REFERENCE SHEET

BlazeMaster®
FIRE PROTECTION SYSTEMS

SCIENCE. SERVICE. SAFETY.

Project Inspection Reference Sheet

A Resource for Authorities Having Jurisdiction (AHJs)

This reference sheet provides a helpful tool to use during BlazeMaster® CPVC inspections. Check the relevant boxes to guide a comprehensive review. This document provides an overview of key elements of a BlazeMaster CPVC project. Refer to the manufacturer's installation guide for more details.

I. Where Can BlazeMaster® Fire Sprinkler Systems Be Used?

BlazeMaster CPVC pipe and fittings systems are listed by Underwriters Laboratories (UL & C-UL) and Underwriters Laboratories of Canada (ULC) for use in:

Light hazard occupancies as defined in NFPA 13

- Clubs
- Educational establishments (i.e. schools and student housing)
- High rises (i.e. hotels and condos of more than four stories)
- Hospitals
- Institutions
- Libraries
- Museums
- Nursing homes
- Offices
- Places of worship
- Theaters and auditoriums

Residential occupancies

- Up to four stories in height (NFPA 13R)
- One- and two-family dwellings and manufactured homes (NFPA 13D)

Ordinary hazard installations

- NFPA 13 and NFPA 13R permit use of pipe or tube listed for light hazard occupancies in:
  - Ordinary hazard rooms of otherwise light hazard occupancies where room does not exceed 400 ft2 (37 m2)

Air Plenums (NFPA 90A)

Private fire service mains and their appurtenances (NPFA 24)

System risers in residential buildings up to four stories in height (NFPA 13R and 13D)

Installation in concrete (UL and C-UL)

Note: Refer to individual manufacturer's installation instructions for specific listings and approvals.

A. Temperature/Pressure Rating

BlazeMaster CPVC of ¾" to 3" (20 mm to 80 mm) are rated for continuous service of 175 psi (1207 kPa) at 150°F (65°C)

- Ambient temperatures are within the range of 35°F (2°C) and 150°F (65°C)
- In attics and other areas where temperatures may exceed 150°F (65°C), ventilation is provided or insulation used around pipe
- Piping is not closely exposed to devices that generate heat in excess of 150°F (65°C), such as light fixtures, ballasts and steam lines
- If installed in areas exposed to freezing temperatures, the pipe and fittings are protected from freezing

I. Where Can BlazeMaster® Fire Sprinkler Systems Be Used? (CONTINUED)

B. Concealed Installations

Minimum protection consists of:

- One layer of 3/8" (9.5 mm) gypsum wallboard

  Or
- Suspended membrane ceiling with lay-in panels or tiles having a weight of not less than 0.35 lbs./ft2 (1.7 kg/m2) when installed with metallic grid supports

  Or
- ½" (12.7 mm) plywood soffits (U.S.) – includes residential occupancies defined in NFPA 13R and 13D for residential occupancies
- Protection consists of one layer of ½" (12.7 mm) plywood (minimum)

Note: Factory Mutual considers piping installed above drops in ceilings tiles to be exposed.

C. Sprinkler Head Temperature Ratings

- Concealed (protected) installation: Rated 225°F (107°C)
- Exposed installation: See BlazeMaster Installation & Design Manual for specific applications

D. Installation In Concrete

BlazeMaster CPVC is approved for use in concrete.

- No contact with sharp edges (rocks, metal, structural members)
- Any open pipe ends protected to ensure debris or concrete does not enter system
- Straight runs of pipe or snaked to avoid obstacles
  - If snaked, pipe is laid out to minimize stress once concrete is poured
- No contact with building materials chemically incompatible with BlazeMaster CPVC*
- Layout prevents the wire mesh or reinforcing bars from causing abrasion damage to the pipe.

Notes:
*BlazeMaster CPVC pipe and fittings have been installed in concrete for many years without compatibility issues. However, new construction materials are regularly introduced to the market. If you have questions, check with the manufacturer of the chemical.

Embedded concrete is not approved for post-tension applications.

E. Exposed Installations (Where Sprinklers Are Required)

As an alternative to protection requirements, BlazeMaster CPVC may be installed exposed when subject to the following conditions:

1. Standard Coverage and Residential Sprinklers

- Installed below a smooth, flat, horizontal ceiling

a. Light Hazard or Residential Pendent Sprinklers

- Listed, quick-response pendent sprinklers with 170°F (77°C) maximum temperature rating
- Deflectors installed within 8" (203 mm) of ceiling
- Piping mounted directly on ceiling

  Or
- Listed residential pendent sprinklers with 170°F (77°C) maximum temperature rating located in accordance with listing
- Maximum distance between sprinklers does not exceed 15' (4.57 m)
- Piping is mounted directly on ceiling

b. Light Hazard or Residential Horizontal Sidewall Sprinklers

- Listed, quick-response horizontal sidewall sprinklers with 200°F (93°C) maximum temperature rating
- Deflectors are installed within 12" (304 mm) of ceiling and within 6" (150 mm) of sidewall
- Piping is mounted directly on sidewall

  Or
- Listed residential horizontal sidewall sprinklers with 200°F (93°C) maximum temperature rating located in accordance with their listing
- Maximum distance between sprinklers does not exceed 14' (4.27 m)
- Piping is mounted directly on sidewall

c. Light Hazard Upright Sprinklers

- Listed, quick-response upright sprinklers with 155°F (68°C) maximum temperature rating
- Deflectors are installed within 4" (101 mm) of ceiling
- Maximum distance between sprinklers is not to exceed 15' (4.57 m)
- Maximum distance from ceiling to centerline of main pipe run does not to exceed 7½" (190 mm)
- Distance from centerline of sprinkler to closest hanger is 3" (76mm)

I. Where Can BlazeMaster® Fire Sprinkler Systems Be Used? (CONTINUED)

2. Light Hazard Extended Coverage or Residential Speakers

- Installed below a smooth, flat, horizontal ceiling with unobstructed construction
- Use of Schedule 80 fittings for sizes 1½" (38 mm) and greater
- Pendent sprinklers: piping mounted directly to ceiling
- Horizontal sidewall sprinkler: piping mounted directly to sidewall

a. Light Hazard Extended Coverage or Residential Pendent Sprinklers

- 155°F (68°C) maximum temperature rating for extended coverage OR residential pendent sprinklers
- Deflectors are installed within 8" (203 mm) of the ceiling
- Maximum distance between sprinklers does not exceed 20' (6.09 m)
- Application density is not less than 0.1 gpm/ft2 (4.08 ml/min)

b. Light Hazard Extended Coverage or Residential Horizontal Sidewall Sprinklers

- Listed light hazard, extended coverage quick-response sprinklers with 175°F (79°C) maximum temperature rating
- Deflectors are installed within 12" (304 mm) of ceiling and within 6" (152 mm) of sidewall
- Maximum distance between sprinklers does not exceed 16' (4.87 m)
- Application density is not less than 0.10 gpm/ft2 (4.08 ml/min)

  Or
- Listed residential sidewall sprinklers with 165°F (74°C) maximum temperature rating
- Deflectors are installed within 12" (304 mm) of ceiling and within 6" (152 mm) of sidewall
- Maximum distance between sprinklers does not exceed 18' (5.48 m)
- Application density is not less than 0.10 gpm/ft2 (4.08 ml/min)

  Or
- Listed light hazard, extended coverage quick-response sprinklers with 165°F (74°C) maximum temperature rating
- Deflectors are installed within 12" (304 mm) of ceiling and within 6" (152 mm) of sidewall
- Maximum distance between sprinklers does not exceed 18' (5.48 m)
- Application density is not less than 0.10 gpm/ft2 (4.1 lpm/m2)

  Or
- Listed light hazard, extended coverage quick-response sprinklers with 155°F (68°C) maximum temperature rating made by Reliable Automatic Sprinkler Co. (SINRA03620)
- Deflectors are installed within 12" (304 mm) of ceiling and within 6" (152 mm) of sidewall
- Maximum distance between sprinklers does not exceed 24' (7.31 m)
- Flow is not less than 0.40 gpm (152 L/min) per sprinkler

3. Unfinished Basements

BlazeMaster CPVC may be installed without protection (exposed) in unfinished basements in accordance with NFPA 13D when subject to the following limitations:

a. Ceiling Construction

- Horizontal and made of solid wood joists or composite wood joists
- Nominal depth of 16" (406 mm) or less on maximum 24" (610 mm) centers
- Distance from floor to bottom of joists is between 7' and 10' (2.13 m – 3.04 m)

b. Sprinkler System

- Listed residential pendent sprinklers are rated at 155°F (68°C) with 4.9 minimum K-factor
- Sprinkler spacing does not exceed 16' (4.87 m) (applies only to BlazeMaster CPVC; other CPVC does not have this capability)
- Flow is not less than 13 gpm (49 Lpm) per sprinkler
- Deflectors maximum of 1¾" (44.5 mm) below bottom of joists to allow future installation of a finished ceiling (NFPA 13D, Section 8.2.4, 2016 Edition)
- Schedule 80 fittings used for 1½" (38 mm) and larger sizes

I. Where Can BlazeMaster® Fire Sprinkler Systems Be Used? (CONTINUED)

c. Blocking

- Maximum length along joist does not exceed 40' (12.2 m)
- Blocking used if maximum length exceeds 40' constructed from:
  - Plywood – minimum ½" (12.7 mm) OR
  - Gypsum – minimum ⅜" (9.5 mm) OR
  - Batt insulation – minimum 3½" (88.9 mm)
    - Single piece secured with wire netting that encases both exposed sides
    - Piping, wires, ducts etc. may penetrate blocking with minimal gap.
    - If gap exceeds ¼" (6.4 mm), it is filled with insulation, caulking or other suitable material.

Note: Use of BlazeMaster CPVC is limited to basements where the quantity and combustibility of contents are low so fires of relatively rates of heat release are expected.

d. Perpendicular Installation

- Below joists
  - System mains are installed with listed support devices that mount pipe directly to bottom of the joists
- Through joists
  - System mains and branch lines are supported through holes at or below the center of the depth of the joist
  - Holes are oversized to allow movement
  - Located not to impair structural integrity of joists

e. Parallel Installation

- System mains and branch lines are installed in the cavity between the bottom of the ceiling and above the bottom of the joist
- Pipe and fittings located at or below the center of the joist
- Pipe is installed using listed support devices or other devices that mount CPVC directly to nominal 2" (50.8 mm) wood blocking or support devices that offset the pipe a nominal distance of 1½" (38.1 mm) from the joist

Note: This only applies to 13D applications.

F. Combustible Concealed Installations

- Sprinklers are specifically listed for this application (NFPA 13)
- Approved sprinklers are installed according to manufacturer guidelines

Notes:
When CPVC is used with specially listed combustible concealed sprinklers, refer to the sprinkler data sheet for the CPVC installation requirements.

NFPA 13R and 13D permit the omission of sprinklers from combustible concealed spaces, and BlazeMaster pipe and fittings may be installed in these areas when sprinklering residential occupancies according to these standards.

G. Residential Dry Pipe Systems

- Installation conforms to manufacturer's installation instructions for suitability

H. Attic Spaces

- Use of specially listed sprinkler heads for attics requiring sprinklers
- Installation follows manufacturers' guidelines for these sprinkler heads

I. AIR PLENUMS

BlazeMaster CPVC complies with UL1887 combustibility requirements for thermoplastic sprinkler pipe as described in the Standard for Installation of Air Conditioning and Ventilating Systems, NFPA 90A, and various model mechanical codes.

- Installed adjacent to (not over) opening in ceiling such as ventilation grill

J. CANADIAN INSTALLATIONS

BlazeMaster CPVC products are listed under CAN/ULC Standard S102.2M for flame spread of 5, smoke development of 15, and fuel contribution of 0, meeting the National Building Code of Canada.

K. GARAGE INSTALLATIONS

BlazeMaster CPVC may be installed concealed to protect NFPA 13R garages with the following requirements:

- Minimum protection is one layer of 3/8" (9.5 mm) gypsum or ½" (12.7 mm) plywood
- Listed pendent or sidewall sprinklers with 225°F (107°C) maximum temperature rating
- Installed per NFPA 13R requirements and manufacturer's installation requirements

Notes:
NFPA 13D does not require garages to be protected with sprinklers. However, please consult the local jurisdiction for local amendments.

2019 NFPA updates provide more flexibility to use CPVC in private garages within dwellings so long as the garage space does not exceed 1,000 ft2 and the pipe is protected by a wall or ceiling sheathing.

II. System Risers

BlazeMaster CPVC is approved for use in system risers under NFPA 13, 13R and 13D with the following guidelines:

Concealed

Minimum protection – one layer of ⅜" (9.5 mm) gypsum wallboard or ½" plywood (12.7 mm)

Exposed

Exposed risers are permitted in NFPA 13R and 13D Applications with the following requirements:

- Installed below a smooth, flat, horizontal ceiling
- Listed residential pendent sprinkler is installed with deflector at a distance from ceiling specified in listing

  Or
- Below a horizontal unfinished basement ceiling (NFPA 13D
  - Installed on solid wood or composite wood joists with depth of 16" (406 mm) or less on maximum 24" (610 mm) centers
  - Listed residential pendent sprinkler is installed with deflector a maximum of 1¾" (44.5 mm) below bottom of joists (wood or composite) to allow future installation of finished ceiling

Sprinklers

- Listed residential pendent sprinkler with 155°F (68°C) maximum temperature rating with K-factor of 4.9
- Installed at maximum of 12" from center line of the riser*
- System design is based on listed flows for the sprinkler
- Flow for single sprinkler or multiple sprinklers is not less than 13 gpm (49 Lpm) per sprinkler

*Per UL and FM this sprinkler can be used as part of the coverage area design.

Risers

- Supported vertically within 2' (610 mm) of ceiling or bottom of the joist
- Minimum riser diameter: 1" (25.4 mm)
- Maximum riser diameter: 2" (50.8 mm)
- Maximum distance between walls and outside surface of pipe: 1½" (38 mm)
- Schedule 80 fittings used for 1½" (38 mm) and larger sizes

Supports

- Riser supported by pipe clamps or hangers located on horizontal connection close to the riser
- Listed hangers and clamps used
- Vertical lines are supported at intervals to avoid placing excessive load on fitting at lower end
- Use of riser clamps or double-bolt pipe clamps
- Riser clamps do not squeeze the pipe or rely on compression to support the pipe
- Hangers and straps:
  - Do not compress, distort, cut or abrade pipe
  - Allow free movement of pipe to allow thermal expansion and contraction
- Recommended: Clamps are located just below fitting so shoulder of the fitting rests against the clamp
- Vertical pipe aligns with supports at each floor level or at 10' (3.05 m) intervals, whichever is less
- In vertical shafts or buildings with ceilings over 25', CPVC is:
  - Straight
  - Supported at each floor or at 10' (3.05 m) intervals, whichever is less

Factory Mutual

In properties insured by Factory Mutual (FM), BlazeMaster CPVC pipe and fittings may be installed exposed under the following conditions:

- Miscellaneous nonmanufacturing occupancy classification*
- Residential occupancies**
- Only wet pipe sprinkler systems may be used with BlazeMaster CPVC
- Sprinklers must have quick-response thermal sensing elements
- CPVC is only used in areas that do not require seismic protection
- Smooth, flat, horizontal ceiling, maximum height 10' (3.05 m)

*As described in FM Loss Prevention Data Sheet 3-26, Fire Protection Water Demands for Nonstorage Sprinklered Properties, Table 2, section L

**As described in FM Loss Prevention Data Sheet 2-8N "Installation of Sprinkler Systems"

II. System Risers (CONTINUED)

Sprinklers

The following FM-approved sprinklers must be used:

- Extended coverage light hazard control mode specific application sprinklers
- Minimum flow or pressure established for sprinkler in Data Sheet 2-8N
- Quick-response control mode density area sprinklers with a minimum density of 0.1 gpm/ft2
- (4 mm/min)
- Residential sprinklers with a minimum 0.1 gpm/ft2 (4 mm/min)
- For extended coverage – sprinklers located as recommended in Data Sheet 2-8N
- For quick-response nonextended coverage – deflectors no more than 8" (100 mm) below ceiling
- For residential – sprinklers located per manufacturers' instructions
- Exposed as vertical riser:
  - Sprinkler located adjacent to and no further than
  - 12" (305 mm) from riser
  - Sprinkler's flow included in total hydraulic design

The Loss Prevention Council

- Used only for wet pipe systems
- Not installed outdoors
- Joints adequately cured per manufacturers' instructions
- For exposed installations, system is close to a flat ceiling
- System designed to ensure 'no flow' sections of pipework in the event of sprinkler operation

Notes:
BlazeMaster pipe and fittings may be installed in ordinary classifications such as offices, retail shops and department stores when installed in accordance with Section 21.1: Part 5 of LPC "List of Approved Fire and Security Products and Services."

BlazeMaster pipe and fittings should not be used in high-hazard applications and ordinary hazard applications where the fuel load or rate of heat release is high, such as boiler rooms, kitchens, manufacturing areas, and certain warehouse applications.

Underground Water Pressure Service

1. Pipe and fittings installed in accordance with:

- ASTM D2774 – Standard Recommended Practice for Underground Installation of Thermoplastic Pressure
- ASTM F645 – Standard Guide for Selection, Design and Installation of Thermoplastic Water Pressure Piping Systems
- NFPA 24
- BlazeMaster Installation & Design Manual
- If used, thrust blocks designed per NFPA 24, Section 10.6.1 (2016 Edition)

Note: BlazeMaster fire sprinkler systems utilize a solvent cement joining method. As such, thrust blocks are not required with BlazeMaster CPVC pipe and fittings in underground water pressure service. Reference NFPA 24, Section A.10.6.3 (2016 Edition).

2. Trenching

- Water-filled pipe is buried at least 12" (305 mm) below the maximum expected frost line
- Piping embedded in concrete or metal case under surfaces subject to heavy loads or constant traffic (such as roads, railways)
- Trench bottom continuous, smooth and free of rocks
- Ledge rock, hardpan or boulders: trench bottom padded using minimum of 4" (102mm) of clean soil, sand, crushed stone or other approved material
- Conforms to local, state and national codes
- Pipe is "snaked" to allow thermal expansion/contraction in accordance with manufacturers' guidelines

3. Backfilling

- Pipe is uniformly and continuously supported over entire length on firm, stable material
- No use of blocking to change pipe grade or support pipe across excavated sections
- Backfill materials are free of rocks with particle size of ½" (12.7 mm) or less used to cover pipe
- Backfill materials are placed in layers, with each layer compacted to uniformly develop lateral passive soil forces

Note: BlazeMaster CPVC is not listed for exposed, outdoor applications.

III. Installation

Hangers & Supports

Because BlazeMaster pipe is rigid, it requires fewer supports than flexible plastic systems. See BlazeMaster Installation & Design Manual for spacing requirements. Most metal hangers designed for metal pipe are suitable for CPVC. See BlazeMaster Installation & Design Guide for support spacing.

- Hangers are the right size for the pipe.
- Hangers comply with NFPA 13, 13R and 13D.
- Rigid hangers are secured to ceiling used for quick-response upright sprinkler heads
- Hangers do not have rough or sharp edges in contact with pipe
- Horizontal runs are braced to minimize stress on joints due to bending of pipe
- Pipe is held snugly but not pinched or crushed in any way
- Acceptable hangers:
  - Standard band hanger positioning threaded support rod to 1/16" (1.6 mm) above the pike
  - Split-ring hanger
  - Wrap-around U hanger
  - Special escutcheon that prevents upward movement

Penetration of Studs and Joists

Wooden Studs and Joists

- Holes are oversized to allow for movement

Metal Studs

- Pipe and fittings are protected from sharp edges

Transition to Other Materials

Support

- Threaded adapters or flanges are listed for connected BlazeMaster pipe and fittings to other materials, valves and appurtenances
- Additional support is added at the metal side of a BlazeMaster CPVC-metal transition to support weight of metal system
- Thread sealant is used for connections – TFE (Teflon®) thread tape recommended

Flanged Connections

- Piping runs are joined to the flanges installed in a straight-line position to the flange
- Piping is secured and supported to prevent lateral movement that can damage flange

Grooved Coupling Adapters

- Fittings and pipe are free from indentations, projections or roll-marks on the gasket seating areas

Thermal Expansion and Contraction

Thermal expansion and contraction must be considered, especially in long straight runs, and can be addressed through one of the following:

- Change of direction
- Expansion offset
- Expansion loop

Pipe Deflection

BlazeMaster CPVC is inherently ductile allowing it to be deflected around or away from objects during installation. For maximum installed deflections, see the BlazeMaster Installation & Design Manual.

Other Design Criteria

Chemical Compatibility

AHJs may use the FBC™ System Compatible website to confirm chemical compatibility issues.
lubrizol.com/CPVC/FBC-System-Compatible-Program

Freeze Protection

- Batt Insulation – in some jurisdictions may be used rather than antifreeze solutions
- Glycerin antifreeze solutions – acceptable for use with BlazeMaster CPVC Listed antifreezes on FBC compatible system

Painting

- If approved by AHJ, use water-based latex paint

Penetrating Fire-Rated Walls and Partitions

- Meets local standards
- CPVC pipe protected according to local standards when passing through metal studs

Note: Fire-rated penetrations must be UL listed, and specific requirements for each penetration can be found in the detail sheets from each manufacturer

Earthquake Bracing

- In areas prone to earthquakes, BlazeMaster CPVC is braced in accordance with local codes and NFPA 13
- Bracing free from sharp edges
- Clamps do not apply excessive compressive forces

Please consult seismic system manufacturers (Tolco, Afcon, and Loos) for specific systems related to BlazeMaster seismic applications

In many applications BlazeMaster is attached directly to the structure, this should be considered when examining the need for seismic bracing

Sway Bracing

- Lateral sway braces are designed for use with CPVC
- Within 24" (610 mm) of the centerline of piping
- Lateral brace on pipe of equal or greater size
- If pipe of sufficient size is not accessible, dead leg is used to longitudinally brace line

BlazeMaster®
FIRE PROTECTION SYSTEMS

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