

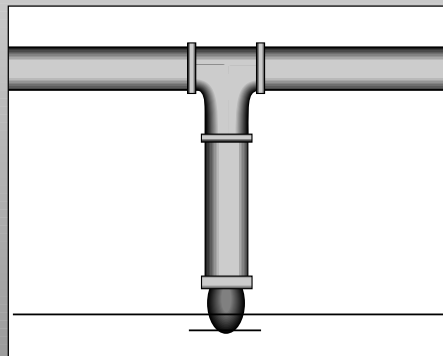
tyco / Flow Control / **Tyco Fire Products**

BlazeMaster®

INSTALLATION INSTRUCTIONS & TECHNICAL MANUAL

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This Installation and Technical Manual refers to pipe produced with either Tyco Fire Products (TFP) BlazeMaster® or BlazeMaster 2000 resin and fittings produced from BlazeMaster resin. When reference to NFPA or NFPA Standards is made in this Installation and Technical Manual, the 1999 edition of the relevant code is used. This Installation and Technical Manual contains the criteria to install a TFP BlazeMaster CPVC piping system in accordance with the UL Listing, C-UL Listing, LPCB Approval, and/or Factory Mutual Research Approval. Additionally, the manual contains recommendations for installation, general piping practices and other suggestions that may not be required to satisfy the UL Listing, C-UL Listing, LPCB Approval, and/or Factory Mutual Research Approval. To differentiate between a requirement and a suggestion, use the following definitions:

SHALL - The use of the word "shall" indicates a mandatory requirement of the Listings/Approvals.

SHOULD - The use of the word "should" indicates a recommendation which is strongly advised, but not required to meet the Listings/Approvals.

Limited Warranty

Products manufactured by Tyco Fire Products are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by Tyco Fire Products. No warranty is given for products or components manufactured by companies not affiliated by ownership with Tyco Fire Products or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association (NFPA), and/or the standards of any other Authorities Having Jurisdiction. Materials found by Tyco Fire Products to be defective shall be either repaired or replaced, at Tyco Fire Products sole option. Tyco Fire Products neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. Tyco Fire Products shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

IN NO EVENT SHALL TYCO FIRE PRODUCTS BE LIABLE, IN CONTRACT, TORT, STRICT LIABILITY OR UNDER ANY OTHER LEGAL THEORY, FOR INCIDENTAL, INDIRECT, SPECIAL OR CONSEQUENTIAL DAMAGES, INCLUDING BUT NOT LIMITED TO LABOR CHARGES, REGARDLESS OF WHETHER TYCO FIRE PRODUCTS WAS INFORMED ABOUT THE POSSIBILITY OF SUCH DAMAGES, AND IN NO EVENT SHALL TYCO FIRE PRODUCT'S LIABILITY EXCEED AN AMOUNT EQUAL TO THE SALES PRICE.

THE FOREGOING WARRANTY IS MADE IN LIEU OF ANY AND ALL OTHER WARRANTIES EXPRESS OR IMPLIED, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Look for the UL, C-UL, Factory Mutual Research, MEA, NSF-pw, LPCB, Dade County, and the City of Los Angeles marks on the product. BlazeMaster® and BlazeMaster® 2000™ are registered trademarks of the BFGoodrich Company. All TFP BlazeMaster CPVC Products are manufactured in the USA.

Introduction

Tyco Fire Products (TFP) Company using BFGoodrich resin has created a line of BlazeMaster[®] CPVC (Post Chlorinated Polyvinyl Chloride) sprinkler pipe and fittings. TFP BlazeMaster[®] products are designed specifically for fire sprinkler systems and provide the following advantages over traditional sprinkler piping systems:

- Increased hydraulic capabilities (C-Factor = 150)
- No precutting and expensive fabrication required
- NSF-pw approved for potable water
- Can be easily connected to other sprinkler piping systems
- Flexibility in the piping for greater ease of installation
- Resistant to rust, scale and foreign contaminant build up
- Inexpensive tools required for installation
- Greater resistance to seismic activity than copper or steel systems
- Easily repaired or modified on site
- Easily transported and handled at installation
- Resists sweating and condensation

Conversion Factors

- Appropriate conversion factors for values shown in this guide are as follows:

1 inch = 25.4 mm
1 foot = 0.3048 meters
1 psi = 6.895 kPa
1 psi = 0.0689 bar
1 psi = 6894.757 Pa
1000 Pa = 1 kPa

Listings and Approvals

TFP BlazeMaster[®] CPVC piping systems have been evaluated and are UL Listed in accordance with U.S. requirements and C-UL Listed in accordance with Canadian requirements by Underwriters Laboratories Inc. and are Factory Mutual Research approved for use in:

- Light Hazard occupancies as defined in the Standard for "Installation of Sprinkler Systems", NFPA 13.
- 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.
- Residential occupancies as defined in the Standard for "Installation of Sprinkler Systems in One and Two Family Dwellings and Manufactured Homes", NFPA 13D.
- Underground fire service systems as described in the "Installation of Sprinkler Systems," NFPA 13, 1999 Edition, and where appropriate the "Standard for Installation of Private Fire Service Mains & Their Appurtenances," NFPA 24.
- TFP BlazeMaster[®] products have also been evaluated and are UL Listed in accordance with U.S. requirements by Underwriters Laboratories, Inc. for use in return air plenums as described in the "Standard for Installation of Air Conditioning and Ventilating Systems", NFPA 90A. TFP BlazeMaster[®] products are not C-UL Listed for use in return air plenums.

TFP BlazeMaster[®] CPVC sprinkler pipe and fittings are Listed by ME&A in Residential buildings as defined by NFPA 13D and 13R. The ME&A listing number is 434-88-M.

TFP BlazeMaster[®] CPVC sprinkler pipe and fittings are tested by NSF for chemical extraction to standard 61 and carry the NSF-pw Listing.

TFP BlazeMaster[®] CPVC sprinkler pipe and fittings are Approved by the Loss Prevention Certification Board for use in Residential and Light Hazard Occupancies as defined above. For "scope of use" of TFP BlazeMaster[®] CPVC products with the LPCB Approval, please refer to the Approval for the TFP CPVC Company in the most recent version of the LPCB Specifiers' Guide, List of Approvals Fire and Security Products and Services.

TFP BlazeMaster[®] CPVC sprinkler pipe and fittings are Approved by the City of Los Angeles and Metro-Dade County for use in Light Hazard and Residential occupancies as defined above.

Special Note: TFP BlazeMaster[®] CPVC pipe and fittings are UL and C-UL Listed and LPCB and Factory Mutual Research Approved for use with TFP and/or other **BlazeMaster[®] and/or BlazeMaster 2000™ CPVC pipe and/or BlazeMaster[®] CPVC fittings Listed and/or Approved in accordance with the appropriate U.S., Canadian and/or U.K. requirements.** TFP BlazeMaster[®] CPVC pipe is UL and C-UL Listed with TFP-500 Solvent/Cement for use with Grinnell Flameaway CPVC fittings listed in accordance with the appropriate US and/or Canadian requirements. Please consult the current UL Fire Protection Equipment Directory, C-UL Products Certified for Canada Directory, Factory Mutual Research Approval Guide, LPCB List of Approved Fire Security Products and Services Guide and/or contact TFP's Corporate Headquarters at 800-523-6512 for further information on Listings and Approvals.

Where and how to use a Tyco Fire Products BlazeMaster® System

1. TFP BlazeMaster® pipe and fittings shall be employed in "wet" systems only. (A wet pipe system contains water and is connected to a water supply so that the water will discharge immediately when the sprinkler is opened.) **TFP BlazeMaster® products shall not be used in a system using compressed air or other gases.**
2. National Fire Protection Association Standards 13, 13R, 13D or 24 shall be followed and when applicable, the National Building Code of Canada shall be referenced for design and installation requirements in conjunction with these instructions.

3. For a concealed installation:

A. In accordance with the UL Listing, protection shall be provided for BlazeMaster® CPVC pipe and fittings. The minimum protection shall consist of either one layer of ½" thick gypsum wall board, ½" plywood soffits, or a suspended membrane ceiling with lay-in panels or tiles having a weight of 0.35 pounds per sq. ft. when installed with metallic grids. For residential occupancies defined in NFPA 13D and 13R, the minimum protection may consist of one layer of ½" plywood. In these cases, any standard sprinkler head rated at 170°F or less may be used.

B. In accordance with the C-UL Listing, protection shall be provided for BlazeMaster® CPVC pipe and fittings. The minimum protection shall consist of either lath and plaster, one layer of 9mm thick gypsum wallboard, one layer of 13mm plywood, or a suspended membrane ceiling with lay-in panels or tiles classified with respect to surface burning characteristics having a mass of not less than 1.7 kg/m² when installed with metallic grids. The effectiveness of this protection can be impaired if penetrated by large openings such as ventilation grills, exhaust fans connected to metal ducts serving washrooms excepted. Where such penetration is present, individual openings exceeding 0.03m², but not exceeding 0.71 m² in area must be located such that the distance from the edge of the opening to the nearest sprinkler does not exceed 300mm. BlazeMaster® pipe and fittings shall not be used where such openings exceed 0.71m² in area. In these cases, any standard sprinkler head rated at 77°C or less may be used.

C. For a concealed installation per Factory Mutual Research Approvals, the piping shall be protected and completely separated by a permanently installed non-combustible barrier from any area protected by the system. A permanently installed barrier is one that cannot be removed without substantial cosmetic damage. Drop in ceiling tiles, as used in suspended ceilings are specifically considered not to be permanently installed for the purposes of this definition. Non-combustible is defined as having a minimum finish fire rating of 15 minutes when tested per ASTM E 119.

4. For an exposed installation:

• **In accordance with the UL and C-UL Listings,** BlazeMaster® CPVC pipe and fittings shall be installed below a smooth flat horizontal ceiling construction per its UL Listing. For C-UL Listed applications, BlazeMaster® CPVC pipe and fittings shall be installed below smooth, flat, fixed, and horizontal ceiling construction. For pendent sprinkler installations, Listed Quick Response, ordinary temperature rating, pendent sprinklers installed within 8" from the ceiling or Listed Residential sprinklers located in accordance with their Listing shall be used and the maximum distance between sprinklers **shall not exceed 15'**.

For horizontal sidewall installations, Listed Quick Response, ordinary temperature rating, horizontal sidewall sprinklers having deflectors within 6" from the ceiling and within 4" from the sidewall or Listed Residential horizontal sidewall sprinklers located in accordance with their Listing shall be used and the maximum distance between sprinklers **shall not exceed 14'**.

5. TFP BlazeMaster® CPVC pipe and fittings shall be installed in areas where the **ambient temperature does not exceed 150°F (65°C).**
6. TFP BlazeMaster® CPVC pipe and fittings **is not approved for installation** in combustible concealed spaces requiring sprinklers, as referenced in NFPA 13 **unless protected by sprinklers specifically Listed for this application.** (Please refer to page 11 of this manual for the Use of CPVC Products in Combustible Concealed Spaces with Specific Use Sprinklers.) NFPA 13R and 13D permit the omission of sprinklers from combustible concealed spaces and TFP BlazeMaster® pipe and fittings can be installed in these areas when protecting residential occupancies according to these standards with sprinklers.
7. In installations where sprinkler pipe runs through an attic space that **requires** sprinklers per NFPA, CPVC piping shall be protected in order to meet the requirements of its UL and C-UL Listings. The *Authority Having Jurisdiction* shall be consulted prior to any installation of CPVC in attic spaces requiring sprinklers. Protection methods and requirements may vary by jurisdiction and are subject to interpretation.
8. TFP BlazeMaster® CPVC pipe and fittings, when installed in accordance with its UL Listing in air plenums, may be installed in the plenum adjacent to, but not over, an opening in the ceiling such as ventilation grills. Return Air Plenum installations may only be made with UL Listed TFP BlazeMaster® CPVC pipe and fittings and require the use of Schedule 80 fittings for installation sizes 1-1/2" and larger. Grinnell Flameaway fittings may not be used with TFP BlazeMaster® pipe in return air plenum installations. The Factory Mutual Research Approval restricts the use of TFP BlazeMaster® CPVC pipe and fittings in return air plenums as referenced in NFPA 90A.
9. Before penetrating fire rated walls and partitions, consult building codes and *Authorities Having Jurisdiction* in your area. TFP BlazeMaster® systems should be designed and installed so that the piping is not exposed to excessive temperatures from specific heat producing sources, such as light fixtures, ballasts and steam lines. Pipe shall not be positioned directly over open ventilation grills.
Note: There is no exact minimum distance TFP BlazeMaster® CPVC pipe and fittings should be installed from heat sources. Minimum distances are a function of the specific heat producing source, the maximum ambient temperature, heat shielding, if any, and proximity of CPVC piping to the above. Please consult TFP's Technical Services department for answers regarding specific heat sources and recommended TFP BlazeMaster® CPVC spacing.
10. During remodeling or ceiling repair appropriate precautions must be implemented to properly shield the piping from the protected occupancy.
11. TFP BlazeMaster® CPVC pipe and fittings shall not be installed in outdoor applications.
12. The use of BlazeMaster® CPVC in ceiling spaces above non-sprinklered areas has not been investigated by UL or Factory Mutual Research.

Tyco Fire Products BlazeMaster[®] Specifications

Pipe

TFP BlazeMaster[®] CPVC sprinkler pipe conforms to the requirements of ASTM F442 and carries the markings of Underwriters Laboratories Inc. (UL & C-UL), Factory Mutual Research, ME&A, Dade County, City of Los Angeles, LPCB, and the National Sanitation Foundation (NSF-pw S.E.) for use in potable water systems.

Fittings

TFP BlazeMaster[®] CPVC sprinkler fittings conform to the requirements of ASTM F438 (Schedule 40 dimensions from 3/4" to 1 1/4") and ASTM F439 (Schedule 80 dimensions for 1 1/2" to 3"). Female threaded adapters for sprinkler head connections contain brass inserts. Fittings carry the markings of Underwriters Laboratories Inc. (UL & C-UL), Factory Mutual Research, ME&A, Dade County, City of Los Angeles, LPCB, and National Sanitation Foundation (NSF-pw S.E.) for use in potable water systems.

Solvent/Cement

BlazeMaster[®] CPVC socket connections can be joined using one of two solvent/cementing processes. Connections shall be joined with TFP BlazeMaster[®] One-Step TFP-400 or TFP-500 Solvent Cements or Two Step TFP-100 Primer and TFP-200 Solvent Cement. TFP-100, TFP-200, TFP-400 and TFP-500 Solvent/Cements meet ASTM F493 and NSF requirements. Please review solvent cementing instructions within this manual prior to installation. Other primer or cements shall not be used with TFP BlazeMaster[®] products and the use of such non-approved welding agents will void the Manufacturer's warranty and product Listings/Approvals. **Caution: Avoid applying too much cement. Do not allow the cement to drip beyond the bottom of fitting socket. Excessive cement on the pipe and/or fitting can result in decreasing the overall strength of the pipe and/or fitting and may cause cracks when pressure is applied.**

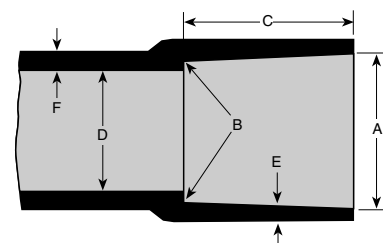
Dimensions for TFP BlazeMaster[®] CPVC Pipe

Nominal Size (see note)	Average OD		Average ID		Pounds per Feet
3/4"	1.050	(26.7)	.874	(22.2)	.168
1"	1.315	(33.4)	1.101	(28.0)	.262
1 1/4"	1.660	(42.2)	1.394	(35.6)	.418
1 1/2"	1.900	(48.3)	1.598	(40.6)	.548
2"	2.375	(60.3)	2.003	(50.9)	.859
2 1/2"	2.875	(73.0)	2.423	(61.7)	1.257
3"	3.500	(88.9)	2.952	(75.1)	1.867

Note: TFP BlazeMaster[®] pipe is produced in SDR 13.5 dimensions in accordance with ASTM442. SDR (Standard Dimension Ratio) is the ratio of the outside pipe diameter to the wall thickness of the pipe.

ASTM CPVC Fitting Socket Dimensions

Nominal Size	A Socket Entrance Diameter Average Diameter	B Socket Bottom Diameter Average Diameter	C Socket Length Minimum	D Inside Diameter Minimum	Minimum Wall Thickness	
					E	F
3/4"	1.058	1.046	0.719	0.820	0.113	0.141
1"	1.325	1.310	0.875	1.044	0.133	0.166
1 1/4"	1.670	1.655	0.938	1.375	0.140	0.175
1 1/2"	1.912	1.894	1.375	1.446	0.200	0.250
2"	2.387	2.369	1.500	1.933	0.218	0.275
2 1/2"	2.889	2.868	1.750	2.316	0.276	0.345
3"	3.516	3.492	1.875	2.892	0.300	0.375



Product Ratings and Capabilities

Pressure Rating & Pressure Listing

TFP BlazeMaster® pipe and fittings are UL and C-UL Listed and Factory Mutual Research and LPCB Approved for a rated pressure of 175 psi (1210 kPa) for sprinkler service up to 150°F (65°C).

Friction Loss

TFP BlazeMaster® CPVC pipe has a Hazen-Williams C-Value of 150. Pipe friction loss calculations shall be made according to NFPA Standards. The following table shows the allowance of friction loss for fittings, expressed in equivalent feet of pipe.

Allowance for Friction Loss in Fittings (Equivalent Feet of Pipe)							
Fitting Size (In.)	¾"	1"	1¼"	1½"	2"	2½"	3"
Tee Branch	3	5	6	8	10	12	15
Elbow 90° *	4	5	6	7	9	12	13
Elbow 45°	1	1	2	2	2	3	4
Coupling	1	1	1	1	1	2	2
Tee Run	1	1	1	1	1	2	2

*The above stated friction loss values are for TFP BlazeMaster® fittings only. When using other Listed BlazeMaster® CPVC 90° elbows with TFP BlazeMaster® products, please consult the fitting manufacturer's installation and design manuals.

Thermal Expansion

BlazeMaster® plastics, like all piping materials, expand and contract with changes in temperature. The coefficient of linear expansions is:

$$0.0000340 \text{ inch/inch/}^\circ\text{F.}$$

A 25°F change in temperature will cause an expansion of ¼ inch for a 50 foot straight length. For most operating and installation conditions, expansion and contraction can be accommodated at changes in direction of the pipe run. For additional information on Thermal Expansion please see Table C.

Temp Change ΔT°F	Length of Run (ft.)															
	5	10	15	20	25	30	35	40	45	50	70	90	120	160		
	Thermal Expansion, ΔL (In.)															
20	.04	.08	.12	.16	.20	.24	.29	.33	.37	.41	.57	.73	.98	1.31		
30	.06	.12	.18	.24	.31	.37	.43	.49	.55	.61	.86	1.10	1.47	1.96		
40	.08	.16	.24	.33	.41	.49	.57	.65	.73	.82	1.14	1.47	1.96	2.61		
50	.10	.20	.31	.41	.51	.61	.71	.82	.92	1.02	1.43	1.84	2.45	3.26		
60	.12	.24	.37	.49	.61	.73	.86	.98	1.10	1.22	1.71	2.20	2.94	3.92		
70	.14	.29	.43	.57	.71	.86	1.00	1.14	1.29	1.43	2.00	2.57	3.43	4.57		
80	.16	.33	.49	.65	.82	.98	1.14	1.31	1.47	1.63	2.28	2.94	3.92	5.22		
90	.18	.37	.55	.73	.92	1.10	1.29	1.47	1.65	1.84	2.57	3.30	4.41	5.88		
100	.20	.41	.61	.82	1.02	1.22	1.43	1.63	1.84	2.04	2.86	3.67	4.90	6.53		

Where $\Delta L = 12eL (\Delta T)$
 $e = 3.4 \times 10^{-5} \text{ in/in/}^\circ\text{F}$ (Coefficient of Linear Expansion)

L = Length of Run in Feet

ΔT = Temperature Change in °F

An example of Thermal Expansion is shown below:

Example: How much will a 40 foot run of ¾" of BlazeMaster® CPVC pipe increase in length (or expand) if the expected ambient temperature ranges from 35°F to 85°F? Changes in length due to fittings are insignificant relative to the pipe.

$$\Delta L = 12eL (\Delta T)$$

$$\Delta L = 12 (.000034) \times 40 \times 50$$

$$\Delta L = .82 \text{ in. or } \frac{13}{16}"$$

TFP BlazeMaster® CPVC exhibits a relatively high coefficient of thermal expansion (see Table C). When designing TFP BlazeMaster® sprinkler systems, expansion of long runs must be considered if temperature variations will be encountered (ie; summer to winter extremes). Methods of compensating for thermal expansion are; expansion loops, offsets and change of direction of the pipe run. (See Figure G for examples of control methods.)

The expansion loops and offset tables are shown below. If the change in temperature and the maximum working temperature are lower than those used to derive the tables, the numbers will be conservative in nature. For example, for a temperature change from 60°F to 125°F use Table F because the maximum temperature is greater than those shown in Tables D and E.

For conditions which are not covered in the Loop Length Tables, use the formulas and examples found in Table H.

Note: Table based on Stress and Modulus of Elasticity at 100°F.

Refer to Table H on page 5.

$$\Delta T = 70^\circ\text{F}$$

$$S = 1560 \text{ psi}$$

$$E = 3.85 \times 10^5 \text{ psi}$$

Nom. Pipe Size	Avg. O.D.	Length of Run (ft.)															
		10	20	30	40	50	60	70	80	90	100	120	140	160			
¾"	1.050	Length of Loop (in.)															
¾"	1.050	11	15	18	21	24	26	28	30	32	33	37	39	42			
1"	1.315	12	17	20	24	26	29	31	33	35	37	41	44	47			
1¼"	1.660	13	19	23	26	30	32	35	37	40	42	46	50	53			
1½"	1.900	14	20	25	28	32	35	38	40	43	45	49	53	57			
2"	2.375	16	22	27	32	35	39	42	45	48	50	55	59	63			
2½"	2.875	18	25	30	35	39	43	46	49	52	55	60	65	70			
3"	3.500	19	27	33	38	43	47	51	54	58	61	67	72	77			

Table E • Loop Length (60°F to 120°F) ΔT = 60°F

Nom. Pipe Size	Avg. O.D.	Length of Run (ft.)												
		10	20	30	40	50	60	70	80	90	100	120	140	160
		Length of Loop (in.)												
¾"	1.050	10	15	18	21	23	25	27	29	31	33	36	39	41
1"	1.315	11	18	20	23	26	28	31	33	35	37	40	43	46
1½"	1.660	13	18	22	26	29	32	34	37	39	41	45	49	52
1½"	1.900	14	20	24	28	31	34	37	39	42	44	48	52	56
2"	2.375	15	22	27	31	35	38	41	44	47	49	54	58	62
2½"	2.875	17	24	30	34	38	42	45	49	51	54	59	64	69
3"	3.500	19	27	33	38	42	46	50	54	57	60	66	71	76

Note: Table based on Stress and Modulus of Elasticity at 120°F
Refer to Table H.

ΔT = 60°F
S = 1275 psi
E = 3.55 x 10⁵ psi

Table F • Loop Length (70°F to 150°F) ΔT = 80°F

Pipe Size	Nom. Avg. O.D.	Length of Run (ft.)												
		10	20	30	40	50	60	70	80	90	100	120	140	160
		Length of Loop (in.)												
¾"	1.050	14	19	23	27	30	33	36	38	40	43	47	50	54
1"	1.315	15	21	26	30	34	37	40	43	45	48	52	56	60
1½"	1.660	17	24	29	34	38	41	45	48	51	53	59	63	68
1½"	1.900	18	26	31	36	40	44	48	51	54	57	63	68	72
2"	2.375	20	29	35	41	45	50	53	57	61	64	70	76	81
2½"	2.875	22	31	39	45	50	55	59	63	67	70	77	83	89
3"	3.500	25	35	43	49	55	60	65	69	74	78	85	92	98

Note: Table based on Stress and Modulus of Elasticity at 150°F

Refer to Table H.
ΔT = 80°F
S = 875 psi
E = 3.08 x 10⁵ psi

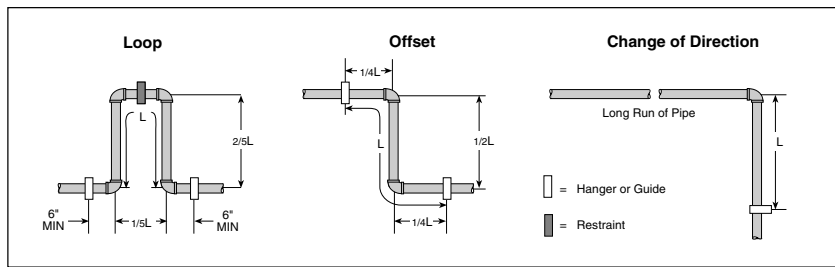


Figure G • Expansion Loop and Offset Configurations

Hangers should only be placed in the loop, offset or change of direction as indicated. Piping supports should restrict lateral movement and shall direct axial movement into the expansion loop.

The Expansion Loop Formula has the following components as shown below:

- L = Length of Expansion Loop in Inches
- E = Modulus of Elasticity at 100°F (Table H below)
- D = Average O.D. of Pipe
- ΔL = Change in Length of Pipe Due to Change in Temperature
- S = Working Stress at 100°F (Table H below)

Table H • Modulus of Elasticity & Stress vs Temperature

Temperature °F	73°	80°	90°	100°	110°	120°	140°	150°
Modulus of Elasticity "E" x 10⁵ (psi)	4.23	4.14	3.99	3.85	3.70	3.55	3.23	3.08
Working Stress "S" (psi)	2,000	1,875	1,715	1,560	1,415	1,275	1,000	875

The Modulus of Elasticity & Stress vs Temperature table H will need to be used to find "E" in the Expansion Loop Formula. An example is presented to demonstrate the calculation of expansion given a defined thermal change and to calculate the length of the expansion loop or offset in inches.

Example

How much expansion can be expected in a 240 foot run of 2" TFP BlazeMaster® CPVC pipe installed in 40°F given a maximum temperature change to 100°F? Additionally, how long should the expansion loop be to compensate for this expansion?

First, find the temperature change expressed as ΔT.

ΔT = 100°F - 40°F
ΔT = 60°F

Now use Table C to calculate the change in length expressed as ΔL. Since the run is 240 feet and the table is inclusive to only 160 feet, two calculations will need to be made.

Length of run = 160 feet with ΔT = 60°F
From Table C, ΔL = 3.92 in

Now we must calculate the additional 80 feet of run for ΔL . Since Table C does not include 80 feet we must interpolate 80 feet between 70 feet and 90 feet.

$$\Delta T = 60^{\circ}\text{F}$$

$$\Delta L = 1.71 \text{ in for } 70 \text{ feet}$$

$$\Delta L = 2.20 \text{ in for } 90 \text{ feet}$$

$$\Delta L = \frac{1.71 + 2.20}{2} = 1.96 \text{ inches for } 80 \text{ feet of pipe}$$

$$\text{Total } \Delta L \text{ for } 240 \text{ feet} = 3.92 + 1.96$$

$$\Delta L = 5.88 \text{ inches}$$

To find the length of the expansion loop on offset in inches

$$L = \sqrt{\frac{3ED(\Delta L)}{2S}}$$

- L = Length of Expansion Loop in inches.
- E = Modulus of Elasticity at maximum temperature from Table H.
- D = Average Outside Diameter of pipe from Table A, in inches.
- S = Working Stress at maximum temperature from Table H, psi.
- ΔL = Change in length of pipe due to a change in temperature from Table C, in inches.

$$L = \sqrt{\frac{3 \times (3.85 \times 10^5) \times (2.375) \times (5.88)}{2(1,560)}}$$

$$L = 71.90 \text{ inches}$$

For Loop Length: $\frac{1}{2} L = \frac{1}{2} \times 71.90 = 14.38 \text{ in.}$
 $\frac{3}{4} L = \frac{3}{4} \times 71.90 = 28.76 \text{ in.}$

For Offset Length: $\frac{1}{4} L = \frac{1}{4} \times 71.90 = 17.98 \text{ in} \approx 18 \text{ in.}$
 $\frac{1}{2} L = \frac{1}{2} \times 71.90 = 35.95 \text{ in} \approx 36 \text{ in.}$

Physical and Thermal Properties of TFP BlazeMaster® CPVC

The Physical and Thermal Properties of TFP BlazeMaster® pipe can be found in Table I.

Property	CPVC	ASTM
Specific Gravity "Sp. Gr."	1.55	D792
IZOD Impact Strength (ft. lbs./inch, notched)	3.0	D256A
Modulus of Elasticity, @ 73°F, psi "E"	4.23 x 10 ⁵	D638
Ultimate Tensile Strength, psi	8,400	D638
Compressive Strength, psi "o"	9,600	D695
Poisson's Ratio "o"	.35 - .38	-
Working Stress @ 73°F, psi "S"	2,000	D1598
Hazen Williams "C" Factor "C"	150	-
Coefficient of Linear Expansion in/(in °F) "e"	3.4 x 10 ⁵	D696
Thermal Conductivity BTU/hr/ft ² /°F/in "k"	0.95	C177
Flash Ignition Temperature F°	900	D1929
Limiting Oxygen Index "LOI"	%60	D2863
Electrical Conductivity	Non Conductor	

Permissible Bending Deflections

BlazeMaster® fire sprinkler piping, while classified as a rigid piping material, is inherently flexible allowing it to be deflected, within permissible limits, **around or away from objects during installation.** The maximum allowable deflections for BlazeMaster® piping can be found in Tables J and K.

Table J • Permissible Bending Deflections SDR 13.5 (73°F)
"Bending"
(One End Restrained)

Pipe Size	Length of Run (L) in feet														
	2'	5'	7'	10'	12'	15'	17'	20'	25'	30'	35'	40'	45'	50'	
	Deflection (D) in inches														
¾"	1.3	7.8	15.4	31.3	45.1	70.5	90.6	125.4	195.9	282.1	383.9	-	-	-	
1"	1.0	6.3	12.3	25.0	36.0	56.3	72.3	100.1	156.4	225.2	306.6	400.4	-	-	
1¼"	0.8	5.0	9.7	19.8	28.5	44.6	57.3	79.3	123.9	178.4	242.8	317.2	401.4	-	
1½"	0.7	4.3	8.5	17.3	24.9	39.0	50.1	69.3	108.2	155.9	212.2	277.1	350.7	433.0	
2"	0.6	3.5	6.8	13.9	20.0	31.2	40.0	55.4	86.6	124.7	169.7	221.7	280.6	346.4	
2½"	0.5	2.9	5.6	11.4	16.5	25.8	33.1	45.8	71.5	103.0	140.2	183.1	231.8	286.2	
3"	0.4	2.4	4.6	9.4	13.5	21.2	27.2	37.6	58.8	84.6	115.2	150.4	190.4	235.1	

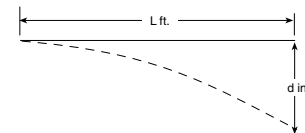
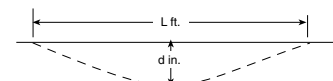
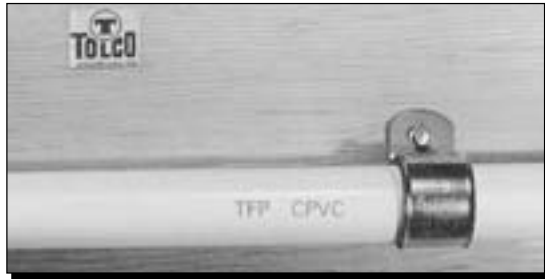


Table K • Permissible Bending Deflections SDR 13.5 (73°F)
"Snaking"
(Both Ends Restrained)

Pipe Size	Length of Run (L) in feet														
	2'	5'	7'	10'	12'	15'	17'	20'	25'	30'	35'	40'	45'	50'	
	Deflection (D) in inches														
¾"	.3	2.0	3.8	7.8	11.3	17.6	22.6	31.3	49.0	70.5	96.0	125.4	158.7	195.9	
1"	.3	1.6	3.1	6.3	9.0	14.1	18.1	25.0	39.1	56.3	76.6	100.1	126.7	156.4	
1¼"	.2	1.2	2.4	5.0	7.1	11.2	14.3	19.8	31.0	44.6	60.7	79.3	100.4	123.9	
1½"	.2	1.1	2.1	4.3	6.2	9.7	12.5	17.3	27.1	39.0	53.0	69.3	87.7	108.2	
2"	.1	.9	1.7	3.5	5.0	7.8	10.0	13.9	21.6	31.2	42.4	55.4	70.1	86.6	
2½"	.1	.7	1.4	2.9	4.1	6.4	8.3	11.4	17.9	25.8	35.1	45.8	57.9	71.5	
3"	.1	.6	1.2	2.4	3.4	5.3	6.8	9.4	14.7	21.2	28.8	37.6	47.6	58.8	



Support and Hanger Recommendations*



One Hole Strap



Two Hole Strap

Some hangers designed for metal pipe are suitable for CPVC pipe. The hanger shall not have rough or sharp edges which can come in contact with the pipe. **Do not use under sized hangers.** Hangers with sufficient sizing shall be selected based on pipe size (ie; 1½" hangers for 1½" pipe). Pipe hangers must comply with the appropriate Standard, NFPA 13, 13D, or 13R, whichever applies and should have load bearing surfaces at least ½" wide.

Some local codes may not allow plastic to metal contact. In this case, plastic sleeves or vinyl electrical tape should be used to isolate the materials.

Strapping pipe overly tight to a structural member can cause damage to the pipe when pressurized. Please ensure the pipe is held snug by the hanger, but is not pinched or crushed in any way.

PLUMBERS TAPE OR J HOOKS ARE NOT RECOMMENDED WITHOUT SHIELDING FOR ROUGH EDGES IN NFPA 13D APPLICATIONS.

Pipe Bracing with Standard Band Hanger*

Tolco, Inc. and Afcon make three hanger/restraining devices that are available for use with TFP BlazeMaster®.

A "one hole strap", shown left, can function as a hanger and as a restraining device. As a restraining device, invert the hanger so that the fastener is downward. Installation in this manner will prevent upward movement of the sprinkler head during activation.

A "two hole strap, shown left, can function as a hanger and as a restraining strap. UL Listed CPVC hangers incorporate features which protect the pipe from sharp edges and ease installation. The hex head self-threading screw (furnished with most UL Listed CPVC hangers) is easily installed using a rechargeable electric drill and a ⅝" socket attachment. No predrilling of a pilot hole is required.

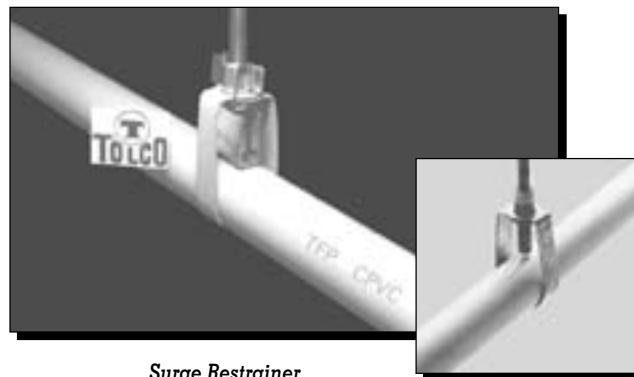
Both Tolco Models 22 and 23 and Afcon Models 513 and 510 were designed and tested for CPVC plastic pipe only and are UL Listed for this application. The Tolco Models 22 and 23, and Afcon Models 513 and 510 satisfy both support and vertical restraint criteria. For more information about Tolco or Afcon products, consult TFP.

Table L • Support Spacing "L" (ft.) CPVC SDR 13.5

Temp °F	Nominal Pipe Size					
	¾"	1"	1¼"	1½"	2"	3"
73°	5½'	6'	6½'	7'	8'	10'

Hanger/Support Spacing

Because TFP BlazeMaster® pipe is more rigid than other types of plastic pipe systems, the support spacing shown in Table L shall be adhered to when installing the system. **For exposed installations, Listed support devices shall be used which mount piping directly to the ceiling or side wall, except when using upright sprinklers per the installation information on Page 11 of this manual.**



Surge Restrainer

Table M • Support Spacing Distance to an In Line Sprinkler Head Drop Tee

Nominal Pipe Size	Less than 100 psi (690 kPa)	Greater than 100 psi (690 kPa)
¾ inch	4'	3'
1 inch	5'	4'
1½ inch	6'	5'
1½ to 3 inches	7'	7'

Vertical Restraint

When a sprinkler head activates, a significant reactive force is exerted on the pipe, especially at system pressures greater than 100 psi. The reactive force will cause the pipe to lift vertically if it is not properly secured, especially if the sprinkler drop is from a small diameter pipe.

When a sprinkler drop is from ¾", 1" or 1½" pipe, the closest hanger should brace the pipe against vertical lift-up. A number of techniques can be used to brace the pipe such as a standard band hanger positioning the threaded support rod to ⅛ inch above the pipe or using a split ring or a wrap-around hanger for restraint.

Note: Threaded rod shall not come in contact with CPVC when installed. It is advisable to use lift restraint devices such as those produced by Tolco and Afcon which prevent the threaded rod from coming in contact with the CPVC pipe as shown to the left.

Branch lines shall be braced at a distance from a tee or elbow to prevent lift of sprinklers as shown in Tables M and N.

*Local codes have final authority on which types of hangers can be used.

Table N • Support Spacing to an End Line Sprinkler Head Drop Elbow

Nominal Pipe Size	Less than 100 psi (690 kPa)	Greater than 100 psi (690 kPa)
¾ inch	9"	6"
1 inch	1'0"	9"
1¼ inch	1'4"	1'
1½ to 3 inches	2'	1'

When piping is suspended from a deck, hangers are required to suspend the pipe as well as provide vertical lift restraint. One hanger can serve as both. Drop locations between supports are acceptable in any location as long as support spacing is in compliance with Tables M and N as applicable. Examples of where this type of hanging is used include: concrete decks with rod and ring hangers, "pan decks" on I beams with beam clamps, or concrete anchors, and under wood joists with straps or rod hangers. See Figure O.

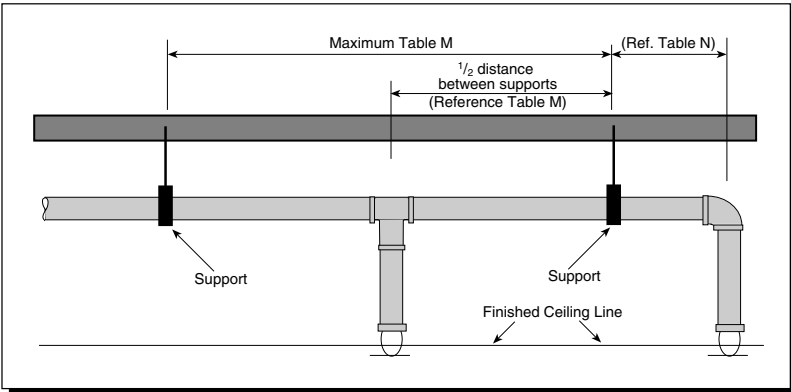


Fig. O • Drop Ceiling Installation.

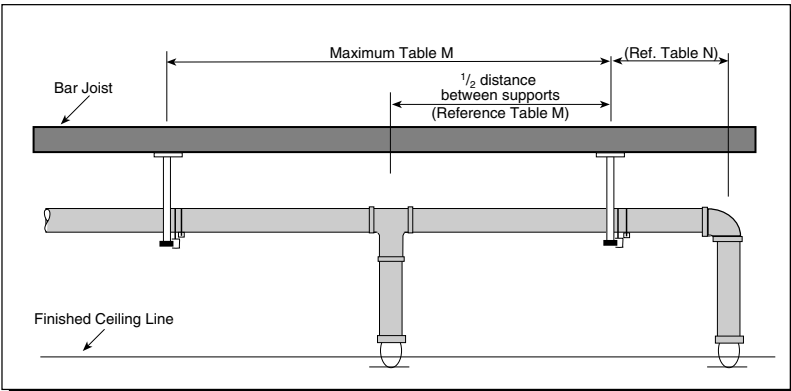
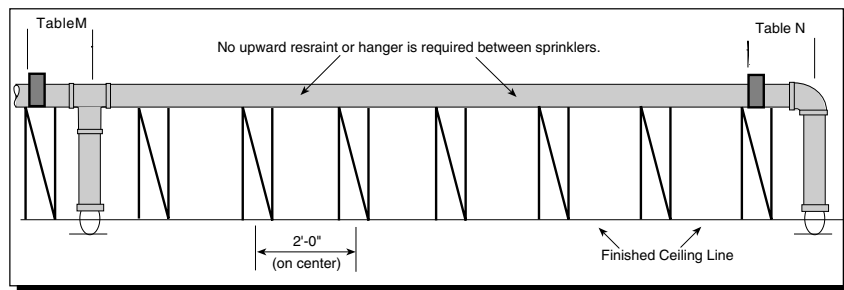


Fig. Q • Sprinkler Drop Pipe Adjacent to Truss

When the piping is supported by wood joists or trusses, the structure provides the support, especially when the joists are close together. The only requirement with this type of construction is to provide vertical restraint of the sprinkler and additional hangers on the line may not be required. When supporting CPVC piping below the deck, and when the supporting members are spaced far apart, it is important to brace for vertical restraint per Tables M and N. Drop location between supports are acceptable in any location as long as support spacing is in compliance with Tables M and N.



Wood Frame Construction

In manufactured homes, additional hangers may be required to prevent pipe movement from thermal expansion. Please consult with your Authority Having Jurisdiction and TFP's Technical Services Department for further information.

*CPVC pipe or fitting must be supported near a sprinkler head as shown in Tables M and N.

Underground Installation Specifications

Pipe

TFP BlazeMaster® CPVC pipe complies with the requirements of ASTM F442 and standard dimension ratio (SDR) 13.5. **TFP BlazeMaster® pipe is UL Listed and C-UL Listed for a rated pressure of 175 psi (1210 kPa) for underground service.**

Fittings

TFP BlazeMaster® CPVC fittings comply with the requirements of ASTM F438 (Schedule 40 socket) or ASTM F439 (Schedule 80 socket).

Primer/Solvent Cement

All socket type joints shall be made in accordance with TFP's Installation Instructions using the "One Step" TFP-400 or TFP-500 Solvent Cements or "Two Step" TFP-100 Primer and TFP-200 Solvent Cement. Please refer to sections of this manual for Joining TFP BlazeMaster® Pipe Systems which reference the application of these systems as well as page 19 for the standard practice for safe handling of Primers and Solvent/Cements.

Note: When using TFP BlazeMaster® pipe and fittings, pipe and fittings must be installed in accordance with ASTM D2774, the standard recommended practice for underground installation of thermoplastic pressure piping and ASTM F645, the standard guide for selection, design and installation of thermoplastic water pressure piping systems, and all TFP installation instructions contained within this document.

System Design

A TFP BlazeMaster® underground system shall be hydraulically calculated using a Hazen-Williams C-Factor of 150, and designed and installed in accordance with the the "Installation of Sprinkler Systems," NFPA 13, 1999 edition, and where appropriate the "Standard for Installation of Private Fire Service Mains and Their Appurtenances," NFPA 24.

Installation Procedures

The installation procedures detailed within apply to TFP BlazeMaster® CPVC pipe that has solvent cemented joints in size ranging from 3/4" - 3".

Inspection

Before installation, TFP BlazeMaster® CPVC pipe and fittings should be thoroughly inspected for cuts, scratches, gouges or split ends which may have occurred to the products during shipping and handling.

Trenching

The trench should be of adequate width to allow convenient installation, while at the same time being as narrow as possible. Minimum trench widths may be utilized by joining pipe outside of the trench and lowering it into the trench after adequate joint strength has been achieved.

Note: Please refer to TFP's instructions for recommended set and cure times for solvent cemented joints as found in Tables U through Z1 of this installation guide. Trench widths will have to be wider where pipe is joined in the trench or where thermal expansion and contraction is a factor. For additional details on expansion and contraction, please see thermal expansion characteristics on page 4 of this brochure. The following chart shows the trench width and minimum ground cover required for underground installation.

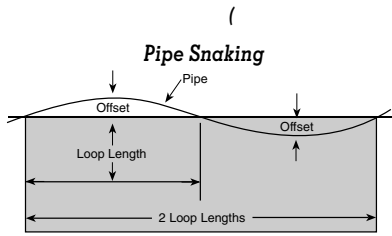
Pipe Size	Trench Width	Ground Cover Minimum	
		Light Traffic	Heavy Traffic
3" and Under	8"	12" - 18"	30" - 36"

All TFP BlazeMaster® CPVC pipe that is water filled should be buried at least 12" below the maximum expected frost line. It is recommended that TFP BlazeMaster® piping be run within a metal or concrete casing when it is installed beneath surfaces that are subject to heavy-weight or constant traffic such as roadways and railroad tracks.

The trench bottom should be continuous, relatively smooth and free of rocks. Where ledge rock, hardpan or boulders are encountered, it is necessary to pad the trench bottom using a minimum of four (4) inches of tamped earth or sand beneath the pipe as a cushion and for protection of the pipe from damage. Sufficient cover must be maintained to keep external stress levels below acceptable design stress. Reliability and safety of service is of major importance in determining minimum cover. Local, state and national codes may also govern.

Snaking of Pipe

After TFP BlazeMaster® CPVC pipe has been solvent cemented, it is advisable to snake the pipe according to the following recommendations beside the trench during its required drying time. **Be especially careful not to apply any stress that will disturb the undried joint.** Snaking is necessary in order to allow for any anticipated thermal contraction that will take place in the newly joined pipe line. Snaking is particularly necessary on the lengths of pipe that have been Solvent/Cement welded during the late afternoon of a hot summers day, because the drying time will extend through the cool of the night when thermal contraction of the pipe could stress the joints to the point of pull out. This snaking is also especially necessary with pipe that is laid in its trench (necessitating wider trenches than recommended) and is back-filled with cool earth before the joints are thoroughly dry. The following chart (Table R) shows the Pipe Snaking and the Loop Off Set in inches for contraction.



**Table R • Maximum Temperature Variation, °F
Between Time of Solvent Welding and Final Use**

Loop Length	10°F	20°F	30°F	40°F	50°F	60°F	70°F	80°F	90°F	100°F
20 Feet	3"	4"	5"	5"	6"	6"	7"	7"	8"	8"
50 Feet	7"	9"	11"	13"	14"	16"	17"	18"	19"	20"
100 Feet	18"	18"	22"	26"	29"	32"	35"	37"	40"	42"

Back-Filling

Ideally, back-filling should only be completed early in the morning during hot weather when the line is fully contracted and there is no chance of insufficiently dried joints being subject to contraction stresses.

The pipe should be uniformly and continuously supported over its entire length with firm, stable material. Blocking should not be used to change pipe grade or to intermittently support pipe across excavated sections. Pipe is installed in a wide range of sub soils. These soils should not only be stable, but applied in such a manner so as to physically shield the pipe from damage. Attention should be given to local pipe laying experience which may indicate particular bedding problems.

Back-filled material free of rocks with a size of 1/2" or less should be used to surround the pipe with 6" - 8" of cover. The back-filled material should be placed in layers. Each soil layer should be sufficiently compacted uniformly to develop laterally passive soil forces during the back-fill operation. It may be advisable to have the pipe under water pressure, 15 - 25 psi during the back-filling.

Vibratory methods are preferred when compacting sand or gravel. Best results are obtained when the soils are in a nearly saturated condition. Where water flooding is used, the initial back-fill should be sufficient to ensure complete coverage of the pipe. Additional material should not be added until the water flooded back-fill is firm enough to walk on. Care should be taken to avoid floating the pipe.

Sand and gravel containing a significant portion of fine-grained material such as silt and clay should be compacted by hand or preferably by a mechanical tamper. The remainder of the back-fill should be placed and spread in uniform layers in such a manner to fill the trench completely so that there will be no unfilled spaces under or about rocks or lumps of earth in the back-fill. Large or sharp rocks, frozen clods and other debris greater than 3" in diameter should be removed. Rolling equipment or heavy tampers should only be used to consolidate the final back-fill.

Maintenance

Maintenance of TFP BlazeMaster® CPVC pipe and fittings for underground water service shall be in accordance with the Standard for Inspection, Testing and Maintenance of Water Based Extinguishing Systems as defined by NFPA 25.

TFP BlazeMaster® CPVC Fire Sprinkler Pipe and Fittings for use in System Risers in accordance with NFPA 13D and 13R

In accordance with the UL Listing, TFP BlazeMaster® CPVC pipe and fittings may be used as system risers in accordance with NFPA 13D and 13R when subject to the following additional limitations:

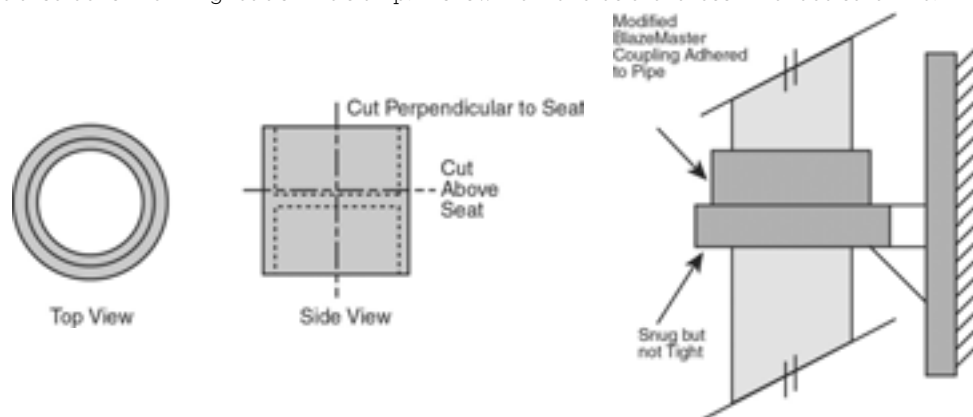
1. When installed protected (concealed), the minimum protection shall consist of either one layer of 3/8 in. (9.5 mm) thick gypsum wallboard or 1/2 in. (12.7 mm) thick plywood.
2. When installed without protection (exposed), the following limitations shall apply:
 - a) The riser shall be installed below a smooth, flat, horizontal ceiling construction. A Listed residential pendent sprinkler is to be installed with its deflector at the distance from the ceiling specified in the sprinkler Listing.

OR

The riser shall be installed below a horizontal unfinished basement ceiling (in accordance with NFPA 13D) constructed utilizing nominal 2 in. x 10 in. or nominal 2 in. x 12 in. exposed solid wood joists on 16 in. centers. A Listed residential pendent sprinkler is to be installed with its deflector a maximum of 1-3/4 in. below the bottom of the solid wood joist in anticipation of future installation of a finished ceiling.

- When installing TFP BlazeMaster® CPVC pipe and fittings in conjunction with 2 in. x 12 in. solid wood joists, the maximum system working pressure under flowing conditions shall not exceed 100 psi and the maximum system working pressure under static (non-flowing) conditions shall not exceed 175 psi.
- b) The Listed residential pendent sprinkler is to have a maximum temperature rating of 155°F and a minimum K-factor of 3.0 and is to be installed at a maximum horizontal distance of 12 inches from the center line of the riser. The system is to be designed based upon the Listed flows for the sprinkler selected except that the flow for a single sprinkler flowing is to be not less than 10 gpm and the flow for multiple sprinklers flowing is to be not less than 8 gpm per sprinkler.
- c) The riser shall be supported vertically within 2 feet of the ceiling or bottom of the joist.
- d) The minimum riser diameter shall be 1 in. and the maximum riser diameter shall be 2 in.
- e) The maximum distance between the wall(s) and the outside surface of the riser pipe shall be 1-1/2 in.
- f) All solvent cement joints shall be made with TFP-500 One Step Solvent Cement.

- g) The instructions shown here for Exposed System Risers require the use of Schedule 80 fittings for riser sizes 1- 1/2" and larger. Grinnell Flameaway fittings are not to be used with TFP BlazeMaster® CPVC Pipe for Exposed System Riser installations.
3. The system shall be installed per the requirements of NFPA 13, Sections 6-2.5 (1999 Edition), Support of Risers.
4. The TFP BlazeMaster® CPVC sprinkler pipe and fittings shall be installed per the manufacturer's installation and design manual.
5. Risers shall be supported by pipe clamps or by hangers located on the horizontal connection close to the riser. Only Listed hangers and clamps shall be used.
6. Vertical lines must be supported at intervals, described in 7 & 8 below, to avoid placing excessive load on a fitting at the lower end. Do this by using riser clamps or double bolt pipe clamps Listed for this service. The clamps must not exert compressive stresses on the pipe. If possible, the clamps should be located just below a fitting so that the shoulder of the fitting rests against the clamp. If necessary, a coupling can be modified and adhered to the pipe as a bearing support such that the shoulder of the fitting rests on the clamp. Follow the manufacturer's recommended cure time.



Recommended method for securing TFP BlazeMaster® pipe vertically. Place clamp below shoulder of fitting.
 WARNING: Modified riser collar shall only be used to provide support to the riser and shall not be used to join two pieces of pipe.

7. Do not use riser clamps that squeeze the pipe and depend on compression of the pipe to support the weight.
8. Hangers and straps shall not compress, distort, cut or abrade the piping and shall allow for free movement of the pipe to allow for thermal expansion and contraction.
9. Maintain vertical piping in straight alignment with supports at each floor level, or at 10 feet (3.05 m) intervals, whichever is less.
10. TFP BlazeMaster® CPVC risers in vertical shafts or in buildings with ceilings over 25 feet (7.62 m), shall be aligned straightly and supported at each floor level, or at 10 feet (3.05 m) intervals, whichever is less.

Upright Sprinkler Installation Specifications

Primer/Solvent Cement

All socket type joints shall be made in accordance with TFP's Installation and Technical Manual using TFP-400 or TFP-500 "One Step" Solvent Cements. When installing TFP BlazeMaster® CPVC products per the Specifications for Upright Sprinkler Installations, "One Step" TFP-400 or TFP-500 Solvent Cements shall only be used on all pipe sizes. Please refer to Page 14 of this manual, which reference the application of these Solvent Cement systems as well as Page 13 of the manual for the Standard Practice for Safe Handling of Primers and Solvent/Cements.

Requirements for Pipe, Fittings, Installations, System Design, and Maintenance are covered within this manual. Please read these sections carefully prior to designing or installing TFP BlazeMaster® pipe and fittings for upright sprinkler installation. **The installation of TFP BlazeMaster® pipe and fittings for use with upright sprinklers is only UL Listed and is not C-UL Listed nor Factory Mutual Research Approved.**

Installation Requirements

TFP BlazeMaster® pipe and fittings may be used with upright Quick Response sprinklers in NFPA 13, 13R and 13D installations. TFP BlazeMaster® CPVC pipe and fittings shall be installed without protection (exposed) when subject to the following limitations:

1. Exposed pipe shall be installed below smooth flat horizontal ceiling construction.
2. The system shall be installed with Listed Quick Response upright sprinklers having deflectors installed a maximum of 4" from the ceiling.
3. The sprinkler heads shall have a temperature rating not exceeding 155°F.
4. The maximum distance from the ceiling to the centerline of the main run of pipe shall be 7 1/2".
5. The distance from the centerline of a sprinkler head to a hanger shall be 3".

Use of CPVC Products in Combustible Concealed Spaces with Specific Use Sprinklers

Product Description

In accordance with the UL Listing, the Central Sprinkler Corporation Model CC1 Combustible Concealed Sprinklers are specific application sprinklers designed to provide protection of specific light hazard combustible, as well as non-combustible, concealed spaces requiring sprinkler protection. The Model CC1 Sprinklers can in some cases allow for the use of BlazeMaster® CPVC pipe and fittings within concealed spaces requiring automatic sprinkler protection.

Installation Requirements

When using the Model CC1 Sprinklers, the system can be installed with BlazeMaster® CPVC pipe and fittings in wood truss construction provided the system is installed in accordance with the Technical Data Sheet for the Model CC-1 Combustible Concealed Space Sprinklers (reference Technical Data Sheet 6-3.0).

CPVC Fire Sprinkler Pipe and Fittings for use in Unfinished Basements with Exposed Solid Wood Joist Installations in accordance with NFPA 13D

In accordance with the UL Listing, TFP BlazeMaster® CPVC pipe and fittings may be installed without protection (exposed) in unfinished basements in accordance with NFPA 13D when subject to the following additional limitations:

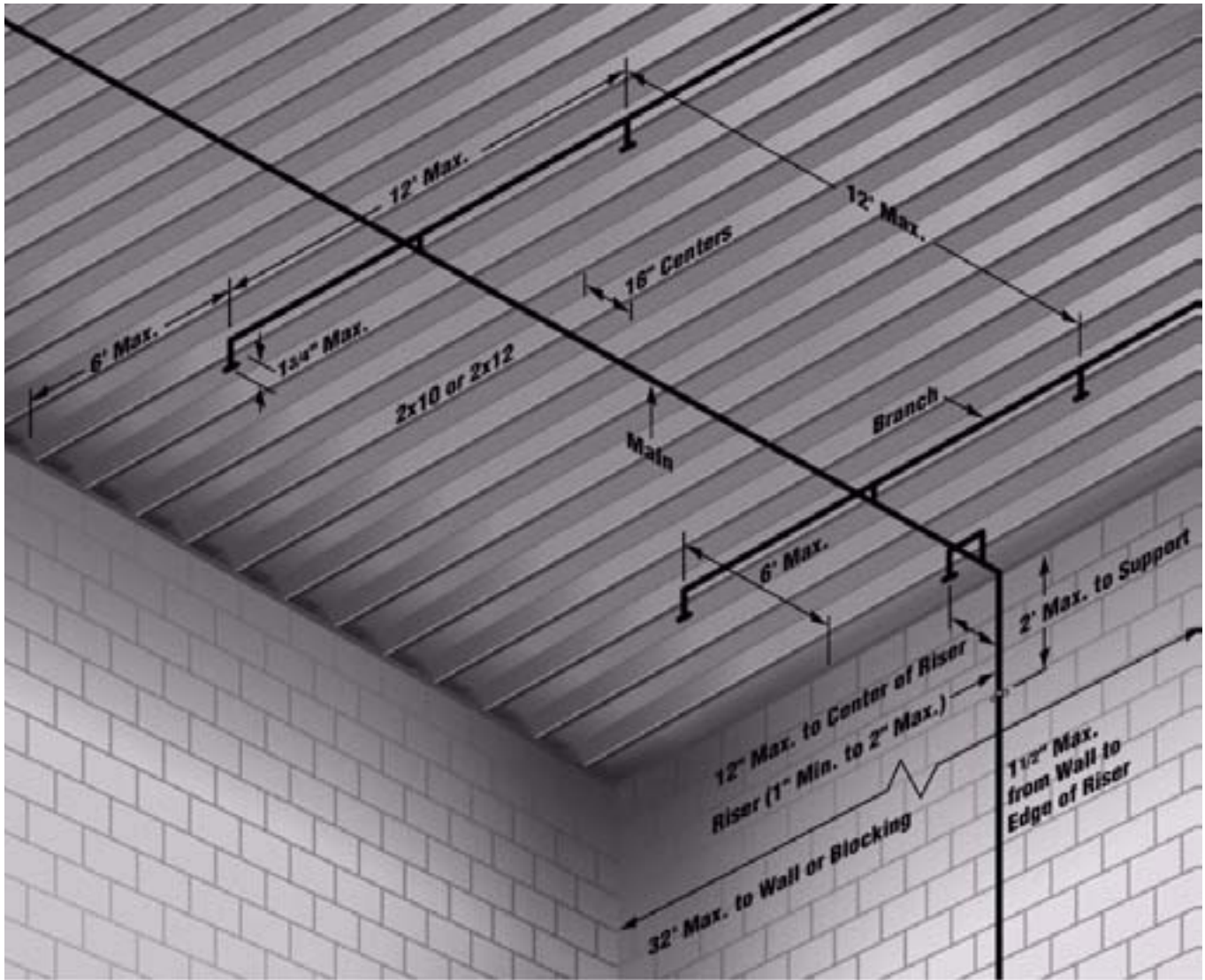
1. The ceiling shall be horizontal and constructed utilizing nominal 2 in. x 10 in. solid wood joists on 16 in. centers.

OR

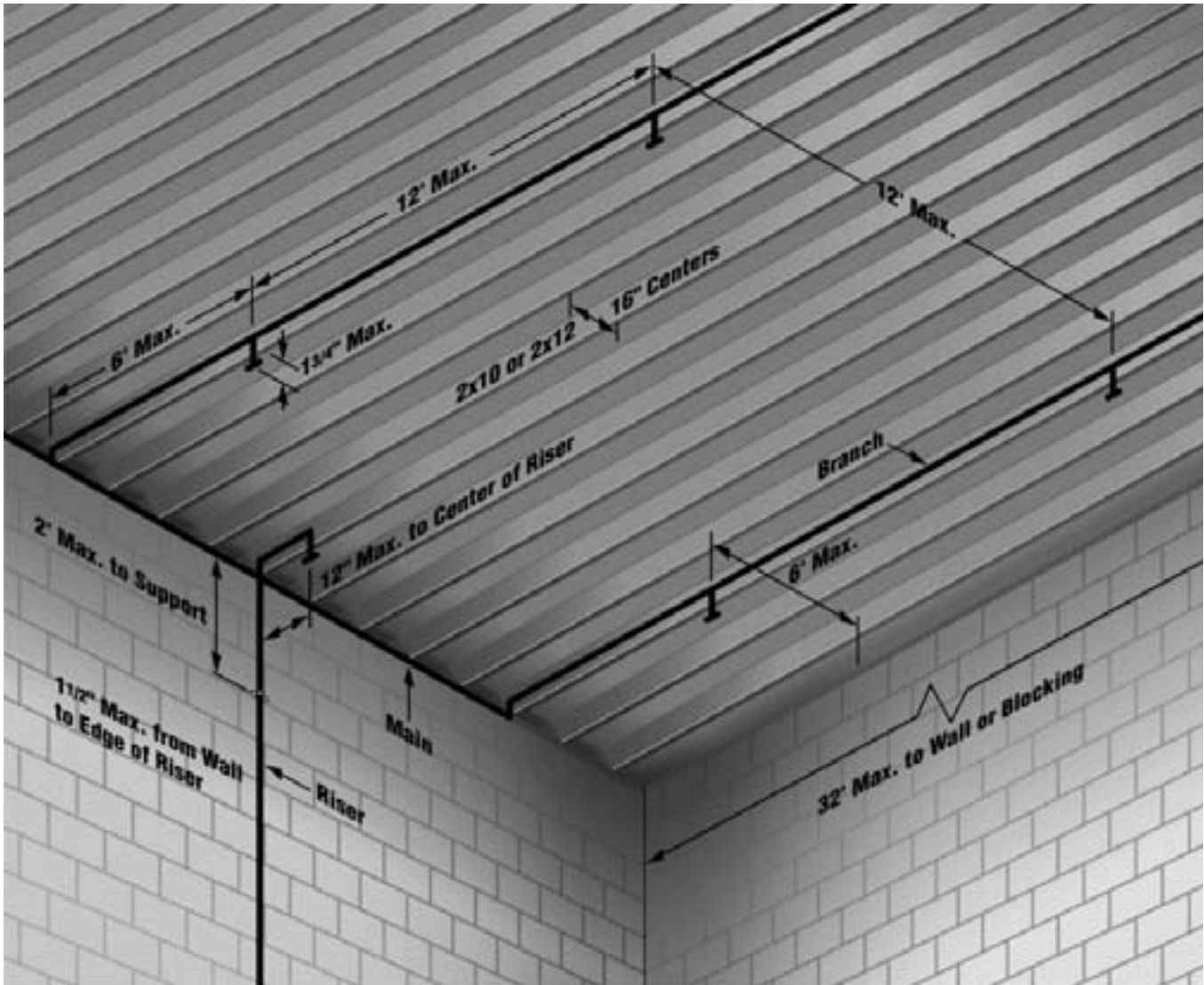
The ceiling shall be horizontal and constructed utilizing nominal 2 in. x 12 in. solid wood joists on 16 in. centers. When installing TFP BlazeMaster® CPVC pipe and fittings in conjunction with 2 in. x 12 in. solid wood joists, the maximum system working pressure under flowing conditions shall not exceed 100 psi and the maximum system working pressure under static (nonflowing) conditions shall not exceed 175 psi.

2. The distance from the floor to the bottom of the solid wood joists shall be between 7 ft and 8 ft.
3. Listed residential pendent sprinklers with a maximum temperature rating of 155°F and a minimum K-factor of 3.0 are to be used for this type of installation. The maximum sprinkler spacing shall not exceed 12 feet. The system is to be designed based upon the Listed flows for the sprinkler selected except that the flow for a single sprinkler flowing is to be not less than 10 gpm and the flow for multiple sprinklers flowing is to be not less than 8 gpm per sprinkler. The sprinklers are to be installed with their deflectors a maximum of 1-3/4 in. below the bottom of the solid wood joists in anticipation of future installation of a finished ceiling. (reference NFPA 13D, Section 4-2.4, 1999 Edition)
4. All system mains shall be run perpendicular to the joists. All branch lines shall be run parallel to the joists.

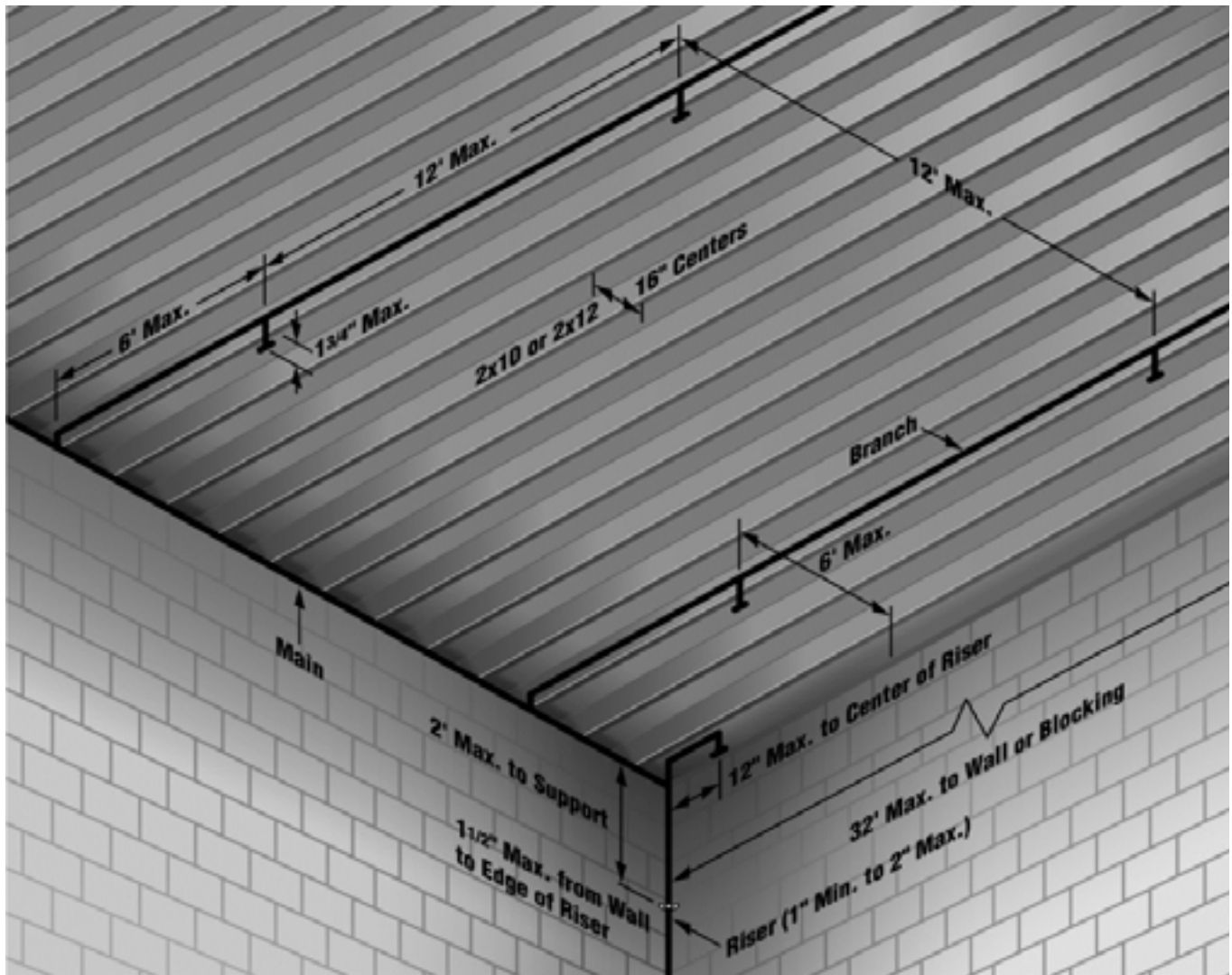
Center Wall Riser with Center Room Main



Center Wall Riser with Main at Wall



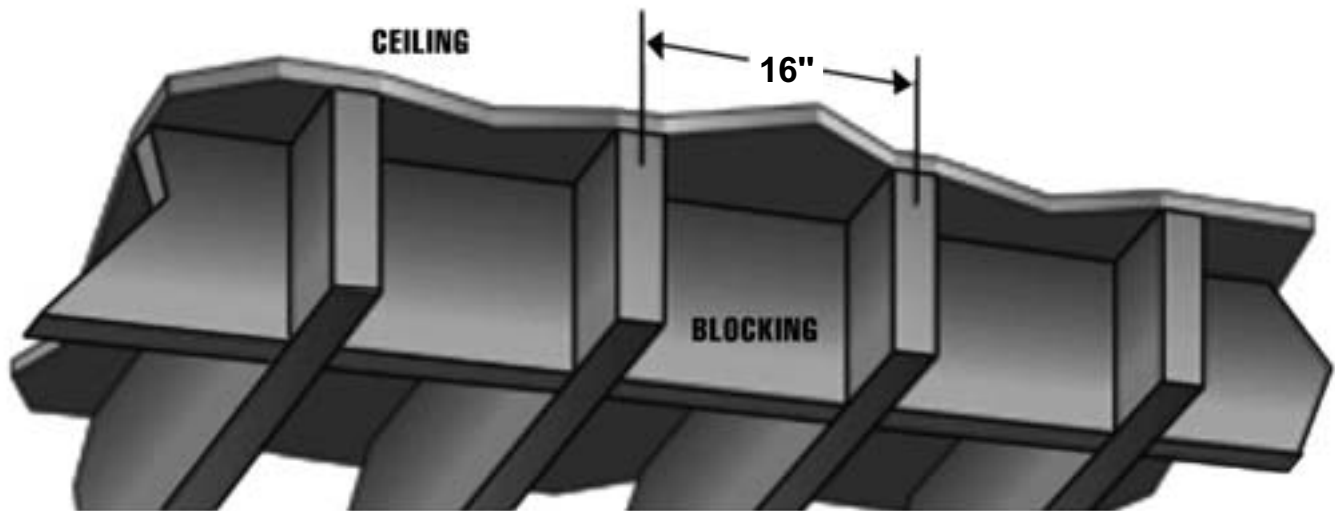
Riser in Corner



- For installations incorporating 2 in. x 10 in. solid wood joists, all solvents cement joints should be made with TFP-400 or TFP-500 One Step Solvent Cement.

For installations incorporating 2 in. x 12 in. solid wood joists, all solvent cement joints shall be made with TFP-500 One Step Solvent Cement.

- When the total protected area exceeds 1,000 square feet, blocking shall be utilized to divide the area into individual compartments not exceeding 1,000 square feet. The maximum length along the joist shall not exceed 32 feet. When the length exceeds 32 feet, blocking shall be utilized. The blocking shall be constructed of minimum 1/2 in. plywood and shall be the full depth of the wood joists.



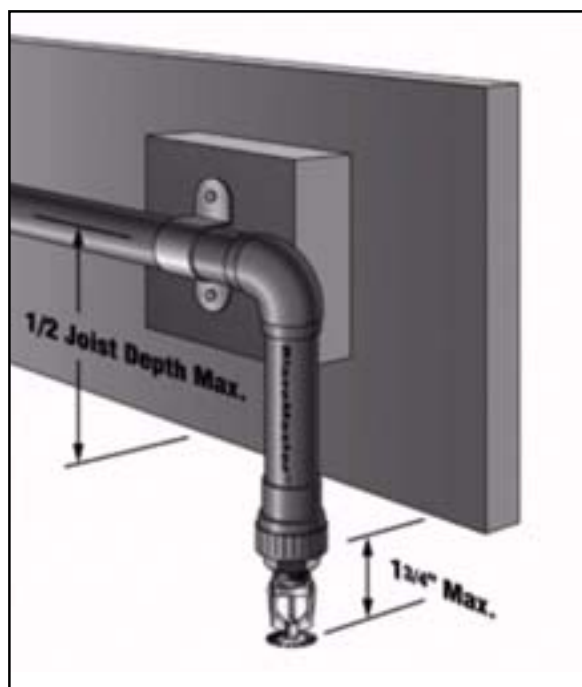
7. When installing TFP BlazeMaster[®] CPVC pipe and fittings perpendicular (system mains) to the solid wood joists, listed support devices for thermoplastic sprinkler piping or other listed support devices shall be used which mount the piping directly to the bottom of the solid wood joists. As an alternative to mounting the pipe and fittings below the solid wood joists, it is also acceptable to cut holes in the solid wood joists at or below the center of the depth of the solid wood joist for support – the holes should be oversized to allow for movement and located to not impair the structural integrity of the joists.

CAUTION: When drilling holes in the solid wood joists, the structural integrity must be maintained. Consult the Authority Having Jurisdiction (AHJ) or building code for requirements.

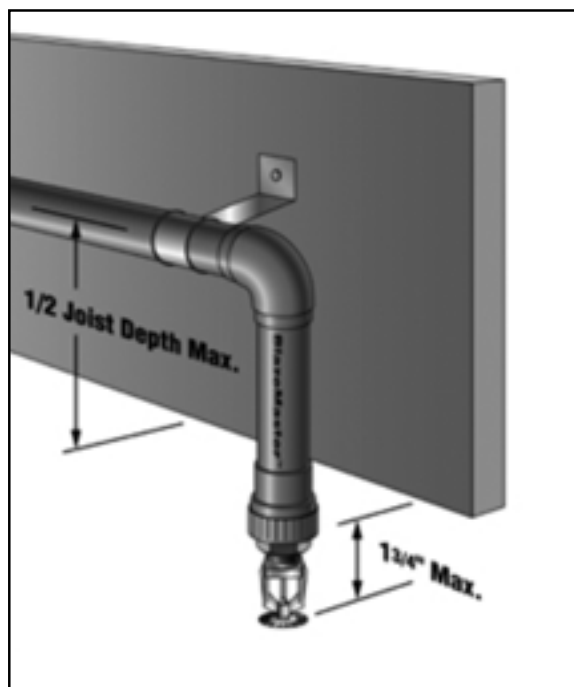
8. When installing TFP BlazeMaster[®] CPVC pipe and fittings parallel (branch lines) to the solid wood joists, the pipe and fittings shall be installed in the cavity below the bottom of the ceiling and above the bottom of the joist. The branch lines shall be located at or below the center of the depth of the solid wood joist. The pipe shall be installed utilizing listed support devices for thermoplastic sprinkler piping or other listed support devices which mount the piping directly to nominal 2 in. wood blocking or listed support devices for thermoplastic sprinkler piping which offset the pipe a nominal distance of 1-1/2 in. from the solid wood joists.

9. The instructions shown here for Unfinished Basements with Exposed Solid Wood Joists require the use of Schedule 80 fittings for installations of 1-1/2" sizes and larger. Grinnell Flameaway fittings may not be used with TFP BlazeMaster[®] CPVC pipe for Unfinished Basements with Exposed Solid Wood Joist installations.

Branches Supported with Blocking



Branches Supported with Hangers



Use of TFP BlazeMaster[®] CPVC pipe and fittings is limited to basements where the quantity and combustibility of contents is low and fires with relatively low rates of heat release are expected.

Use of CPVC Products in Combustible Attic Spaces with Specific Use Sprinklers

Product Description

In accordance with the UL listing, the Central Sprinkler Corporation Specific Application Attic Sprinklers are specific application sprinklers designed to provide protection of specific light hazard combustible, as well as non-combustible, attic spaces requiring sprinkler protection. The Specific Application Attic Sprinklers can allow for the use of BlazeMaster CPVC pipe and fittings within the attic space provided the attic space is protected with Specific Application Attic Sprinklers and the BlazeMaster CPVC pipe and fittings are only used to feed the wet system sprinklers below the ceiling. The Specific Application Attic Sprinklers cannot be installed with BlazeMaster CPVC pipe and fittings.

Installation Requirements

When using the Specific Application Attic Sprinklers, the system below the ceiling can be installed with BlazeMaster CPVC pipe and fittings provided both systems are installed in accordance with the Technical Data Sheet for the Specific Application Attic Sprinklers (reference Technical Data Sheet 6-1.0).

Support and Hanger Recommendations for TFP BlazeMaster® Fire Sprinkler Systems

Special care must be exercised when selecting the appropriate hanger or support method for TFP BlazeMaster® CPVC fire sprinkler systems.

TFP BlazeMaster® CPVC fire sprinkler systems may be supported as follows:

- Using the same hangers as metal piping systems that meet the requirements of this section.
- Using hangers specifically listed for thermoplastic sprinkler piping.
- Using any other support method acceptable to the local Authority Having Jurisdiction.

The pipe size of the hanger shall be the same size as the supported pipe, and the hanger shall be applied to the pipe (i.e., not the fittings). Horizontal runs of piping must be braced so that stress loads (caused by bending or snaking the pipe) will not be placed on a fitting or joint. In jurisdictions that do not allow plastic to metal contact, plastic sleeves or vinyl electrical tape should be used to isolate the materials. Strapping pipe overly tight to a structural member may cause damage to the pipe when pressurized. The pipe should be held snugly by the hanger, but cannot be pinched or crushed in any way. Pipe hangers must comply with the appropriate Standard, NFPA 13, NFPA 13D, or NFPA 13R, whichever applies.

Some hangers designed for metal pipe are suitable for use with TFP BlazeMaster® CPVC fire sprinklers systems. The hanger shall not have rough or sharp edges, which can come in contact with the pipe. Pipe hangers must have a load bearing surface at least 1/2" wide.

There are several types of hangers, which have been specifically listed as "Support Devices For Thermoplastic Piping" such as the Tolco (Fig. 22, 23, 24), Afcon (Model 510, 511, 512) or Erico (Model 7FL or 8FL). Please consult the specific manufacturer for information on the appropriateness of these devices as hangers and/or vertical restraining devices.

Two types of hangers have been specifically listed as "Support Devices For Thermoplastic Piping". For complete installation and positioning requirements for the "Headset TM" and "No-Block TM" hangers refer to their individual Technical Data Sheet. With the provided fasteners, they are designed for direct attachment to the side of a structural wood joist or structural composite wood joist (minimum 3/8 inch thick OSB web member or equivalent).

- The Model SHB1 "Head Set" sprinkler head mounting bracket is listed for use with 3/4, 1, 1-1/4, 1-1/2 and 2 in. CPVC pipe. The "Head Set" restrains against upward movement of the sprinkler head, as well as pre-positions the sprinkler for the future ceiling. By simply aligning the appropriate serration on the depth tab with the bottom of the ceiling joist, the installer is assured of the proper sprinkler to ceiling fit. Due to the unique design of the "Head Set" hanger, no additional "blocking" is required to allow for clearance of the sprinkler escutcheon from the edge of the ceiling joist.
- The Models S012, S016, S020, S024, S032 Offset strap "No Block" hangers are listed for use with 3/4, 1, 1-1/4, 1-1/2 and 2 in. CPVC pipe. The "No Block" is a simple two-hole strap for hanging CPVC pipe in joist channels. With "No Block" hangers, there is no longer the need to nail "blocking" to the beam. The offset strap positions the face of the CPVC pipe 1-1/2" off the face of the joist from which it is being hung.

PLUMBERS TAPE OR J HOOKS ARE NOT RECOMMENDED WITHOUT SHIELDING FOR ROUGH EDGES IN NFPA 13D APPLICATIONS.

Garage Installation Specifications

Scope of Use

Garage Installation Specifications shall only apply for the installation of UL Listed BlazeMaster® CPVC pipe and fittings in garages requiring sprinkler protection per NFPA 13D and NFPA 13R. These Standards are defined in NFPA codes entitled "One and Two Family Dwellings and Mobile Homes" and "Residential Occupancies up to Four Stories in Height". As referenced in NFPA 13D Section 4-6, Exception Number 3, "Sprinklers are not required in garages, open attached porches, carports or similar structures." The installation of TFP BlazeMaster® sprinkler pipe and fittings for use in garages requiring sprinkler protection per NFPA 13R is only applicable to the UL Listing of this product.

Requirements for Pipe, Fittings, Solvent Cement Systems, System Design, Installation, Freeze Protection, and Penetrating Fire Related Walls and Partitions are covered in this installation and technical manual. Please read these sections of the manual carefully prior to designing or installing TFP BlazeMaster® pipe and fittings for garage installations. **The installation of TFP BlazeMaster® pipe and fittings in garages requiring sprinklers is only UL Listed and is not C-UL Listed or Factory Mutual Research Approved.**

Installation Requirements

Protection: TFP BlazeMaster® CPVC pipe and fittings shall be installed concealed behind protection consisting of a minimum of one layer of 3/8" thick gypsum wallboard or 1/2" thick plywood.

Sprinkler Requirements: UL Listed pendant or sidewall sprinklers with a maximum temperature rating of 170 degrees F shall be utilized. All sprinklers shall be installed per the manufacturer's published installation instructions.

Installation Standard: The Listing for Garage Installations shall pertain to those occupancies defined by NFPA 13R.

Handling & Storage

Handling

TFP BlazeMaster® CPVC pipe and fittings are boxed for ease of handling and storage, minimizing the potential damage of pipe and fittings due to transit and storage.

CPVC piping products have a lower impact strength as compared to metal piping products. Pipe fittings, cartoned or loose, should **never** be tossed or thrown to the ground. Pipe should **never** be dropped or dragged on the ground (ie; when unloaded from a truck) and should remain boxed until ready for use. Impact cracks, splits or scratches can weaken or damage the pipe and fittings. Heavy or sharp objects should not be thrown into or against CPVC pipe or fittings. When handling plastic pipe, please ensure that the pipe is well supported and sagging is minimized.

**VERY COLD WEATHER WILL MAKE PLASTIC PIPE AND FITTINGS BRITTLE.
EXTRA CARE DURING HANDLING SHOULD BE TAKEN TO PREVENT DAMAGE.**

Pipe and fittings should always be inspected for damage before actual installation. Pipe or fittings with cuts, gouges, scratches, splits or other signs of damage from improper handling or storage should not be used. Damaged sections on lengths of pipe can easily be cut out using proper techniques for cutting BlazeMaster® CPVC pipe.

Storage

TFP BlazeMaster® pipe (un-boxed) must be covered with a non-transparent material when stored out of doors for extended periods of time. Brief exposure to direct sunlight on the job site may result in color fade, but will not affect physical properties. TFP BlazeMaster® pipe and fittings can be stored in their original containers to keep them free from dirt and reduce the possibility of damage.

When storing inside, TFP BlazeMaster® pipe and fittings should be kept in a well ventilated area, away from steam-lines or other types of heat sources. TFP BlazeMaster® pipe and fittings should always be stored in the original packaging to eliminate color fading and possible damage until needed for use.

Pipe should be stored on a clean, flat surface that provides an even support for the entire length of the pipe. When palatized pipe is stored, insure that the wooden pallet bracings are in full contact with each other. Loose pipe should be stored in original packaging from previously used CPVC BlazeMaster® pipe. When storing pipe on racks, the racks should have continuous or close support arms to prevent the pipe from sagging. Plastic pipe fittings should be stored in their original cartons, on pallets. The cartons should then be wrapped with thin plastic sheeting to prevent moisture from causing the packaging to collapse. Pipe fittings should never be mixed in storage bins with metal fittings. **Special care shall be taken to avoid contamination of TFP BlazeMaster® pipe and fittings with petroleum based products such as cutting or packing oils that may be present on metallic system components.**

Handling of TFP BlazeMaster® Cements and Primers

Safety and Health Precautions: Prior to using CPVC primers and solvent cements, read the directions and take precautions found on the container labels, material safety data sheets and Standard Practice for Safe Handling, ASTM F402. Cements and primers contain volatile solvents, which evaporate rapidly. Avoid breathing the vapors and provide ventilation. If necessary, use a fan to keep the work area clear of fumes. Avoid skin or eye contact. Keep the cement can closed when not in use. If the cement thickens beyond its original consistency, discard it. Do not attempt to dilute it with primer or thinner, as this may change the character of the cement and make it ineffective.

Caution: CPVC solvent cement has a limited shelf life of approximately one to two years. Do not use the cement beyond the period recommended by the manufacturer as stated on can.

Solvent/Cementing Instructions

Solvent cementing is the only method of joining rigid CPVC pipe and fittings which provides a chemically fused joint. Solvent cementing procedures must be carefully followed. Field experience has shown that problems can occur with improperly solvent cemented joints.

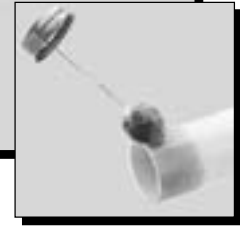
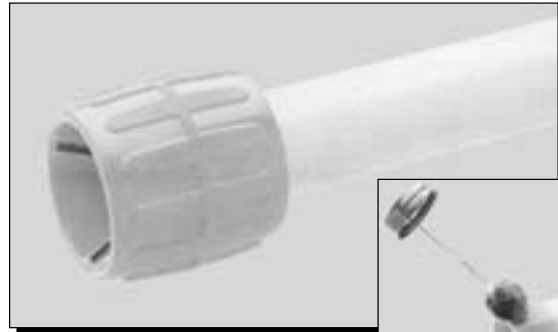
Follow the instructions presented below carefully. Do not omit any steps and ensure that all facets of installation are fully understood prior to commencing work. Please note the specific instructions and cure times for the "One-Step" TFP-400 and TFP-500 Solvent/Cements and the "Two-Step" TFP-100 Primer and TFP-200 are provided within this manual and must be followed carefully. TFP offers a demonstration program for installers which is outlined on Page 25 of this guide.

Joining TFP BlazeMaster[®] Pipe Systems

Cutting: BlazeMaster[®] pipe can be easily cut with a ratchet cutter, wheel-type plastic tubing cutter or a power or other fine toothed saw. To ensure the pipe is cut square, a miter box should be used when using a saw. Cutting the pipe as squarely as possible provides the surface of the pipe with maximum bonding area. Caution should be taken when cutting CPVC pipe in cold weather as **a ratchet cutter shall not be used below 50°F (10°C) without warming the pipe.**



Deburring: Burrs and filings can prevent proper contact between the pipe and fitting during assembly, and shall be removed from the outside and the inside of the pipe. A chamfering tool or file is suitable for this purpose. A slight bevel shall be placed at the end of the pipe as shown below. This will ease entry of the pipe into the socket and minimize the chance of wiping solvent cement from the fitting.



Fitting Preparation: Using a clean dry rag, wipe loose dirt and moisture from the fitting socket and pipe end. Moisture can slow the cure time, and at this stage of assembly, excessive water can reduce joint strength. Check the dry fit of the pipe and fitting. The pipe should enter the fitting socket easily $\frac{1}{4}$ to $\frac{3}{4}$ of the way. If the pipe bottoms in the fitting with little interference, use extra solvent cement in making the joint. **Before applying primer and/or solvent cement, appropriate safety precautions should be taken. Primer and cement must be stored between 40°F (4.4°C) and 100°F (38°C) and should be kept in the shade. Eliminate all ignition sources and do not smoke when using. Avoid breathing vapors. Use only with adequate ventilation; explosion-proof general mechanical ventilation or local exhaust is recommended to maintain vapor concentrations below recommended exposure limits. In confined or partially enclosed areas, a NIOSH approved organic vapor cartridge respirator with full face piece is recommended. Containers of primer and solvent cement should be closed when not in use. Avoid frequent contact with skin by wearing PVA coated protection gloves and an impervious apron are recommended. Contact with eyes can be avoided. Splash proof chemical goggles are recommended. For further information refer to Material Safety Data Sheets for TFP BlazeMaster[®] "Two Step" TFP-100 Primer and TFP-200 Solvent/Cement, and "One Step" TFP-400 and TFP-500 Solvent/Cements.**

Estimating Primer and Cement Requirements: The following guidelines are provided to allow estimation of TFP BlazeMaster[®] Primer and Cement quantities needed.

Primer and Cement Requirements

Fitting Size (in.)	One Step Solvent Cements No. of Joints per Quart	Two Step Solvent Cement No. of Joints per Quart	Two Step Primer No. of Joints per Quart
$\frac{3}{4}$	260	270	810
1	170	180	540
$1\frac{1}{4}$	125	130	390
$1\frac{1}{2}$	95	100	300
2	65	70	210
$2\frac{1}{2}$ *	40	50	150
3*	30	40	120

Note: Use of solvent cement products other than those recommended by the TFP will void its warranty on BlazeMaster[®] pipe and fittings. **Caution: Avoid applying too much cement. Do not allow the cement to drip beyond the bottom of fitting socket. Excessive cement on the pipe and/or fitting can result in decreasing the overall strength of the pipe and/or fitting and may cause cracks when pressure is applied.**

"Two-Step" TFP-100 Primer Application: TFP BlazeMaster[®] TFP-100 primer is needed to prepare the bonding area for the addition of the TFP-200 cement and subsequent assembly. It is important to use a proper applicator - a dauber or paint brush approximately $\frac{1}{2}$ the size of the pipe diameter is appropriate. A rag must not be used. Apply TFP BlazeMaster[®] TFP-100 primer to the outside of the pipe end and the inside of the fitting socket, re-dipping applicator as necessary to ensure entire surface is tacky. **Over application of TFP-100 primer can over-soften the pipe wall or fitting socket and can cause joint failure when pressurized. Please use extreme caution to ensure over-application of TFP-100 primer is avoided.**



“Two-Step” TFP-200 Solvent/Cement Application: TFP BlazeMaster® TFP-200 solvent/cement must be applied when the pipe surface is still tacky (not wet) from the primer. Joining surfaces should be penetrated and softened. TFP BlazeMaster® cement should be applied with a natural bristle brush ½ the size of the pipe diameter. A dauber may be used to apply cement on pipe sizes below 2 inches. For pipe sizes 2 inches and above, a roller is available to apply the cement. Apply a heavy, even coat of TFP-200 cement to the outside pipe end. Apply a medium coat to the fitting socket. If there was little interference when the dry fit was checked, a second application of cement should be made to the pipe end.

“One-Step” TFP-400 and TFP- 500 Solvent/Cement Application : Joining surfaces shall be penetrated and softened with TFP BlazeMaster® TFP-400 or TFP-500 solvent/cements. Cement must be applied to the pipe and fittings. Cement shall be applied (worked into pipe) with an applicator ½ the size of the pipe diameter. Apply a heavy, even coat of cement to the outside pipe end. Apply a medium coat to the fitting socket. Apply a second cement application on the pipe end. (Apply cement on the pipe end, in the fitting socket, and on the pipe again.) It is important to insure sufficient penetration of the solvent/cement into the pipe and fitting surface(s) by wiping the cement with the dauber until the pipe markings have been removed from the pipe surface. Usually 3-5 rotations around the pipe with the dauber are sufficient to achieve proper softening.

Assembly: Immediately insert the pipe into the fitting socket, while rotating the pipe ¼ turn. Properly align the fitting for the installation at this time. The pipe end must reach socket bottom. Hold assembly for 10 to 15 seconds to ensure initial bonding. A bead of cement should form around the outside of the pipe and the shoulder of the fitting. If this bead is not continuous around the socket shoulder, it may indicate that insufficient cement was applied. If insufficient cement is applied, cut out the joint, discard the fitting and begin once again. Cement in excess of the continuous bead should be wiped off with a rag.

Set and Cure Times: TFP BlazeMaster® solvent cement cure times are a function of pipe size, temperature, relative humidity, and tightness of fit. Drying time is faster in drier environments, smaller pipe sizes, high temperatures and tighter fits. **The assembly must be allowed to set, without any stress on the joint, for 1 to 5 minutes.** Larger sizes require longer set times. Following initial set period, the assembly can be handled carefully avoiding significant stresses to the joint. Refer to the following tables for **minimum cure times** prior to pressure testing.

TFP 100 & TFP 200 “Two Step” Solvent Cement

Table U • 225 psi (maximum test pressure)		
Pipe Size	40°F-120°F	0°F-39°F
3/4" -2"	48 hours	See Note 1
2 1/2"-3"	96 hours	See Note 1

See Note 3 for use of these products.

TFP 400 and TFP-500 “One Step” Solvent Cements

Table V • 100 psi (maximum) Test Pressure			
Pipe Size	Ambient Temperature During Cure Period		
	60°F-120°F	40°F-59°F	0°F-39°F
¾"	15 minutes	15 minutes	30 minutes
1"	15 minutes	30 minutes	30 minutes
1¼"	15 minutes	30 minutes	2 hours

See Note 2 and 3 for use of these products.

TFP 400 and TFP-500 “One Step” Solvent Cements

Table W • 200 psi (maximum) Test Pressure			
Pipe Size	Ambient Temperature During Cure Period		
	60°F-120°F	40°F-59°F	0°F-39°F
¾"	45 minutes	1½ hours	24 hours
1"	45 minutes	1½ hours	24 hours
1¼"	1½ hours	16 hours	120 hours
1½"	1½ hours	16 hours	120 hours
2"	6 hours	36 hours	See Note 1
2½"	8 hours	72 hours	See Note 1
3"	8 hours	72 hours	See Note 1

See Note 2 and 3 for use of these products.

TFP 400 and TFP-500 “One Step” Solvent Cement

Table X • 225 psi (maximum) Test Pressure			
Pipe Size	Ambient Temperature During Cure Period		
	60°F-120°F	40°F-59°F	0°F-39°F
¾"	1 hour	4 hours	48 hours
1"	1½ hour	4 hours	48 hours
1¼"	3 hours	32 hours	10 days
1½"	3 hours	32 hours	10 days
2"	8hours	48 hours	See Note 1
2½"	24 hours	96 hours	See Note 1
3"	24 hours	96 hours	See Note 1

See Note 2 and 3 for use of these products.

Note 1: For this size pipe and fitting, the primer (if applicable) and solvent cement can be applied at temperatures below 40°F (4.5°C), however, the sprinkler system temperature must be raised to a temperature of 40°F (4.5°C) or above and allowed to cure per the above recommendations prior to pressure testing.

Note 2: Do not mix TFP-400 and TFP-500 “One Step” Solvent Cements with one another as each is a different formulation and has not been investigated for performance.

Note 3: LPCB Approval does not recognize nor accept the use of the TFP-100 and TFP-200 “Two Step” Solvent Cement process as only “One Step” TFP-400, and TFP-500 Solvent Cement products have been tested and approved for use.

Special Notes: The cure time can be accelerated with Solvent Cement systems by use of external heating methods to warm the surface of the pipe and fittings to temperatures of 40°F (4.5°C) or higher. Caution **shall** be used in heating surfaces of pipe and fittings due to the flammable nature of Solvent/Cement. Use of excessive heat on cold TFP BlazeMaster® pipe and fittings can cause the piping system to snake and bend, thus moving unanchored drops and pipe runs.

Extra set and cure time should be allowed in colder temperatures. In extremely hot temperatures, make sure both surfaces to be joined are still wet with cement when putting them together.

Pressure Testing the System: Once an installation is completed and cured per the recommendations, the system shall be pressure tested at 200 psi (1379 kPa) for two hours, or at 50 psi (345 Kpa) in excess of the static pressure, when the maximum water pressure to be maintained in the system is in excess of 150 psi (1,034 Kpa), in accordance with the requirements established by NFPA Standard 13, 13R, 13D or 24 as applicable. (Note: 175 psi (1210 kPa) is the maximum rated continuous working pressure.) Sprinkler systems in one and two family dwellings and mobile homes may be tested at line pressure in accordance with the requirements established by NFPA 13D, Section 1-5.4.

When pressure testing the system, the sprinkler system shall be filled with water and the air bled from the highest and farthest sprinkler heads before test pressure is applied. **Air or compressed gas should never be used for pressure testing.** If a leak is found, the fitting shall be cut out and discarded. A new section can be installed using couplings.

Warning: Sprinkler heads shall be installed only after all the CPVC pipe and fittings, including the sprinkler head adapters, are solvent welded to the piping and allowed to cure for a minimum of 30 minutes. Sprinkler head fittings should be visually inspected and probed with a wooden dowel to insure that the water way and threads are clear of any excess cement that may restrict the flow of water before installing the sprinkler head. Once the installation is complete and **cured per Tables U, V, W, or X**, the system shall be hydrostatically tested. It is an unacceptable practice to install sprinklers into the head adapter fittings and then solvent cement to the drop.

Transition to Other Materials

Female brass insert thread adapters, grooved pipe adapters or flanges shall be used when connecting a TFP BlazeMaster[®] system to other piping materials. Special brass threaded adapters are used for connection to sprinkler heads.

A thread sealant should be used when making a threaded connection. TFE (Teflon) thread tape is the only recommended sealant and must be used with all threaded connections. The use of other thread sealants may result in damage to the BlazeMaster[®] CPVC. Teflon tape should be wrapped in the direction of the threads for the entire length of the thread. Generally, 2 to 3 wraps is sufficient to obtain a leak free seal.

Cautions For Transition to Other Materials

Care must be taken when transition is made to dissimilar materials. **Brass inserts used in male and female threaded and grooved CPVC adapters may create galvanic reaction with steel and iron drop nipples, pipe, and cast fittings in certain water conditions. If you are unsure of the potential for galvanic reaction to occur, verify the water condition and conductivity of the water being used in the sprinkler system piping prior to installation. Brass threaded nipples are recommended when using brass inserted threaded BlazeMaster[®] CPVC fittings to reduce the potential of galvanic reaction caused by dissimilar metals.**

Care must be taken to avoid over-torquing – usually 1 to 2 turns beyond finger tight is all that is required to make up a threaded connection. TFP recommends between 14 and 21 foot pounds of torque to achieve a leak free seal. **Note: Torquing on the body of the sprinkler head adapter or female adapter without holding back on the brass threaded connector may damage the fitting and will void the published TFP warranty. When transitioning from steel piping systems to a BlazeMaster[®] CPVC piping system via grooved coupling adapters, female adapters, or flanges, caution must be taken to ensure that all hydrocarbons and/or cutting oils are removed from the system piping as petroleum based substances can stress fail CPVC products causing leakage and/or breakage.** The instructions for transitioning to other materials are specifically for TFP produced BlazeMaster[®] CPVC fittings. Should other Listed BlazeMaster[®] CPVC fittings be used in conjunction with TFP BlazeMaster[®] CPVC products, please consult the fitting manufacturer's installation and design manuals.

Flanged Connections

Piping runs joined by flanges shall be installed in a straight line position to avoid over stressing the flange due to misalignment. Piping must also be secured to prevent lateral movement which can create stress and damage the flange.

- A. With gasket in place, align the bolt holes of the mating flanges by rotating the ring into position. (Consideration should be given to alignment of a One-Piece Flange prior to joining with pipe.)
- B. Insert all bolts, washers (two standard flat washers per bolt), and nuts.
- C. Make sure the faces of the mating surfaces are flush against gasket prior to bolting down the flanges.
- D. Tighten the nuts by hand until they are snug. Establish uniform pressure over the flange face by tightening the bolts in 5 ft-lb increments according to the sequence shown in Fig. Z3 following a 180° opposing sequence.
- E. Care must be taken to avoid "bending" the flange when joining a flange to a "raised face" flange, or a wafer style valve. Do not use bolts to bring together improperly mated flanges.

Caution: Unnecessary over-torquing will damage the flange.

Flange Size (in.)	Bolt Diameter (in.)	Torque (ft. lb)
¾ - 1½	½	10 - 15
2 - 3	¾	20 - 30

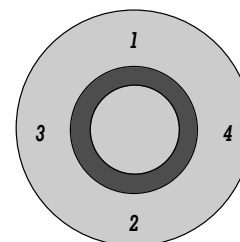


Fig. Z3
Tightening Sequence for Flange Bolt

Torque given is for dry, non lubricated bolt, standard washers, neoprene 1/8" thick full face gasket. If lubricant (non-petroleum based) is used, torque levels may vary. Bolts, nuts, washers and gaskets are not furnished. Actual field conditions may require a variation in these recommendations.

Grooved Coupling Adapters

The following procedures are recommended for proper assembly of the Grooved Coupling Adapter. **READ THESE INSTRUCTIONS CAREFULLY BEFORE BEGINNING INSTALLATION.**

Inspect the fittings and pipe to insure that they are sufficiently free from indentations, projections or roll-marks on the gasket seating areas of the fitting and pipe. The pipe should be squarely cut. Any loose scale, paint and/or dirt must be removed from the groove and seating surfaces prior to assembly. **Use a standard grade EPDM-A* compound that is suitable for wet fire sprinkler service. A flexible coupling shall be used with grooved coupling adapters such as the TFP Figure 575, 705 or 707 Grooved flexible coupling. Caution: Use of rigid style couplings may damage the grooved coupling adapter. Consult the grooved coupling manufacturer for proper selection and installation instructions. Use of petroleum based lubricants will damage the gasket and may damage the adapter resulting in stress failure of the CPVC housing.**

*See manufacturer for temperature ratings.

Penetrating Fire Rated Walls & Partitions with TFP BlazeMaster[®] Piping

Consult the *Authority Having Jurisdiction* and building codes prior to penetrating fire rated walls and partitions. Several through-penetration firestop systems are UL Classified for use with CPVC pipe. TFP recommends the use of **BlazeMaster[®] Caulk and Walk[®]** for use with its BlazeMaster[®] pipe and fittings as this caulking product contains a water based intumescent which will not harm the CPVC compound as verified by BFGoodrich. For further information on Firestop systems, contact TFP or BFGoodrich.

Other Design Criteria

TFP BlazeMaster[®] piping systems shall be designed and installed so that the piping is not closely located to heat producing sources, such as light fixtures, ballasts and steam lines. Pipe must not be positioned directly over open ventilation grills. Finally, during periods of remodeling and renovations, appropriate steps must be taken to protect the piping from fire exposure if the ceiling is temporarily removed.

Since BlazeMaster[®] plastic is flexible compared to metallic sprinkler pipe, it has greater capacity to withstand earthquake damage. In areas subject to earthquakes, TFP BlazeMaster[®] systems should be designed and braced in accordance with local codes and NFPA Standard 13. For information regarding Bending Deflections and Snaking Deflections for given lengths of CPVC SDR 13.5 pipe, refer to Tables J & K on Page 6.

Freeze Protection

Whenever possible, TFP BlazeMaster[®] CPVC systems are recommended to be protected using Batt Insulation and building construction techniques which ensure adequate freeze protection and wind blocking. Batt insulation guidelines are provided by most local *Authorities Having Jurisdiction* with recommendations for NFPA 13D installations provided in the Appendix of the Standard. Local building code and *Authorities Having Jurisdiction* requirements **must** be followed carefully as misplaced or inadequate insulation and wind blocking can create localized freeze of the system piping which can result in damage to the structure and piping system. When adequate insulation and wind blocking are not available, TFP BlazeMaster[®] pipe and other Listed BlazeMaster[®] fittings can be protected with Glycerine antifreeze solutions only as outlined by NFPA 13 in areas that are subject to freezing.

The guidelines provided below should be followed when providing freeze protection for TFP BlazeMaster[®] CPVC pipe and fittings.

- The use of glycol based antifreeze solutions is specifically prohibited for use with BlazeMaster[®] CPVC systems.
- Prior to using Glycerine Antifreeze, consult the Local Authority Having Jurisdiction on the use of antifreeze solutions in fire sprinkler applications.
- Glycerin Antifreeze should only be used in TFP BlazeMaster[®] CPVC systems when purity levels of 96.5 USP Grade or higher are achieved. There are many manufacturers and distributors of Glycerine antifreeze, thus extreme care should be used when purchasing Glycerine antifreeze to ensure purity. Obtain material certifications and check the labeling on antifreeze solutions prior to usage in TFP Sprinkler BlazeMaster[®] CPVC systems.
- Glycerine antifreeze stored or mixed in contaminated barrels or containers may have serious and detrimental affects on the performance of TFP BlazeMaster[®] CPVC products. **Contaminated Glycerine can stress fail CPVC products causing leakage and deterioration of the piping system.**
- Glycerine and water solutions must be mixed properly and completely. If mixing an antifreeze solution for the piping system from concentrate/pure Glycerine antifreeze, you must completely agitate the antifreeze and water to ensure proper mixing. Glycerine antifreeze must not be pumped into the piping system with water without being fully mixed to ensure that the solution does not separate thus causing localized freeze of the system piping and increased chance of leakage in system components. Properly mixed Glycerine antifreeze and water solutions will not separate.
- Glycerine antifreeze should never be introduced into a piping system without mixing with water (excepting premixed solutions), since Glycerine antifreeze tends to thicken near 32 degrees Fahrenheit (0 degrees Celsius) thus increasing viscosity and reducing freeze protection.
- Do not hydro test Glycerine antifreeze designed sprinkler systems with water only prior to introducing Glycerine antifreeze as the potential for freezing in the drops is increased as the Glycerine solution will not fully mix with trapped water in sprinkler drops and sprinkler system low points.
- A Glycerine antifreeze sprinkler system is more prone to leakage than a water only sprinkler system. Glycerine antifreeze characteristics increase the capacity for leakage which can be successfully addressed by using care when making threaded connections by utilizing high quality teflon thread tape, and by ensuring sufficient torque is applied to the male and female threads being mated together. **TFP recommends between 14 and 21 foot pounds of torque to achieve a leak free seal. Do not use fittings or sprinklers with damaged threads in glycerine systems, as the damaged threads create increased leakage potential.**
- Glycerine antifreeze can be cleaned with alcohol based cleaners. Prior to using any cleaner on a surface, please ensure compatibility with the surface material to be cleaned. If compatibility with the surface to be cleaned is questionable, a small section of the surface should be spot cleaned prior to wide spread application of the cleaner.

NFPA References:

- NFPA 13 Section 4-5.2.3 indicates glycerine antifreeze solutions shall be prepared with a freezing point below the expected minimum temperature for the locality.
- NFPA 13 Section 4-5.2.3 also indicates antifreeze solutions shall be checked by hydrometer with suitable scale or refractometer having a scale calibrated for the antifreeze solution used.
- **NFPA 13 Section 4-5.3.2 requires the use of expansion chambers to accommodate for the expansion of the antifreeze solution when connection between the antifreeze system and wet pipe system incorporates the use of a backflow prevention device.**
- NFPA 13 Appendix A4-5.1 recommends the use of antifreeze in sprinkler systems **not exceeding** 40 gallons (151L).
- NFPA 13 Section 4-5.1 states “the use of antifreeze solutions shall be in conformity with state and local health regulations”.

Batt Insulation Requirements and Suggestions

Many jurisdictions recommend the use of batt insulation for freeze protection in place of antifreeze solutions. These jurisdictions typically publish recommended batt insulation installation guidelines which provide the minimum thickness of insulation to be utilized. These **minimum** insulation recommendations should be followed. Insulation requirements may vary by geographic area given climate conditions. Batt insulation is used to maintain a minimum water temperature in the sprinkler piping of 40°F or 3°C. The minimum insulation recommendations pictured in the Appendix of NFPA 13D are shown primarily for piping wood frame ceilings with an unheated attic or an un-insulated roof above. Many jurisdictions do not allow the installation of water filled sprinkler piping in unheated outside walls. Consult with your local *Authority Having Jurisdiction* prior to installing batt insulation for freeze protection with TFP BlazeMaster® CPVC products.

Batt Insulation Installation Recommendations

NFPA 13D, The Standard for the Installation of Sprinkler Systems in One and Two-Family Dwellings and Manufactured Homes, Appendix A-4-3.1 recommends the following guidelines for use of batt insulation:

- “In areas subject to freezing, care should be taken to cover sprinkler piping completely in unheated attic spaces with insulation. Installation should follow the guidelines of the insulation manufacturer.” (Figures A-4-3.1 (a) through (e) show several installation methods that can be considered.)
- A-4-3.1 (a) “It is important that the insulation be installed tight against the joists. In unheated areas, any spaces or voids between the insulation and the joists causes the water in the fire sprinkler piping to freeze.”
- A-4-3.1 (b) “For areas having temperatures of 0°F (-18°C) or lower, an additional batt of insulation covering the joist and the fire sprinkler piping should be used. If this is not done, localized freeze-ups can occur in the sprinkler piping.”
- A-4-3.1 (c) “Boring holes in the joist is one of the methods for locating the fire sprinkler piping in the ceiling. As an alternative, when temperatures are expected to be 0°F (-18°C) or lower, loose pieces of insulation should be stuffed in the bored holes around the piping.”
- A-4-3.1 (d) (e) “Care should be taken to avoid compressing the insulation. This reduces its R value. To prevent potential freeze-ups of the sprinkler piping, the insulation should be tight against the joists.”

Minimum insulation R value requirements are typically between R19 and R30; however, the minimum requirements **must** be verified with the *Authority Having Jurisdiction*.

TFP BlazeMaster® Systems and Penetration of Metal Studs

Please use extreme care when passing TFP BlazeMaster® pipe and fittings through metal studs as the sharp cut edges of these studs can scar or puncture thermoplastic pipe. TFP recommends the use of rubber or plastic gromets such as those commonly used in the plumbing industry for protection of the pipe when passing through such spaces. Please consult your local *Authority Having Jurisdiction* for additional information regarding the protection of thermoplastic pipe when passed through metal studs.

Solvent Cement and Primer Spills

The best protection from accidental spills of cement or primer is to protect the work area with drop cloths. If cement or primer comes in contact with fiberglass tub/shower enclosures, carpet or furniture, the excess cement or primer must be wiped up immediately before it sets. Once the cement or primer is dry, it is almost impossible to remove, especially the purple stain in the CPVC primer.

Immediate use of soap and water or a mild cleaner such as “Ajax” or “Comet” will remove the stain of the primer from a fiberglass tub/shower surface. Whatever method is used, test it on a small hidden area first to see if it removes the shine or color or softens the surface. If this happens, do not use.

The use of solvents such as alcohol, M.E.K., or acetone will usually work on tile sinks or floors but can do more damage than good on some synthetic materials. Caution should be used when trying any solvent to remove cement or primer from any surface. Always protect the work area before you start, both under and around where cement or primer spills can cause irreparable damage.

Joining TFP BlazeMaster® CPVC in Adverse Conditions

Joining TFP BlazeMaster® CPVC in Cold Weather

TFP BlazeMaster® TFP-200, TFP-400, and TFP-500 solvent cements are approved for cold weather usage down to 0°F (-17°C). The bonding of pipe and fittings is a function of temperature and time, so therefore very cold weather requires proper care and extra time be taken in joining pipe and fittings. Very cold weather will make TFP BlazeMaster® pipe and fittings brittle, extra care should be taken to prevent damage during handling.

Caution: Ratchet type cutters should never be used on pipe below 50°F (10°C) without warming the pipe first. Ratchet cutters tend to leave hair line cracks on the end of the pipe in cold weather. Additionally, dull pipe cutters should be checked as they may break the pipe prior to cutting through completely.

Follow the installation instructions when working in cold weather taking special note that solvents penetrate and soften the surfaces more slowly than in warm weather. (Assembly temperatures below 0°F (-17°C) are not in accordance with the UL and C-UL Listings.) Colder temperatures require greater cure time due to the slower evaporation of primer in solvent cements.

Cure charts are found in Tables U, V, W, and X. The following recommendations should be followed when cementing during cold weather.

1. Carefully read and follow all directions before installation.
2. Prefabricate as much of the system as possible in a heated working area.
3. Store cements and primers in a warmer area when not in use and make sure they remain fluid. Do not allow the cement to freeze or become "jelly-like". **Gelled cement shall be discarded.**
4. Take special care to remove moisture, including ice and snow.
5. Always use TFP-100 primer to soften the joining surfaces before applying TFP-200 cement if using the "Two Step" process.
6. When using TFP-400 or TFP-500 "One Step" solvent cements, Primer shall never be used.
7. Allow a longer cure period before the system is used.

Joining TFP BlazeMaster® CPVC in Hot Weather

CPVC solvent cements contain volatile solvents. Higher temperatures and/or wind accelerate evaporation. Pipe stored in direct sunlight may have surface temperatures of 20°F to 30°F above air temperatures. Solvents attack these hot surfaces deeper, therefore it is very important to **avoid puddling** the primer or cement inside the fitting socket. Always ensure that the excess cement and primer are wiped from the outside of the joint. Follow the standard installation instructions and take special note of the tips and cautions below.

1. Please refer to Table C on page 4 for the appropriate temperature related expansion and contraction information.
2. Store solvent cements and primers in a cool or shaded area prior to use.
3. If possible, store pipe and fittings, or at least the ends to be solvent welded, in a shady area before cementing.
4. Make sure that both surfaces to be joined are still wet with cement when putting them together. With larger size pipe more people may be required to complete application successfully.
5. Carefully read and follow all directions before installation.

Helpful Tips

Page No.

- Do not thread, groove, or drill into BlazeMaster® pipe.
- Always use tools specifically designed for plastic pipe and fittings. 20
- Refer to Tables for Thermal Expansion when large temperature changes are encountered. 20
- Always chamfer and debur CPVC pipe prior to installation. 20
- Do not use ratchet type cutters in temperatures below 50°F (10°C) without warming pipe. 20
- Air shipment of cement and primer is strictly prohibited by law (contact carriers for details). -
- When bottoming a joint, rotate ¼ turn if possible. If a particular alignment is required, dry mark your pipe and/or use the hash marks on the fittings. 21
- When solvent cementing, avoid sources of heat or open flame. 20
- PVA-coated protection gloves are recommended for use while solvent cementing. If hands come in contact with solvent cement, use a waterless abrasive soap. 20
- DO NOT SMOKE.**
- Always hold the pipe end and fitting socket downward when applying primer and cement to prevent the solvents from running into the pipe or fitting socket. 21
- Do not bend, twist or pressure test a BlazeMaster® system until the recommended cure time has elapsed. 21
- Do not get solvent cement and primer in sprinkler heads and threads. 22
- Acetone, alcohol, or MEK (Methyl Ethyl Ketone) may be used to clean accidental spills of primer and cement from certain surfaces. . . . 24
- Batt Insulation is the preferred method of insulation for TFP BlazeMaster® CPVC. Glycerine Antifreeze is the only approved antifreeze solution that can be used with CPVC products. 23 - 24

Material Safety Data for Primer Solvent Cements

Please review the Material Safety Data Sheets contained within this guide. As with all toxic products, extra precaution should be taken during use and all directions followed.

Training/Demonstration

TFP strongly recommends that installers receive hands on demonstration in the proper procedure(s) for installation of BlazeMaster® sprinkler systems. On-site demonstration in proper pipe preparation, solvent cementing, proper handling of CPVC and installation instruction is available from TFP at no charge. Upon completion of the BlazeMaster® demonstration program, TFP will issue a completion card to the persons successfully finishing the required subject matter. This demonstration card is to be carried when working on BlazeMaster® CPVC systems. For information about on-site demonstration, please contact your local TFP Distribution Center or your TFP sales representative.

TFP-100 PRIMER		MATERIAL SAFETY DATA SHEET		Date Revised: APR 1992 Supersedes: JUN 1990			
Information on this form is furnished solely for the purpose of compliance with the Occupational Safety and Health Act and shall not be used for any other purpose. Tyco Fire Products Company urges the customer receiving this Material Safety Data Sheet to study it carefully to become aware of the hazards, if any, of the products involved. In the interest of safety, you should notify your employees, agents, and contractors of the information on this sheet.							
SECTION I							
MANUFACTURER'S NAME IPS Corporation for Tyco Fire Products			TRANSPORTATION EMERGENCIES: CHEMTREC: (800) 424-9300 Medical Emergencies: (213) 222-3212 (L.A. Poison Center 24 Hr. No.) Business: (213) 321-6515				
ADDRESS 451 North Cannon Avenue, Lansdale, PA 19446							
CHEMICAL NAME AND FAMILY Mixture of Organic Solvents		TRADE NAME TFP-100 BLAZEMASTER PURPLE PRIMER for CPVC PLASTIC PIPE & FITTINGS					
		FORMULA Proprietary					
SECTION II - HAZARDOUS INGREDIENTS							
None of the ingredients below are listed as carcinogens by IARC, NTP or OSHA		CAS #	APPROX %	ACGIH-TLV	ACGIH-STEL	OSHA-PEL	OSHA-STEL
Tetrahydrofutan (THF)		109-99-9	45-55	200 PPM	250 PPM	200 PPM	250 PPM
Methyl Ethyl Ketone (MEK)		78-93-3	47*	200 PPM	300 PPM	200 PPM	300 PPM
Cyclohexanone		108-94-1	5-15	25 PPM Skin		25 PPM Skin	
*Title III Section 313 Supplier Notification: This product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40CFR372. This information must be included in all MSDS's that are copied and distributed for this material.							
SHIPPING INFORMATION DOT Hazard Class: Flammable Liquid DOT Shipping Name: Flammable Liquid, N.O.S. (Tetrahydrofuran, Methyl Ethyl Ketone) Identification Number: UN 1993			SPECIAL HAZARD DESIGNATIONS				
			HEALTH:	2	2	HAZARD RATING	
			FLAMMABILITY:	3	3	0 - MINIMAL	
			REACTIVITY:	0	1	1 - SLIGHT	
			PROTECTIVE EQUIPMENT:	H		2 - MODERATE	
						3 - SERIOUS	
						4 - SEVERE	
SECTION III - PHYSICAL DATA							
APPEARANCE Purple or Clear, thin liquid	ODOR Ethereal		BOILING POINT (°F/°C) 151°F based on first boiling component: THF				
SPECIFIC GRAVITY @ 73 +/-2°F Typical 0.870 +/-0.040	VAPOR PRESSURE (mm Hg.) 143 mm Hg. Based on first boiling component, THF @ 20°C		PERCENT VOLATILE BY VOLUME (%) 100%				
VAPOR DENSITY (Air = 1) 2.49	EVAPORATION RATE (BUAC = 1) > 1.0		SOLUBILITY IN WATER Completely soluble in water				
VOC STATEMENT: This cement contains 850 grams of VOC per liter as manufactured. More than 60 percent of the VOC acts as a reactive diluent and remains in the joint.							
SECTION IV - FIRE AND EXPLOSION HAZARD DATA							
FLASH POINT 6°F T.C.C. Based on THF		FLAMMABLE LIMITS (Percent by Volume)			LEL 2.0	UEL 11.8	
FIRE EXTINGUISHING MEDIA Ansul "Purple K" potassium bicarbonate dry chemical, carbon dioxide, National Aer-O-Foam universal alcohol resistant foam, water spray.							
SPECIAL FIRE FIGHTING PROCEDURES Evacuate enclosed areas, stay upwind. Close or confined quarters require self-contained breathing apparatus, positive pressure hose masks or airline masks. Use water spray to cool containers, to flush spills from source of ignition and to disperse vapors.							
UNUSUAL FIRE AND EXPLOSION HAZARDS Fire hazard because of low flash point and high volatility. Vapors are heavier than air and may travel to source of ignition.							

SECTION V - HEALTH HAZARD DATA

PRIMARY ROUTES

 OF ENTRY: Inhalation Skin Contact Eye Contact Ingestion

EFFECT OF OVEREXPOSURE
ACUTE: Inhalation: Severe overexposure may result in nausea, dizziness, headache. Can cause drowsiness, irritation of eyes and nasal passages.

Skin Contact: Skin irritant. Liquid contact may remove natural skin oils resulting in skin irritation. Dermatitis may occur with prolonged contact.

Skin Absorption: Prolonged or widespread exposure may result in the absorption of harmful amounts of material.

Eye Contact: Overexposure may result in severe eye injury with corneal or conjunctive inflammation on contact with the liquid. Vapors slightly uncomfortable.

Ingestion: Moderately toxic. May cause nausea, vomiting, diarrhea. May cause mental sluggishness.

CHRONIC: Symptoms of respiratory tract irritation and damage to respiratory epithelium were reported in rats exposed to 5000 ppm for 90 days. Elevation of SGPT suggests a disturbance in liver function. The NOEL was reported to be 200 ppm.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with pre-existing diseases of the eyes, skin or respiratory system may have increased susceptibility to the toxicity of excessive exposures.

EMERGENCY AND FIRST AID PROCEDURES
Inhalation: If overcome by vapors, remove to fresh air and if breathing stopped, give artificial respiration. If breathing is difficult, give oxygen. Call physician.

Eye Contact: Flush eyes with plenty of water for 15 minutes and call a physician.

Skin Contact: Remove contaminated clothing and shoes. Wash skin with plenty of soap and water for at least 15 minutes. If irritation develops, get medical attention.

Ingestion: Give 1 or 2 glasses of water or milk. Do not induce vomiting. Call physician or poison control center immediately.

SECTION VI - REACTIVITY

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	x	Keep away from heat, sparks, open flame and other sources of ignition.

INCOMPATIBILITY

(MATERIALS TO AVOID) Caustics, ammonia, inorganic acids, chlorinated compounds, strong oxidizers and isocyanates.

HAZARDOUS DECOMPOSITION PRODUCTS

When forced to burn, this product gives out carbon monoxide, carbon dioxide, hydrogen chloride and smoke.

HAZARDOUS	MAY OCCUR		CONDITIONS TO AVOID
POLYMERIZATION	WILL NOT OCCUR	x	Keep away from heat, sparks, open flame and other sources of ignition

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Eliminate all ignition sources. Avoid breathing of vapors. Keep liquid out of eyes. Flush with large amount of water. Contain liquid with sand or earth. Absorb with sand or nonflammable absorbent material and transfer into steel drums for recovery or disposal. Prevent liquid from entering drains.

WASTE DISPOSAL METHOD

Follow local, State and Federal regulations. Consult disposal expert. Can be disposed of by incineration. Excessive quantities should not be permitted to enter drains. Empty containers should be air dried before disposing. Hazardous Waste Code: 214.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

Atmospheric levels should be maintained below established exposure limits contained in Section II. If airborne concentrations exceed those limits, use of a NIOSH-approved organic vapor cartridge respirator with full face-piece is recommended. The effectiveness of an air purifying respirator is limited. Use it only for a single short-term exposure. For emergency and other conditions where short term exposure guidelines may be exceeded, use an approved positive pressure self-contained breathing apparatus.

VENTILATION

Use only with adequate ventilation. Provide sufficient ventilation in volume and pattern to keep contaminants below applicable exposure limits set forth in Section II. Use only explosion proof ventilation equipment.

PROTECTIVE GLOVES

PVA Coated

EYE PROTECTION

Splashproof chemical goggles

OTHER PROTECTIVE EQUIPMENT AND HYGIENIC PRACTICES

Impervious apron and a source of running water to flush or wash the eyes and skin in case of contact.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Store in the shade between 40°F - 110°F. Keep away from heat, sparks, open flame and other sources of ignition. Avoid prolonged breathing of vapor. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Train employees on all special handling procedures before they work with this product.

OTHER PRECAUTIONS

Follow all precautionary information given on container label and solvent cementing literature. Follow good industrial safety practices. All handling equipment should be electrically grounded.

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of this data or the results to be obtained from the use thereof.

TFP-200 SOLVENT/CEMENT		MATERIAL SAFETY DATA SHEET		Date Revised: APR 1992		
				Supersedes: JUN 1990		
Information on this form is furnished solely for the purpose of compliance with the Occupational Safety and Health Act and shall not be used for any other purpose. Tyco Fire Products Company urges the customer receiving this Material Safety Data Sheet to study it carefully to become aware of the hazards, if any, of the products involved. In the interest of safety, you should notify your employees, agents, and contractors of the information on this sheet.						
SECTION 1						
MANUFACTURER'S NAME IPS Corporation for Tyco Fire Products			TRANSPORTATION EMERGENCIES: CHEMTREC: (800) 424-9300			
ADDRESS 451 North Cannon Avenue, Lansdale, PA 19446			Medical Emergencies: (213) 222-3212 (L.A. Poison Center 24 Hr. No.) Business: (213) 321-6515			
CHEMICAL NAME AND FAMILY Mixture of CPVC Resin and Organic Solvents			TRADE NAME TFP-200 BLAZEMASTER ORANGE CEMENT for CPVC PLASTIC PIPE & FITTINGS			
			FORMULA Proprietary			
SECTION II - HAZARDOUS INGREDIENTS						
None of the ingredients below are listed as carcinogens by IARC, NTP or OSHA	CAS #	APPROX %	ACGIH-TLV	ACGIH-STEL	OSHA-PEL	OSHA-STEL
Chlorinated Polyvinyl Chloride Resin	NON/HAZ		N/A		N/A	
Tetrahydrofutan (THF)	109-99-9	50-70	200 PPM	250 PPM	200 PPM	250 PPM
Methyl Ethyl Ketone (MEK)	78-93-3	15*	200 PPM	300 PPM	200 PPM	300 PPM
Cyclohexanone	108-94-1	5-15	25 PPM Skin		25 PPM Skin	
*Title III Section 313 Supplier Notification: This product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40CFR372. This information must be included in all MSDS's that are copied and distributed for this material.						
SHIPPING INFORMATION DOT Hazard Class: Flammable Liquid DOT Shipping Name: Cement Identification Number: NA 1133			SPECIAL HAZARD DESIGNATIONS			
			HMIS	NFPA	HAZARD RATING	
			HEALTH: 2	2	0 - MINIMAL	
			FLAMMABILITY: 3	3	1 - SLIGHT	
			REACTIVITY: 0	1	2 - MODERATE	
			PROTECTIVE		3 - SERIOUS	
			EQUIPMENT: H		4 - SEVERE	
SECTION III - PHYSICAL DATA						
APPEARANCE Tan or gray, medium syrupy liquid	ODOR Ethereal		BOILING POINT (°F/°C) 151 °F based on first boiling component: THF			
SPECIFIC GRAVITY @ 73 +/-2°F Typical 0.968 +/-0.040	VAPOR PRESSURE (mm Hg.) 143 mm Hg. Based on first boiling component, THF @ 20°C		PERCENT VOLATILE BY VOLUME (%) Approx: 80 - 90%			
VAPOR DENSITY (Air = 1) 2.49	EVAPORATION RATE (BUAC = 1) > 1.0		SOLUBILITY IN WATER Solvent portion completely soluble in water Resin portion separates out.			
VOC STATEMENT: This cement contains 760 grams of VOC per liter as manufactured. More than 60 percent of the VOC acts as a reactive diluent and remains in the joint.						
SECTION IV - FIRE AND EXPLOSION HAZARD DATA						
FLASH POINT 6°F T.C.C. Based on THF		FLAMMABLE LIMITS (Percent by Volume)		LEL	UEL	
				2.0	11.8	
FIRE EXTINGUISHING MEDIA Ansul "Purple K" potassium bicarbonate dry chemical, carbon dioxide, National Aer-O-Foam universal alcohol resistant foam, water spray.						
SPECIAL FIRE FIGHTING PROCEDURES Evacuate enclosed areas, stay upwind. Close or confined quarters require self-contained breathing apparatus, positive pressure hose masks or airline masks. Use water spray to cool containers, to flush spills from source of ignition and to disperse vapors.						
UNUSUAL FIRE AND EXPLOSION HAZARDS Fire hazard because of low flash point and high volatility. Vapors are heavier than air and may travel to source of ignition.						

SECTION V - HEALTH HAZARD DATA

PRIMARY ROUTES

 OF ENTRY: Inhalation Skin Contact Eye Contact Ingestion

EFFECT OF OVEREXPOSURE
ACUTE: Inhalation: Severe overexposure may result in nausea, dizziness, headache. Can cause drowsiness, irritation of eyes and nasal passages.

Skin Contact: Skin irritant. Liquid contact may remove natural skin oils resulting in skin irritation. Dermatitis may occur with prolonged contact.

Skin Absorption: Prolonged or widespread exposure may result in the absorption of harmful amounts of material.

Eye Contact: Overexposure may result in severe eye injury with corneal or conjunctive inflammation on contact with the liquid. Vapors slightly uncomfortable.

Ingestion: Moderately toxic. May cause nausea, vomiting, diarrhea. May cause mental sluggishness.

CHRONIC: Symptoms of respiratory tract irritation and damage to respiratory epithelium were reported in rats exposed to 5000 ppm for 90 days. Elevation of SGPT suggests a disturbance in liver function. The NOEL was reported to be 200 ppm.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with pre-existing diseases of the eyes, skin or respiratory system may have increased susceptibility to the toxicity of excessive exposures.

EMERGENCY AND FIRST AID PROCEDURES
Inhalation: If overcome by vapors, remove to fresh air and if breathing stopped, give artificial respiration. If breathing is difficult, give oxygen. Call physician.

Eye Contact: Flush eyes with plenty of water for 15 minutes and call a physician.

Skin Contact: Remove contaminated clothing and shoes. Wash skin with plenty of soap and water for at least 15 minutes. If irritation develops, get medical attention.

Ingestion: Give 1 or 2 glasses of water or milk. Do not induce vomiting. Call physician or poison control center immediately.

SECTION VI - REACTIVITY

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	x	Keep away from heat, sparks, open flame and other sources of ignition.

INCOMPATIBILITY

(MATERIALS TO AVOID) Caustics, ammonia, inorganic acids, chlorinated compounds, strong oxidizers and isocyanates.

HAZARDOUS DECOMPOSITION PRODUCTS

When forced to burn, this product gives out carbon monoxide, carbon dioxide, hydrogen chloride and smoke.

HAZARDOUS	MAY OCCUR		CONDITIONS TO AVOID
POLYMERIZATION	WILL NOT OCCUR	x	Keep away from heat, sparks, open flame and other sources of ignition

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Eliminate all ignition sources. Avoid breathing of vapors. Keep liquid out of eyes. Flush with large amount of water. Contain liquid with sand or earth. Absorb with sand or nonflammable absorbent material and transfer into steel drums for recovery or disposal. Prevent liquid from entering drains.

WASTE DISPOSAL METHOD

Follow local, State and Federal regulations. Consult disposal expert. Can be disposed of by incineration. Excessive quantities should not be permitted to enter drains. Empty containers should be air dried before disposing. Hazardous Waste Code: 214.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)

Atmospheric levels should be maintained below established exposure limits contained in Section II. If airborne concentrations exceed those limits, use of a NIOSH-approved organic vapor cartridge respirator with full face-piece is recommended. The effectiveness of an air purifying respirator is limited. Use it only for a single short-term exposure. For emergency and other conditions where short term exposure guidelines may be exceeded, use an approved positive pressure self-contained breathing apparatus.

VENTILATION

Use only with adequate ventilation. Provide sufficient ventilation in volume and pattern to keep contaminants below applicable exposure limits set forth in Section II. Use only explosion proof ventilation equipment.

PROTECTIVE GLOVES

PVA Coated

EYE PROTECTION

Splashproof chemical goggles

OTHER PROTECTIVE EQUIPMENT AND HYGIENIC PRACTICES

Impervious apron and a source of running water to flush or wash the eyes and skin in case of contact.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Store in the shade between 40°F - 110°F. Keep away from heat, sparks, open flame and other sources of ignition. Avoid prolonged breathing of vapor. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Train employees on all special handling procedures before they work with this product.

OTHER PRECAUTIONS

Follow all precautionary information given on container label and solvent cementing literature. Follow good industrial safety practices. All handling equipment should be electrically grounded.

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of this data or the results to be obtained from the use thereof.

TFP-400	MATERIAL SAFETY DATA SHEET	Date Revised: 03/12/96
Solvent/Cement		Supersedes:

Information on this form is furnished solely for the purpose of compliance with the Occupational Safety and Health Act and shall not be used for any other purpose. Tyco Fire Products Company urges the customer receiving this Material Safety Data Sheet to study it carefully to become aware of the hazards, if any, of the products involved. In the interest of safety, you should notify your employees, agents, and contractors of the information on this sheet.

SECTION I

MANUFACTURER'S NAME Oatey Company for Tyco Fire Products ADDRESS 4700 West 160th Street, PO Box 35906, Cleveland, OH 44135	TRANSPORTATION EMERGENCIES ONLY: CHEMTREC: (800) 424-9300 Emergency First Aid: (303) 623-5716 COLLECT (L.A. Poison Center 24 Hour Number) Business: (216) 267-7100
TRADENAME BLAZEMASTER CPVC CEMENT TFP-400 FORMULA Mixture of CPVC Resin and Organic Solvents	PRODUCT NUMBERS 90397, 90398

SECTION II - HAZARDOUS INGREDIENTS

INGREDIENTS	%	CAS #	SEC 313
Tetrahydrofuran	35 - 45 %	109-99-9	No
Acetone	20 - 30 %	67-64-1	No
Cyclohexanone	5 - 10 %	108-94-1	No
Methyl Ethyl Ketone	< 5 %	78-93-3	Yes
NONHAZARDOUS INGREDIENTS			
CPVC Resin	13 - 16 %	68648-82-8	No
Amorphous Silica	.25 - 3 %	112945-52-5	No
Proprietary	5 - 25 %		No

SECTION III - KNOWN HAZARDS UNDER 29 CFR 1910.1200

HAZARDS	YES	NO	HAZARDS	YES	NO
Combustible Liquid		X	Skin Hazard	X	
Flammable Liquid	X		Eye Hazard	X	
Pyrophoric Material		X	Toxic Agent	X	
Explosive Material		X	Highly Toxic Agent		X
Unstable Material		X	Sensitizer		X
Water Reactive Material		X	Kidney Toxin	X	
Oxidizer		X	Reproductive Toxin	X	
Organic Peroxide		X	Blood Toxin		X
Corrosive Material		X	Nervous System Toxin	X	
Compressed Gas		X	Lung Toxin	X	
Irritant	X		Liver Toxin	X	
Carcinogen NTP/IARC/OSHA		X			

SECTION IV - REGULATIONS

CHEMICAL	TLV (TWA)	PEL (Transitional Limits)	STEEL	HAZARD ACTION LEVEL
Tetrahydrofuran	200 ppm, 590 mg/cu m	200 ppm, 590 mg/cu m	250 ppm, 735 mg/cu m	N/A
Acetone	750 ppm, 1800 mg/cu m	1000 ppm, 2400 mg/cu m	1000 ppm, 2400 mg/cu m	N/A
Cyclohexanone	25 ppm, 100 mg/cu m (skin)	50 ppm, 200 mg/cu m	100 ppm, 400 mg/cu m	N/A
Methyl Ethyl Ketone	200 ppm, 590 mg/cu m	200 ppm, 590 mg/cu m	300 ppm, 885 mg/cu m	N/A
Amorphous Silica	10 mg/cu m	20 mppcf	N/A	N/A

SECTION V - REGULATED IDENTIFICATION

DOT PROPER SHIPPING NAME.....	CONSUMER COMMODITY ORM-D; for gallons: Adhesive (Contains Tetrahydrofuran, Acetone) 3, 1133, PG II, Cement-001
DOT HAZARD CLASS.....	Flammable Liquid
SHIPPING ID NUMBER.....	NA 1133 (Gallons Only)
EPA HAZARDOUS WASTE ID NUMBER...	D-001
EPA HAZARD WASTE CLASS.....	Ignitable Waste

TFP-400	MATERIAL SAFETY DATA SHEET	Date Revised: 03/12/96
Solvent/Cement		Supersedes:

SECTION VI - EFFECTS OF EXPOSURE

ENTRY ROUTE.....	INHALE - YES INGEST - YES SKIN - YES EYE - YES
INHALATION.....	May cause irritation of mucous membranes, nose & throat, headache, dizziness, nausea, numbness of the extremities and narcosis in high concentrations. Has caused CNS depression & liver damage in animals, & high concentrations have caused retardation of fetal developments in rats.
SKIN.....	Chronic contact may lead to irritation & dermatitis. Chronic exposure to vapors of high concentration may cause dermatitis. May possibly be absorbed through the skin.
EYE.....	Vapors or direct contact may cause irritation.
INGESTION.....	May be aspirated into the lungs or cause systemic effects described under inhalation.
TARGET ORGANS..	Eye, Skin, Kidney, Lung, Liver, Central Nervous System

SECTION VII - EMERGENCY AND FIRST AID PROCEDURES - 303/623-5716 COLLECT

SKIN.....	If irritation arises, wash thoroughly with soap and water. Seek medical attention if irritation persists.
EYES.....	If fumes cause irritation, move to fresh air and irrigate eyes with water for 15 minutes. If irritations persists, seek medical attention. If eye is struck with wire, seek medical attention.
INHALATION.....	Move to fresh air. If breathing is difficult, give oxygen. If not breathing, give artificial respiration. Keep victim quiet and warm. Call a poison control center or physician immediately.
INGESTION.....	Drink water and call a poison control center or physician immediately. Avoid alcoholic beverages. Never give anything by mouth to an unconscious person.

SECTION VIII - PHYSICAL AND CHEMICAL PROPERTIES

NFPA HAZARD SIGNAL.....	HEALTH 1 STABILITY 0 FLAMMABILITY 3 SPECIAL NONE
BOILING POINT.....	151 Degrees F/66 Degrees Celsius
MELTING POINT.....	N/A
VAPOR PRESSURE.....	145 mmHg @ 20 Degrees psi
VAPOR DENSITY (AIR - 1)...	2.5
VOLATILE COMPONENTS....	70 - 80% WT.
SOLUBILITY IN WATER.....	Negligible
PH.....	N/A
SPECIFIC GRAVITY.....	0.91 +/- 0.02
EVAPORATION RATE.....	(BUAC = 1) = 5.5 - 8.0
APPEARANCE.....	Red Liquid
ODOR.....	Ether-Like
WILL DISSOLVE IN.....	Tetrahydrofuran
MATERIAL IS.....	Liquid

SECTION IX - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY.....	LEL - 1.8 % Volume UEL - 11.8 % Volume
FLASHPOINT AND METHOD USED.....	5 - 8 Degrees F/PMCC
STABILITY.....	Stable Conditions to Avoid: Heat, sparks and open flame. HAZARDOUS DECOMP. P.DTS.: Carbon Monoxide/carbon dioxide/hydrogen chloride/smoke
HAZARDOUS POLYMERIZATION.....	Will not occur. Conditions to Avoid: None
INCOMPATIBILITY/MAT. TO AVOID.....	Acids, oxidizing materials, alkalis, chlorinated inorganics (potassium, calcium and sodium hypochlorite), copper and copper alloys
SPECIAL FIRE RIGHTING PROCEDURE...	FOR SMALL FIRES: Use dry chemical, CO2, water or foam extinguisher. FOR LARGE FIRES: Evacuate are and call Fire Department immediately.

SECTION X - SPILL AND DISPOSAL INFORMATION

SPILL OR LEAK PROCEDURES....	Ventilate area, stop leak if it can be done without risk. Take up with sand, earth, or other noncombustible absorbing material.
WASTE DISPOSAL.....	Dispose of according to local, state, and Federal regulations.

SECTION XI - SAFE USAGE DATA

PROTECTIVE EQUIPMENT TYPES.	NIOSH-Approved cannister respirator in absence of adequate ventilation.
VENTILATION.....	GENERAL MECHANICAL: Exhaust ventilation capable of maintaining emissions at the point of use below PEL. LOCAL EXHAUST: Open doors & windows. If used in enclosed area, use exhaust fans.
PRECAUTIONS:.....	HANDLING & STORAGE: Keep away from heat, sparks and flames; store in cool, dry place. OTHER: Containers, even empties will retain residue and vapors.

TFP-500 Solvent/Cement	MATERIAL SAFETY DATA SHEET	Date Revised: APR 1996 Supersedes:
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SECTION I

MANUFACTURER'S NAME IPS Corporation for Tyco Fire Products ADDRESS 17109 South Main Street, P.O. Box 379, Gardena, CA 90248	TRANSPORTATION EMERGENCIES ONLY: CHEMTREC: (800) 424-9300 Emergency First Aid: (231) 222-3212 (L.A. Poison Center 24 Hour Number) Business: (310) 898-3300
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CHEMICAL NAME AND FAMILY Solvent Cement for CPVC Plastic Pipe Mixture of CPVC Resin and Organic Solvents	TRADENAME: TFP-500 BlazeMaster Red Cement for CPVC Plastic Pipe FORMULA: Proprietary
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SECTION II - HAZARDOUS INGREDIENTS

None of the ingredients below are listed as carcinogens by IARC, NTP or OSHA

	CAS #	APPROX %	ACGIH-TLV	ACGIH-STEL	OSHA-PEL	OSHA-STEL
Chlorinated Polyvinyl Chloride Resin (CPVC)	NON/HAZ		N/A		N/A	
Tetrahydrofuran (THF)	1099-99-9	50-60	200 PPM	250 PPM	200 PPM	250 PPM
Methyl Ethyl Ketone (MEK)	78-93-3	2-9	200 PPM	300 PPM	200 PPM	300 PPM
Cyclohexanone	108-94-1	2-10	25 PPM Skin		25 PPM Skin	
Acetone	67-64-1	5-12	750 PPM	1000 PPM	750 PPM	1000 PPM

* Title III Section 313 Supplier Notification: This product contains toxic chemicals subject to the reporting requirements of Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986 and of 40CFR372. This information must be included in all MSDS's that are copied and distributed for this material.

SHIPPING INFORMATION FOR GALLON CONTAINERS OR ABOVE DOT Shipping Name: Adhesive DOT Hazard Class: 3 Identification Number: UN 1133 Packaging Group: II Label Required: Flammable Liquid	SPECIAL HAZARD DESIGNATIONS <table style="width:100%;"> <tr> <td></td> <td style="text-align: center;">HMIS</td> <td style="text-align: center;">NFPA</td> <td style="text-align: center;">HAZARD RATING</td> </tr> <tr> <td>HEALTH:</td> <td style="text-align: center;">2</td> <td style="text-align: center;">2</td> <td style="text-align: center;">0-MINIMAL</td> </tr> <tr> <td>FLAMMABILITY:</td> <td style="text-align: center;">3</td> <td style="text-align: center;">3</td> <td style="text-align: center;">1-SLIGHT</td> </tr> <tr> <td>REACTIVITY:</td> <td style="text-align: center;">0</td> <td style="text-align: center;">1</td> <td style="text-align: center;">2-MODERATE</td> </tr> <tr> <td>PROTECTIVE</td> <td></td> <td></td> <td style="text-align: center;">3-SERIOUS</td> </tr> <tr> <td>EQUIPMENT:</td> <td style="text-align: center;">H</td> <td></td> <td style="text-align: center;">4-SEVERE</td> </tr> </table>		HMIS	NFPA	HAZARD RATING	HEALTH:	2	2	0-MINIMAL	FLAMMABILITY:	3	3	1-SLIGHT	REACTIVITY:	0	1	2-MODERATE	PROTECTIVE			3-SERIOUS	EQUIPMENT:	H		4-SEVERE
	HMIS	NFPA	HAZARD RATING																						
HEALTH:	2	2	0-MINIMAL																						
FLAMMABILITY:	3	3	1-SLIGHT																						
REACTIVITY:	0	1	2-MODERATE																						
PROTECTIVE			3-SERIOUS																						
EQUIPMENT:	H		4-SEVERE																						
SHIPPING INFORMATION FOR CONTAINERS LESS THAN ONE GALLON DOT Shipping Name: Consumer Commodity DOT Hazard Class: ORM-D																									

SECTION III - PHYSICAL DATA

APPEARANCE Red, medium syrupy liquid	ODOR Ethereal	BOILING POINT (°F/°C) 133°F Based on first boiling component: Acetone
SPECIFIC GRAVITY @ 73 +/- 2°F Typical 0.985 +/- 0.040	VAPOR PRESSURE (mmHg) 143 mmHg based on first boiling component, Acetone @ 20°C	PERCENT VOLATILE BY VOLUME (%) Approx: 70-80%
VAPOR DENSITY (Air = 1) 2.0	EVAPORATION RATE (BUAC = 1) >1.0	SOLUBILITY IN WATER Solvent portion completely soluble in water. Resin portion separates out.

VOC STATEMENT: VOC as manufactured: 760 Grams/Liter. Maximum VOC emission per SCAQMD Rule 1168, Test Method 316A: 450 Grams/Liter

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT 0-6°F T.C.C. Based on Acetone	FLAMMABLE LIMITS (PERCENT BY VOLUME)	LEL	UEL
		2.0	11.8

FIRE EXTINGUISHING MEDIA
 Ansul "Purple K" potassium bicarbonate dry chemical, carbon dioxide, National Aer-O-Foam universal alcohol resistant foam, water spray.

SPECIAL FIRE FIGHTING PROCEDURES
 Evacuate enclosed areas, stay upwind. Close or confined quarters require self-contained breathing apparatus, positive pressure hose masks or airline masks. Use water spray to cool containers, to flush spills from source of ignition and to disperse vapors.

UNUSUAL FIRE AND EXPLOSION HAZARDS
 Fire hazard because of low flash point and high volatility. Vapors are heavier than air and may travel to source of ignition.

TFP-500 Solvent/Cement		SECTION V - HEALTH HAZARD DATA	
PRIMARY ROUTES OF ENTRY:			
	<u> X </u>	Inhalation	<u> X </u>
		Skin Contact	<u> X </u>
		Eye Contact	<u> X </u>
		Ingestion	<u> X </u>
EFFECT OF OVEREXPOSURE			
ACUTE:			
Inhalation:	Sever overexposure may result in nausea, dizziness, headache. Can cause drowsiness, irritation of eyes and nasal passages.		
Skin Contact:	Skin irritant. Liquid contact may remove natural skin oils resulting in skin irritation. Dermatitis may occur with prolonged contact.		
Skin Absorption:	Prolonged or widespread exposure may result in the absorption of harmful amounts of material		
Eye Contact:	Overexposure may result in sever eye injury with corneal or conjunctive inflammation on contact with the liquid. Vapors slightly uncomfortable.		
Ingestion:	Moderately toxic. May cause nausea, vomiting, diarrhea. May cause mental sluggishness.		
CHRONIC:	Symptoms of respiratory tract irritation and damage to respiratory epithelium were reported in rats exposed to 5000 ppm THF for 90 days. Elevation of SGPT suggests a disturbance in liver function. The NOEL was reported to be 200 ppm.		
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Individuals with pre-existing diseases of the eyes, skin or respiratory system may have increased susceptibility to the toxicity of excessive exposures.			
EMERGENCY AND FIRST AID PROCEDURES			
Inhalation:	If overcome by vapors, remove to fresh air and if breathing stopped, give artificial respiration. If breathing is difficult, give oxygen. Call physician.		
Eye Contact:	Flush eyes with plenty of water for 15 minutes and call a physician.		
Skin Contact:	Remove contaminated clothing and shoes. Wash skin with plenty of sap and water for at least 15 minutes. If irritation develops, get medical attention.		
Ingestion:	Give 1 or 2 glasses of water or milk. Do not induce vomiting. Call physician or poison control center immediately.		
SECTION VI - REACTIVITY			
STABILITY	UNSTABLE		CONDITIONS TO AVOID Keep away from heat, sparks, open flame and other sources of ignition.
	STABLE	X	
INCOMPATIBILITY (MATERIALS TO AVOID) Caustics, ammonia, inorganic acids, chlorinated compounds, strong oxidizers and isocyanates.			
HAZARDOUS DECOMPOSITION PRODUCTS When forced to burn, this product gives out carbon monoxide, carbon dioxide, hydrogen chloride and smoke.			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID Keep away from heat, sparks, open flame, and other sources of ignition.
	MAY NOT OCCUR	X	
SECTION VII - SPILL OR LEAK PROCEDURES			
STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASE OR SPILLED Eliminate all ignition sources. Avoid breathing of vapors. Keep liquid out of eyes. Flush with large amount of water. Contain liquid with sand or earth. Absorb with sand or nonflammable absorbent material and transfer into steel drums for recovery or disposal. Prevent liquid from entering drains.			
WASTE DISPOSAL METHOD Follow local, State and Federal regulations. Consult disposal expert. Can be disposed of by incineration. Excessive quantities should not be permitted to enter drains. Empty containers should be air dried before disposing. Hazardous Waste Code: 214.			
SECTION VIII - SPECIAL PROTECTION INFORMATION			
RESPIRATORY PROTECTION (Specify type) Atmospheric levels should be maintained below established exposure limits contained in Section II. If airborne concentrations exceed those limits, use of NIOSH approved organic vapor cartridge respirator with full face-piece is recommended. The effectiveness of an air purifying respirator is limited. Use it only for a single short-term exposure. For emergency and other conditions where short term exposure guidelines may be exceeded, use an approved positive pressure self-contained breathing apparatus.			
VENTILATION Use only with adequate ventilation. Provide sufficient ventilation in volume and pattern to keep contaminants below applicable exposure limits set forth in Section II. Use only explosion proof ventilation equipment.			
PROTECTIVE GLOVES PVA coated		EYE PROTECTION Splashproof chemical goggles	
OTHER PROTECTIVE EQUIPMENT AND HYGIENIC PRACTICES Impervious apron and a source of running water to flush or wash the eyes and skin in case of contact.			
SECTION IX - SPECIAL PRECAUTIONS			
PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING Store in the shade between 40°F - 110°F. Keep away from heat, sparks, open flame, and other sources of ignition. Avoid prolonged breathing of vapor. Use with adequate ventilation. Avoid contact with eyes, skin and clothing. Train employees on all special handling procedures before they work with this product.			
OTHER PRECAUTIONS Follow all precautionary information given on container label, product bulletins and our solvent cementing literature. All handling equipment should be electrically grounded.			
The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of this data or the results to be obtained from the us thereof.			



TYCO FIRE PRODUCTS

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