



UL 1821

STANDARD FOR SAFETY

Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service

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UL Standard for Safety for Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service, UL 1821
Second Edition, Dated April 23, 2003

Summary of Topics

This revision to ANSI/UL 1821 includes the following changes in requirements:

Revise Section 9 to Include References to Pipe Threads other than NPT into the Standard

Update the Initial Boiling Point Specification for the Heptane Fuel used in the Fire Test

Delete the Reference to Mercury Gauges

Add a New Definition of Nominal Pipe Size (NPS) and Reference NPS or Nominal Pipe Size in the Appropriate Sections

Add Test Method and Equipment Requirements for Reducing the Test Pressure in the Hydrostatic Test for Materials Capable of Absorbing Pressure Surges

Text that has been changed in any manner or impacted by UL's electronic publishing system is marked with a vertical line in the margin. Changes in requirements are marked with a vertical line in the margin and are followed by an effective date note indicating the date of publication or the date on which the changed requirement becomes effective.

The new/revised requirements are substantially in accordance with Proposal(s) on this subject dated May 6, 2011 and August 26, 2011.

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The requirements in this Standard are now in effect, except for those paragraphs, sections, tables, figures, and/or other elements of the Standard having future effective dates as indicated in the note following the affected item. The prior text for requirements that have been revised and that have a future effective date are located after the Standard, and are preceded by a "SUPERSEDED REQUIREMENTS" notice.

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Future Effective Dates	References
December 15, 2012	34.1



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ANSI/UL 1821-2011

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UL 1821

Standard for Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service

Prior to the first edition, the requirements for the products covered by this standard were included in the Outline of Investigation for Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service, Subject 1821.

First Edition – December, 1994

Second Edition

April 23, 2003

This ANSI/UL Standard for Safety consists of the Second edition including revisions through December 15, 2011.

The most recent designation of UL 1821 as an American National Standard (ANSI) occurred on December 13, 2011. ANSI approval for a standard does not include the Cover Page, Transmittal Pages, Title Page, or effective date information.

Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <http://csds.ul.com>.

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INTRODUCTION

1 Scope

1.1 These requirements cover thermoplastic pipe and fittings for use in wet pipe sprinkler systems for fire protection service.

1.2 Thermoplastic pipe and fittings covered by these requirements are intended for use in sprinkler systems in any of the following types of occupancies:

- a) Light hazard occupancies as defined in the Standard for Installation of Sprinkler Systems, NFPA 13;
- b) Residential occupancies as defined in the Standard for Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes, NFPA 13D; and
- c) Residential occupancies as defined in the Standard for Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height, NFPA 13R.

1.2 revised August 16, 2006

1.3 The pipe and fittings covered by these requirements are intended to be installed in accordance with the Standard for Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes, NFPA 13D; the Standard for Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height, NFPA 13R; or the Standard for Installation of Sprinkler Systems, NFPA 13.

1.3 revised August 16, 2006

1.4 Deleted August 16, 2006

2 Components

2.1 Except as indicated in 2.2, a component of a product covered by this standard shall comply with the requirements for that component. See Appendix A for a list of standards for components referenced in this standard.

2.2 A component is not required to comply with a specific requirement that:

- a) Involves a feature or characteristic not required in the application of the component in the product covered by this standard, or
- b) Is superseded by a requirement in this standard.

2.3 A component shall be used in accordance with its rating established for the intended conditions of use.

2.4 Specific components are incomplete in construction features or restricted in performance capabilities. Such components are intended for use only under limited conditions, such as certain temperatures not exceeding specified limits, and shall be used only under those specific conditions.

3 Units of Measurement

3.1 Values stated without parentheses are the requirement. Values in parentheses are explanatory or approximate information.

4 Undated References

4.1 Any undated reference to a code or standard appearing in the requirements of this standard shall be interpreted as referring to the latest edition of that code or standard.

5 Reference Publications

Clause 5 revised August 16, 2006

ASME B1.20.1,
Standard for Pipe Threads, General Purpose, Inch

ASTM D 396,
Standard for Specification for Fuel Oils

ASTM D 638,
Standard Test Method for Tensile Properties of Plastics

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

ASTM D 2444,
Standard Test Method for Determination of the Impact Resistance of Thermoplastic Pipe and Fittings by Means of a Tup (Falling Weight)

ASTM D2837,
Standard Test Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials or Pressure Design Basis for Thermoplastic Pipe Products

NFPA 13,
Standard for the Installation of Sprinkler Systems

NFPA 13D,
Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes

NFPA 13R,
Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height

NFPA 90A,
Standard for the Installation of Air Conditioning and Ventilating Systems

6 Terminology

6.1 The term "pipe", "piping", or "fitting" as used in these requirements refers to all thermoplastic pipe or fittings or any part thereof covered by these requirements unless specifically noted otherwise.

7 Glossary

7.1 For the purposes of these requirements, the following definitions apply.

7.2 FLEXIBLE THERMOPLASTIC PIPE – A fire sprinkler pipe that has sufficient flexibility to achieve directional changes, provided turns are not made with the pipe using a bending radius less than the minimum specified in the installation and design manual.

7.3 MULTIPURPOSE PIPING SYSTEM – A piping system within residential occupancies (NFPA 13R), dwellings and manufactured homes (NFPA 13D) intended to serve both domestic and fire protection needs.

7.3.1 NPS (NOMINAL PIPE SIZE) – A dimensionless designator for pipe sizes defined in standards including Standard Specification for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe (SDR-PR), ASTM F442/F442M and for PEX it is Standard Specification for Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems, ASTM F877 used to replace terms such as "Nominal Diameter" and "Nominal Size."

7.3.1 added December 15, 2011

7.4 RATED PRESSURE – The maximum internal water pressure to which the piping is intended to be subjected to in the sprinkler system.

7.5 RATED TEMPERATURE – The maximum ambient temperature for which the piping is intended to be exposed for the fire sprinkler application.

7.6 THERMOPLASTIC – A plastic capable of being repeatedly softened by heating and hardened by cooling through a particular temperature range that is characteristic of the plastic. In the softened state, it is able to be shaped by processes such as molding or extrusion.

8 Use in Environmental Air Handling Spaces

8.1 Thermoplastic pipe intended for use in ceiling cavity environmental air handling spaces shall be tested in accordance with the requirements in the Standard for Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics, UL 1887, and comply with the applicable requirements of the Standard for the Installation of Air Conditioning and Ventilating Systems, NFPA 90A.

8.1 revised August 16, 2006

CONSTRUCTION

9 General

9.1 Pipe and fittings shall be in sizes 3/4 NPS and larger diameter and free from visible cracks, holes, foreign inclusions, or other defects.

Exception: Pipe and fittings for use in network systems (NFPA 13D) may be in sizes 1/2 NPS and larger diameter and shall be free from visible cracks, holes, foreign inclusions, or other defects.

9.1 revised December 15, 2011

9.2 Pipe and fittings shall be joined by a means applicable for the type of piping material such as by solvent cement, fusion, or mechanical means.

9.2 revised December 15, 2011

9.3 Threaded thermoplastic fittings intended for transition to other piping material shall be threaded in accordance with 9.4.1. Threaded thermoplastic fittings shall be made in accordance with the American Society for Testing and Materials (ASTM) requirements applicable to the thermoplastic material being used, as well as comply with the requirements of this Standard.

9.3 revised December 15, 2011

9.4 Male or female threaded thermoplastic fittings intended for direct connection to a sprinkler, with or without a metal insert, shall have threads that comply with 9.4.1, in addition to complying with the requirements of this Standard.

9.4 revised December 15, 2011

9.4.1 Threaded thermoplastic fittings intended for transition to other piping material in 9.3 and connection to sprinklers in 9.4 shall be threaded with threads conforming to the following:

- a) Standard for Pipe Threads, General Purpose, Inch, ASME B1.20.1;
- b) Standard for Dryseal Pipe Threads (Inch), ANSI B1.20.3; or
- c) Where piping intended for use in installations where sprinkler fittings incorporate pipe threads other than NPT type threads, pipe threads complying with a national pipe thread standard compatible with those fittings shall be permitted.

9.4.1 added December 15, 2011

9.5 Pipe and fitting materials shall have a minimum flammability classification of HB when tested in accordance with the Standard for Tests for Flammability of Plastic Materials for Parts in Devices and Appliances, UL 94.

9.5 revised August 16, 2006

10 Rated Pressure

10.1 The pipe and fittings covered by these requirements shall have a rated pressure of 175 psig (1.21 MPa) or higher.

Exception: Pipe and fittings for use in NFPA 13D multipurpose piping systems may have a rated pressure of 130 psig (0.90 MPa) or higher.

11 Rated Temperature

11.1 The pipe and fittings covered by these requirements shall have a rated temperature of 120°F (49°C) or higher.

PERFORMANCE

12 General

12.1 Representative sample pipe and fitting assemblies shall be subjected to the tests described in Sections 13 – 29.

13 Fire Exposure Test

13.1 General

13.1.1 When tested as specified in 13.1.2 – 13.3.1, pipe and fitting assemblies:

- a) Shall not burst, separate, or leak; and
- b) Shall maintain the sprinkler in the intended operating position.

Following the fire exposure, the pipe and fitting assemblies shall withstand an internal hydrostatic pressure equal to the maximum rated pressure for 5 minutes without rupture or leaks.

Exception: Pipe and fittings intended to be protected by any of the constructions listed in (a) – (b) are not required to be subjected to the fire exposure test:

- a) 3/8 inch (9.5 mm) thick or thicker gypsum wallboard;*
- b) A suspended membrane ceiling with lay-in panels or tiles having a weight of not less than 0.35 lb/ft² (1.76 kg/m²) when installed with metallic support grids; or*
- c) 1/2 inch (12.7 mm) plywood soffits.*

13.1.2 The test arrangement used to test pipe and fittings shall be in accordance with the installation and design manual and incorporate:

- a) The minimum number of hangers with spacing and locations specified;
- b) The type of sprinkler(s) (residential, quick response, or standard) with which the product is intended to be used, the maximum temperature rating classification specified, and the minimum sprinkler restraint methods;
- c) The minimum ceiling protection, if protection is specified; and