INDUSTRY STANDARDS

OVERVIEW

Minimum product standards for piping components provide the specifying engineer and consumer with the confidence that the thermoplastic piping products will perform as intended. The most frequently referenced standards for Colonial products are listed here as well as installation standards for joining and buried pipe.

ASTM

Voluntary-consensus standards are updated annually by the American Society for Testing and Materials (ASTM). Most appear in volume 08.04, Plastic Pipe and Building Products.

American Society for Testing
and Materials (ASTM)
100 Barr Harbor Drive
West Conshohocken, PA 19428-2959
Phone: (610) 832-9500
Fax: (610) 832-9555
Web site: www.astm.org
E-mail: service@astm.org

PVC & CPVC MATERIALS
ASTM D-1784
Classifies compounds by minimum physical and chemical properties into cell classifications.

POLYPROPYLENE MATERIALS
ASTM D-4101
Classifies injection (formerly D-2146) molding and extrusion grades according to physical properties.

PVDF MATERIALS
ASTM D-3222
Covers polymerization method and classifies compounds by physical properties.

PVC SCH 40, 80 & 120 PIPE
ASTM D-1785
Outlines dimensional specifications, burst strength and maximum operating pressures.

CPVC SCH 40 & 80 PIPE
ASTM F-441
Outlines dimensional specifications, burst strength and maximum operating pressures.

PVC SCH 40 FITTINGS
ASTM D-2466
Outlines specifications for wall thickness and socket and thread dimensions.

PVC SCH 80 FITTINGS
ASTM D-2467
Outlines specifications for wall thickness and socket dimensions.

PVC SCH 80 FITTINGS
ASTM D-2464
Outlines specifications for wall thickness and thread dimensions.

CPVC SCH 80 FITTINGS
ASTM F-439
Outlines specifications for wall thickness and socket dimensions.

CPVC SCH 80 FITTINGS
ASTM F-437
Outlines specifications for wall thickness and thread dimensions.

CPVC-CTS (COPPER TUBE SIZE) FITTINGS
ASTM D-2846
Outlines specifications for wall thickness and socket and thread dimensions for hot and cold water distribution systems.

CPVC SOLVENT CEMENT SPECIFICATION
ASTM F-493

PVC SOLVENT CEMENT SPECIFICATION
ASTM D-2564

PVC SOLVENT CEMENTING PROCEDURE
ASTM D-2855

PRIMERS FOR SOLVENT CEMENTING
ASTM F-656

UNDERGROUND INSTALLATION OF THERMOPLASTIC PRESSURE PIPING
ASTM D-2774

UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY-FLOW APPLICATIONS
ASTM D-2321

SELECTION, DESIGN, AND INSTALLATION OF THERMOPLASTIC WATER PRESSURE PIPING SYSTEMS
ASTM F-645

ANSI

Some ASTM standards are adopted verbatim and labeled as the ANSI (American National Standards Institute) standard on the subject. Some specific ANSI standards for threading, flanges, calibration, etc., are referenced in some sections of the ASTM standard.

American National Standards
Institute (ANSI)
11 West 42nd Street
New York, NY 10036
Phone: (212) 642-4900
Fax: (212) 398-0023

ANSI SPECIFICATION FOR TAPER PIPE THREADS

ANSI B1.20.1. ASTM F-645
(formerly B2.1)

ANSI SPECIFICATION FOR BOLT HOLE PATTERNS FOR CLASS 150 STEEL FLANGES

ANSI B16.5

NSF INTERNATIONAL

NSF International acts as a third party certification agency which tests and certifies that certain products do, in fact, meet the manufacturing standard or specifications claimed. Further, they may also test material and parts to verify compliance to NSF International health standards for potable water use. The World Health Organization (WHO) has designated NSF International as the collaborative center for drinking water safety and treatment.

NSF International
789 Dixboro Road
P.O. Box 130140
Ann Arbor, MI 48113-0140
Phone: (800) 769-8010
Fax: (734) 769-0109

STANDARD 14

This standard provides specifications for toxicological and organoleptic levels of contamination to determine the suitability of plastic piping for potable water service. It further specifies minimum quality control programs and the adherence to specific standards to which products are made. To meet this standard, a manufacturer allows NSF to sample and test products to verify that they do, in fact, conform.

STANDARD 61

This newer standard was developed to establish minimum requirements for control of potential adverse human health effects from products which contact drinking water. It does not attempt to include product performance requirements but conformance to NSF 61 is a prerequisite for NSF Standard 14 certification.

STANDARD 14 SPECIAL ENGINEERING APPURTENANCE PROGRAM (S.E.)

This standard is sometimes referred to simply as the NSF S.E. program. The NSF S.E. program establishes product performance requirements where no directly applicable ASTM specifications exist. NSF S.E. specifications are developed from a combination of applicable portions of ASTM specifications and manufacturers' design specifications as a standard for conformance verification.

DIN

Deutsches Institut Fur Normung (DIN). German (West) Standards like ASTM standards are also published annually. English translations of these standards can be obtained from the Cleveland Public Library, Photo Duplication.

Deutsches Institut Fur Normung (DIN)
Phone: (216) 623-2901
Fax: (216) 623-7078

DIN 3441

Part 1: Requirements and testing of PVC valves. This standard issued in 1982 and revised in 1989 is, as of 1996, the only published consensus standard for PVC plastic valves. Many DIN requirements will be incorporated in an expected ASTM standard. Of particular interest, thermoplastic valves must meet a long-term hydrostatic test based upon their assigned room temperature pressure ratings (see example below).

Test Temperature: 20°C (68°F)
Test Duration: 1 hour @ 4.2 X maximum pressure rating and 1000 hours @ 3.2 X maximum pressure rating.

STANDARDS BY PRODUCT LINE

PVC VALVES
True Union, Single Union, Multi-Port, MIP (Molded In Place), Compact (Super "C"), Ball Check, Butterfly

ASTM D-1784	Material Standard
ASTM D-2467	Socket Dimensions
ASTM D-2464	Thread Dimensions
ASTM D-2564	PVC Solvent Cement
ASTM D-2855	PVC Solvent Cementing Procedure
ASTM F-656	Primers for Solvent Cementing
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
ANSI B16.5	Class 150 Steel Flange Hole Pattern
DIN 3441	Requirements and Testing of PVC Valves *(True Union, Single Union & Multi-Port valves only.)*

CPVC VALVES
True Union, Single Union, Multi-Port, MIP (Molded In Place), Compact (Super "C"), Ball Check

ASTM D-1784	Material Standard
ASTM F-439	Socket Dimensions
ASTM F-437	Thread Dimensions
ASTM F-493	CPVC Solvent Cement
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
ANSI B16.5	Class 150 Steel Flange Hole Pattern
DIN 3441	Requirements and Testing of PVC Valves *(CPVC True Union, Single Union & Multi-Port valves meet the pressure testing requirements of this standard.)*

PP VALVES
True Union, Single Union, Multi-Port, Ball Check

ASTM D-4101	Polypropylene Materials
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)

PVDF VALVES
True Union, Single Union, Ball Check

ASTM D-3222	PVDF Materials
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
DIN 3441	Requirements and Testing of PVC Valves *(PVDF True Union & Single Union valves meet the pressure testing requirements of this standard.)*

CPVC CTS (COPPER TUBE SIZE) VALVES

ASTM D-1784	Material Standard
ASTM D-2846	Dimensional Specifications (sockets, threads and wall thickness)
ASTM F-493	CPVC Solvent Cement
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
NSF14/61	Potable Water

PVC SCH 40 FITTINGS
(White or Gray)

ASTM D-1784	Material Standard
ASTM D-2466	Dimensional Specifications
ASTM D-2774	Buried Pipe Specifications
ASTM D-2564	PVC Solvent Cement
ASTM D-2855	PVC Solvent Cementing Procedure
ASTM F-656	Primers for Solvent Cementing
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
NSF14/61	Potable Water

PVC SCH 80 FITTINGS
(Gray)

ASTM D-1784	Material Standard
ASTM D-2467	Dimensional Specifications (sockets)
ASTM D-2464	Dimensional Specifications (threads)
ASTM D-2774	Buried Pipe Specifications
ASTM D-2564	PVC Solvent Cement
ASTM D-2855	PVC Solvent Cementing Procedure
ASTM F-656	Primers for Solvent Cementing
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
NSF14/61	Potable Water
ANSI B16.5	Class 150 Flange Hole Pattern

CPVC SCH 80 FITTINGS (Gray)

ASTM D-1784	Material Standard
ASTM F-439	Dimensional Specifications (sockets)
ASTM F-437	Dimensional Specifications (threads)
ASTM D-2774	Buried Pipe Specifications
ASTM F-493	CPVC Solvent Cement
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
NSF14/61	Potable Water
ANSI B16.5	Class 150 Flange Hole Pattern

CPVC CTS (COPPER TUBE SIZE) FITTINGS (Tan)

ASTM D-1784	Material Standard
ASTM D2846	Dimensional Specifications (sockets, threads and wall thickness)
ASTM F-493	CPVC Solvent Cement
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
NSF14/61	Potable Water

PVC SCH 40 PIPE

ASTM D-1784	Material Standard
ASTM D-1785	Dimensional Specifications
ASTM D-2774	Buried Pipe Specifications
NSF14/61	Potable Water

PVC SCH 80 PIPE

ASTM D-1784	Material Standard
ASTM D-1785	Dimensional Specifications
ASTM D-2774	Buried Pipe Specifications
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
NSF14/61	Potable Water

CPVC SCH 80 PIPE

ASTM D-1784	Material Standard
ASTM F-441	Dimensional Specifications
ASTM D-2774	Buried Pipe Specifications
ANSI B1.20.1	Taper Pipe Threads (formerly B2.1)
NSF14/61	Potable Water

ADDITIONAL READING

1. Wayne Ulanski, "Valve and Actuator Technology," McGraw-Hill, Inc. (1991)
2. Ron D. Bliesner, "Designing, Operating and Maintaining Piping Systems Using PVC Fittings," PVC Fittings Division of the Irrigation Association (February 3, 1987)
3. Richard B. Choate, "Turf Irrigation Manual," Weather-matic Division of Telsco Industries (1994)
4. David A. Chasis, "Plastic Piping Systems," Industrial Press Inc. (1988)
5. Mohinder L. Nayyar, P.E., "Piping Handbook," McGraw-Hill, Inc. (1992)
6. Michael Frankel, "Facility Piping Systems Handbook," McGraw-Hill, Inc. (1996)
7. "The Effects of Ultraviolet Aging on PVC Pipe," a technical report by Uni-Bell Plastic Association, 2655 Villa Creek Drive, Suite 155, Dallas Texas 75234, (972) 243-3902 (UNI-TR-5-81)

FYI

The Bliesner Report was developed as a guide to assist in the design, operation and maintenance of PVC piping systems. This concise, easy-to-read report is available through Colonial Engineering, Inc.