubing for hot and cold water distribution systems shall conform to the requirements of the ICC International Plumbing Code or IAPMO Uniform Plumbing Code.

## 1.4 DELIVERY, STORAGE AND HANDLING

- 1.4.1 The Cross-linked Polyethylene (PEX) tubing shall be shipped to the job site on truck or in such a manner to protect the tubing. The Cross-linked Polyethylene fittings and manifolds shall not be handled rough during shipment. The tubing and fittings shall be unloaded with reasonable care.
- 1.4.2 Cross-linked Polyethylene plastic tubing and fittings shall be stored in a flat, dry, well ventilated location, not exposed to direct sunlight. Normal care in handling shall be exercised to avoid abuse of the tubing. The tubing and fittings shall not be thrown or dropped on the ground, walked on, or dragged.

## 1.5 PROJECT CONDITIONS

- 1.5.1 The location of a manifold with valves shall be accessible and in an area not subject to freezing. Proper support of the manifold shall be provided.
- 1.5.2 PEX tubing should not be left exposed in direct sunlight for extended periods of time – short periods not to exceed 60 days are permissible.
- 1.5.3 Plastic manifolds and fittings should not be left exposed in direct sunlight for extended periods of time – short periods not to exceed 15 days are permissible.

## 1.6 WARRANTY

- 1.6.1 The tubing and fittings manufacturer shall warrant that the tubing and fittings are free from defects and conform to the designated standard. The warranty shall only be applicable to tubing and fittings installed in accordance with the manufacturer's installation instructions.
- 1.6.2 The manufacturer of the tubing and fittings shall not be responsible for improper use, handling, or installation of the products.

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## PART 2 – PRODUCTS

### 2.1 MANUFACTURERS

2.1.1 PureFlow Water System: ViegaPEX, ViegaPEX Ultra, ViegaPEX Barrier, and FostaPEX manufactured by Viega LLC, 301 N. Main Street, Floor 9, Wichita, KS 67202, 316-425-7400.

### 2.2 MATERIAL

2.2.1 Tubing Standard: ViegaPEX High-Density Cross-linked polyethylene tubing shall be manufactured to the requirements of ASTM F876 and meet the standard grade hydrostatic pressure ratings from Plastic Pipe Institute in accordance with TR-4/03. The following three standard grade ratings are required.

- 200 degrees F (93 degrees C) at 80 psig (551 kPa)
- 180 degrees F (82 degrees C) at 100 psig (689 kPa)
- 73.4 degrees F (23 degrees C) at 160 psig (1102 kPa)

2.2.1.1 Chlorine testing: According to ASTM F876 shall meet or exceed the following end use condition.

- End use conditions of : 100% @ 140°F
  - o Per PEX 5006 (CL5) or NSF P171 (CLR)

2.2.2 Tubing Standard: FostaPEX High-Density Cross-linked polyethylene tubing shall be manufactured to the requirements of ASTM F876 and meet the standard grade hydrostatic pressure ratings from Plastic Pipe Institute in accordance with TR-4/03. The following three standard grade ratings are required.

- 200 degrees F (93 degrees C) at 80 psig (551 kPa)
- 180 degrees F (82 degrees C) at 100 psig (689 kPa)
- 73.4 degrees F (23 degrees C) at 160 psig (1102 kPa)

2.2.3 Fitting Standard: PEX Press fittings shall be manufactured from UNS C83600, C87700 or C87710 Bronze and meet the requirements of ASTM F877 tested as a system with ViegaPEX tubing. The PEX Press sleeve shall be manufactured out of a 304 grade or better stainless steel and have one to three view holes incorporated in it to ensure proper PEX tubing insertion.

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- 2.2.4 Fitting Standard: PEX Crimp fittings for use with copper crimp rings shall be manufactured from UNS C36000, C37700, C69300 or C87850 Brass / Eco Brass® meeting the requirements of ASTM F1807 and or PolyAlloy™ polymer meeting the requirements of ASTM F2159. The PEX Crimp connection shall be made by use of a full circle crimp tool designed to crimp F1807 copper crimp rings.
- 2.2.5 Manifolds: Acceptable manifolds shall include:
- Copper Manifolds: Shall be copper material having a male or female solder, ProPress or PEX Crimp inlets. All outlets shall be PEX Press, PEX Crimp or ProPress fittings. Shall be provided by the Cross-linked Polyethylene system manufacturer.
  - Polymer Manifolds: Shall be plastic material having a male NPSM thread, PEX Press or PEX Crimp inlets. All outlets shall be PEX Press, PEX Crimp, or PEX compression connections provided by the PEX system manufacturer.
- 2.2.6 Adapter Fittings: PEX adapter fittings shall conform to one of the following ASTM standards; F877, F1807, F2159, or ASME B1.20.1 and be listed to the CSA B137.5. The adapter fittings shall mate to NPT threads, copper tubing, copper fittings or ProPress fittings.

## 2.3 SOURCE QUALITY CONTROL

- 2.3.1 The PEX tubing and fitting manufacturer shall maintain a third party listing of the tubing and fittings. The tubing and fittings shall be certified in accordance with ANSI/NSF 14/61 to verify suitability to transport potable water. The tubing and fittings shall have the mark “NSF-pw”, “cNSF® us pw-G”, or “NSF 61” permanently marked on the product to verify the material listing.
- 2.3.2 The manufacturer of the PEX tubing and fittings shall maintain a quality control program in accordance with ISO 9001 or NSF International in the manufacturing plant to assure that the tubing and fittings are continually being produced to the required standard. The tubing and fittings shall be certified as complying with NSF 14.

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## PART 3 – EXECUTION

### 3.1 EXAMINATION

- 3.1.1 The installing contractor shall carefully examine the PEX tubing for defects, cuts, abrasions, cracks, fading color, or blemishes. There shall be no cracks or heavy deformations of the tubing. Fittings and manifolds shall be checked for any signs of abuse. Any damaged tubing or fittings shall be rejected.

### 3.2 PREPARATION

- 3.2.1 ViegaPEX Tubing: Cross-linked Polyethylene tubing shall be cut with a PEX tubing cutter. The tubing shall be cut squarely and neatly to permit a proper connection between the tubing and fitting.
- 3.2.2 FostaPEX Tubing: Cross-linked Polyethylene tubing shall be cut with a PEX cutter. The tubing shall be cut squarely and neatly to permit a proper connection between the tubing and fitting. The outer polyethylene and aluminum layers shall be removed with a Viega supplied prep tool leaving the inner PEX tubing to accept the PEX Press fitting and stainless press sleeve. The prep tool shall have an internal stop to ensure proper length of exposed inner PEX tubing.

### 3.3 INSTALLATION GENERAL LOCATIONS

- 3.3.1 Plans indicate general location and arrangement of PEX system. Identified locations and arrangements are used to size pipe and calculate friction and loss and other design considerations. Install PEX tubing as indicated, except where deviations to layout are approved on coordination drawings.

### 3.4 INSTALLATION, PEX TUBING

- 3.4.1 Pressure Rating: Install components having a pressure rating equal to or greater than the system operating pressure.
- 3.4.2 Install PEX tubing that is free of blemishes, cuts, gouges, kinks or noticeable fading of color.
- 3.4.3 Changes in Direction: PEX tubing shall not exceed an eight times the tubing outside diameter (OD) free bend radius or a five times the tubing OD supported bend radius, with use of a Viega approved bend support. Install fittings for changes in direction where any minimum bend radius is exceeded and branch connections.

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- 3.4.4 PEX Press Connections: Bronze PEX Press fittings shall be made in accordance with the manufacturer's installation instructions. The Stainless press sleeve shall be placed over the end of the squared off PEX tubing while fully inserting the fitting barb into the tubing. Full tubing insertion shall be verified by a visual confirmation of PEX being present through the view holes before engaging a press connection. The PEX Press connection shall be made with a Viega supplied ratcheting PEX Press hand tool or PEX Press power tool.
- 3.4.5 PEX Crimp Connections: PEX Crimp fittings shall be made in accordance with the manufacturer's installation instructions. The copper crimp ring shall be placed over the end of the squared off PEX tubing then the PEX Crimp fitting fully inserted into the tubing. Position the crimp ring 1/8" to 1/4" from the end of the tubing before engaging a crimp connection. The PEX Crimp connection shall be made with a Viega supplied full circle crimp tool or equivalent.
- 3.4.6 Threaded Joints: Threaded joints shall have a potable water listed joint sealant tape applied to the male threads only. Tighten joint with a wrench and backup wrench as required.
- 3.4.7 PEX Tubing Protection: Protect PEX tubing from exposure to direct and indirect sunlight exposure. PEX tubing shall be stored under cover, shielded from direct and indirect sunlight when material is stored for any length of time.
- 3.4.8 Penetration Protection: Provide allowance for thermal expansion and contraction of PEX tubing passing through a wall, floor, ceiling or partition by wrapping with pipe insulation, or by installing through an appropriately sized sleeve. Penetrations of fire resistance rated assemblies shall maintain the rating of the assembly.
- 3.4.9 Backfill Material: Back fill material must be free of large rocks, glass, or other sharp objects which can damage the PEX tubing.
- 3.4.10 Horizontal Support: PEX tubing must be supported every 32" horizontally with Viega approved suspension clips or plastic insulators.
- 3.4.11 Vertical Support: PEX tubing must be supported at each floor or ceiling penetration and every four feet in between.

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## 3.5 FIELD QUALITY CONTROL

- 3.5.1 Water Testing: The PEX tubing system shall be pressure tested in accordance with local code after installation or to at least minimum system working pressure, no less than 40 psi, and for a period of no less than 15 minutes. Water used for this testing shall come from a potable water source. Test should not exceed pressure rating of PEX tubing and shall have no leaks.
- 3.5.2 Air Testing: In lieu of a water test, the PEX tubing system shall be air tested in accordance with local code after installation, or at least system working pressure, no less than 40 psi and no greater than 100 psi. The test shall be conducted for a period of no less than 15 minutes and shall have no leaks.

## 3.6 CLEANING

- 3.6.1 Disinfection: The PEX hot and cold water distribution system may require system disinfection. When no other method is available, follow the time limitations and exposure levels listed below.
  - 3.6.1.1 Flush the system with potable water until discolored water does not appear at any of the outlets.
  - 3.6.1.2 Fill the system with a water chlorine solution containing at least 50 parts per million of chlorine. The system shall be valved in the closed position and to stand for 24 hours. Alternatively, the system shall be filled with water chlorine solution containing at least 200 parts per million of chlorine. The System shall be valved in the closed position and allowed to stand for 3 hours.
  - 3.6.1.3 Following the standing time, the system shall be flushed with water until the chlorine is purged from the system.

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