



NSF International

Special Engineered Specification
NSF SE 8225

CPVC Pipe made to Copper
Tube Size (CTS)

The Public
Health and Safety
Company.™



NSF SE 8225

SPECIFICATIONS FOR A SPECIAL ENGINEERED (SE) PRODUCT

CPVC Pipe made to Copper Tube Size (CTS)

1. Scope of Specification:

This specification defines the product specific requirements for testing, marking, in-plant quality control (QC) for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot-and-Cold-Water Pipe manufactured to SDR 13.5 Copper Tube Size (CTS), from material having an HDB of either 4000 psi @ 73° F and 1250 psi @ 180° F; or 4500 psi @ 73° F and 1250 psi @ 180° F

2. Application:

Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Hot-and-Cold-Water Pipe manufactured to SDR 13.5 Copper Tube Size (CTS) certified against this specification are authorized for use in cold and hot water potable water applications.

3. Reference Documents:

ASTM Standards:

ASTM D 618 – Practice for Conditioning Plastics for Testing

ASTM D 1598 – Test Method for Time-to-Failure of Plastic Pipe Under Constant Internal Pressure

ASTM D 1599 – Test Method for Resistance to Short-Time Hydraulic Pressure of Plastic Pipe, Tubing, and

Fittings

ASTM D 1600 – Terminology for Abbreviated Terms Relating to Plastics

ASTM D 1784 – Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl

Chloride) (CPVC) Compounds

ASTM D 1898 – Practice for Sampling Plastics

ASTM D 2122 – Test Method for Determining Dimensions of Thermoplastic Pipe and Fittings

ASTM D 2837 – Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products

ASTM D2846 – Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Hot-and-Cold -Water Distribution Systems

ASTM F 412 – Terminology Relating to Plastic Piping Systems

NSF Standards:

NSF/ANSI Standard 61 – Drinking Water Systems Components – Health Effects

4. Materials:

4.1 – Physical Properties Requirements – Pipe produced against this specification shall be produced from materials meeting or exceeding a 23447 cell class when tested against the requirements of ASTM D1784.

4.2 – Rework Material – The use of clean, rework material of the same formulation from the same manufacturer is acceptable provided that the finished products meet the requirements of the applicable product standard(s). Plastic piping system components and related materials shall be manufactured in such a way as to prevent contamination.

4.3 – HDB Rating – CPVC materials used in the production of pipe made against this specification shall exceed the minimum Long Term Hydrostatic Strength Requirements of ASTM D2846 as identified below:

Option #	HDB @ 73°	HDB @ 180°
A	4000	1250
B	4500	1250



5.0 Testing Requirements:

Except as noted hereafter, pipe produced against this specification shall comply with the requirements identified in ASTM D2846.

5.1 – Workmanship – Pipe produced against this specification shall not, upon a visual inspection, contain imperfections that would interfere with the performance of the water distribution system it is used with.

5.2 – Dimensions

5.2.1 – Outside Diameter – The outside diameter of pipe produced against this specification shall comply with the values in Table 1.

5.2.2 – Wall Thickness – The wall thickness of pipe (greater than 1/2”) produced against this specification shall comply with Table 1. Pipe sizes smaller than 1/2” shall be against the manufacturer’s specifications. This measurement shall allow the CTS SDR 13.5 pipe produced against this specification to comply with the requirements of sections 5.3 through 5.4.

5.2.3 – Wall Thickness Range – The wall thickness of pipe produced against this specification shall be within 12% when measured in accordance with test method ASTM D2122.

Table 1 – Dimensions

NOMINAL SIZE		O.D. AVERAGE		O.D. TOLERANCE		WALL THICKNESS		THICK. TOLERANCE
IN	MM	IN	MM	IN	MM	IN	MM	IN
1/2"	15.9	0.625	+/-0.08	+/-0.003	1.40	0.055	+0.51	+0.020
3/4"	22.2	0.875	+/-0.08	+/-0.003	1.65	0.065	+0.51	+0.020
1"	28.6	1.125	+/-0.08	+/-0.003	2.12	0.083	+0.51	+0.020
1-1/4"	34.9	1.375	+/-0.08	+/-0.003	2.59	0.102	+0.51	+0.020
1-1/2"	41.3	1.625	+/-0.10	+/-0.004	3.06	0.120	+0.51	+0.020
2"	54.0	2.125	+/-0.10	+/-0.004	4.00	0.157	+0.58	+0.023

5.3 – Flattening – Pipe produced against this specification shall comply with the Flattening requirements of ASTM D2846.

5.4 – Hydrostatic Sustained Pressure

A minimum of six pipes shall be tested in accordance with Section 9.3 of ASTM D2846 with the exception that the test pressure shall be selected from, Table 2 of this document.

5.5 – Potable Water Applications – For Potable Water applications, pipe produced against this specification shall comply with NSF/ANSI Standard 61.



Table 2 – Requirements for CPVC 4120 SDR 13.5, Pipe & Tubing Tested in either Water or Air Bath External Environment at 180°F [82°C]^A

Test Condition	Test Duration	Hydrostatic Test Pressure	
		Water Bath	Air Bath
A	6 min	439 psi (3 030 kPa)	464 psi (3 200 kPa)
B	4 h	321 psi (2 210 kPa)	355 psi (2 450 kPa)

^A Test conditions were calculated from the following experimentally derived, 95% confidence, rupture pressure versus time relationships for CPVC 41 SDR 13.5 pipe and tubing at 180°F [82°C]. Pressure, *P*, and time, *t*, are in psi and h respectively. The 50% confidence relationships are given for information only.

$$\log P = -0.072523 \log t + 2.663645 \quad (50\% \text{ confidence in air})$$

$$\log P = -0.072523 \log t + 2.593064 \quad (95\% \text{ confidence in air})$$

$$\log P = -0.084695 \log t + 2.627449 \quad (50\% \text{ confidence in water})$$

$$\log P = -0.084695 \log t + 2.557572 \quad (95\% \text{ confidence in water})$$

6. Product Marking:

6.1 – Marking on pipe complying with this specification shall consist of the following:

- Manufacturer's name (or trademark)
- Production code
- Certification mark of the agency making the evaluation.
- Identification of the pressure rating at both ambient temperature and 180°F on the pipe. For example: 100 psi @ 180°F and 320 psi @ 73°F
- SDR 13.5
- 23447 Cell class
- Nominal size
- Material Designation – For example; CPVC 4120-06
- Code identifying the material and the date of production

7. In-plant Q.C. Requirements:

The following tests are to be performed at start-up and designated frequencies thereafter and performed in accordance with Section 5 of this document

Test	Frequency
Dimensions	2 h
Pipe Outside Diameter	
Pipe Wall Thickness	
Pipe Out Of Round	
Flattening resistance	Annually
Sustained pressure	Weekly