



THERMALFIT LLC

DESIGN AND INSTALLATION MANUAL

FOR CPVC FIRE SPRINKLER SYSTEMS

November 2006



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THERMALFIT LIMITED WARRANTY

Thermalfit LLC (herein Thermalfit) warrants the goods it manufactures to be free of defects in material and workmanship for a **ten year period from the date of shipment**. Customer agrees that this warranty will only be effective providing that the goods are used for the normal purpose for which they are intended and in conformance with all established specifications, recommendations, and instructions. Any sort of violation voids this warranty and shall relieve Thermalfit of any obligations or responsibility.

Thermalfit specifically disclaims all liability for any problem that is caused by the end user's (or installer's) failure to obey all specifications, recommendations and instructions.

Upon acceptance of delivery, if for any reason customer receives any goods that appear to be defective, the customer must immediately inform the company from which the goods were purchased for further instructions. **This warranty provides ONLY for the replacement of defective parts. Thermalfit will not be responsible for any labor costs, costs for other parts, or costs caused any delays whatsoever.**

Customer promises to make a complete inspection of all goods upon receipt and before any installation begins, and never to install any part that appears defective in any way. **Installation of any part without thorough examination voids this warranty.** The installer or end-user assumes the entire risk and cost of all necessary repairs or remedies that are necessary because of the installation of unexamined defective product.

For the warranty to be effective, all goods must remain in original packages, at room temperature, and away from direct sunlight. CPVC parts shall never be thrown, stepped on, or have objects thrown on them. Improper handling or heavy impact can result in cracks, splits, or gouges. Any such violation will void this warranty and will negate any obligations of Thermalfit.

This constitutes the complete and entire warranty. Thermalfit disavows all other warranties, expressed or implied, oral or statutory. No affirmation by anyone at all, by words or conduct, will constitute any change to the terms of the above warranty.

General Information

Thermalfit CPVC fittings are produced from specialty plastic compounds known as post-chlorinated polyvinyl Chloride (herein CPVC). The compounds used meet cell class 23447-B as defined by ASTM D1784, and are certified by NSF International for use with portable water.

Thermalfit CPVC fittings up to 1 1/4" in size meet or exceed the requirements of ASTM F438 (schedule 40). Thermalfit CPVC fittings that are 1 1/2" or larger in size meet or exceed the requirements of ASTM F439 (schedule 80).

Thermalfit CPVC fittings are Listed by Underwriters Laboratories Inc. for use in wet pipe automatic fire sprinkler system and bear the logo of the Listing agency. They are not to be used in dry systems.

Thermalfit CPVC fittings are intended for use in sprinkler systems in the following types of occupancies:

1. Light Hazard occupancies as defined in ANSI/NFPA 13, "Standard for the Installation of Sprinkler Systems."
2. Residential occupancies as defined in ANSI/NFPA 13R, "Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height."
3. Residential occupancies as defined in ANSI/NFPA 13D, "Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes."

In accordance with NFPA 13, 2002 Edition paragraph 6.3.6.2, "Pipe or tube listed for light hazard occupancies shall be permitted to be installed in ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed 400 square feet. NOTICE: Local jurisdictions must approve of this exception.

Thermalfit CPVC Fire Sprinkler products are suitable for use with CPVC pipe that is UL Listed for use in underground water service.

Thermalfit CPVC Fire Sprinkler products are UL Listed for use in combination with UL Listed CPVC sprinkler products manufactured by Spears FlameGuard (fittings), Victaulic FireLock (pipe and fittings), Harvel BlazeMaster (pipe), Central BlazeMaster (pipe and fittings), Ipex BlazeMaster (pipe and fittings), TYCO Fire Products BlazeMaster (pipe and fittings), or Nibco BlazeMaster (fittings). While Thermalfit CPVC Fire Sprinkler Products are UL Listed for use in combination with other listed manufacturers' products, specific application approvals may not be the same amongst manufacturers. It is the installer's responsibility to verify suitability of products used in combination according to each manufacturer's installation instructions. Contact Thermalfit if you have questions on any application not addressed in this manual.

Thermalfit CPVC fittings are for assembly using one step solvent cement manufactured by IPS Corporation identified as Victaulic FireLock 899, IPEX BM-5, Tyco TFP-500, Central CSC-500, Spears FS-5, and Nibco FP-1000. This solvent cement is Listed by NSF for use in potable drinking water systems. The standard practice for safe handling of solvent cements is in accordance with ASTM F402.

Engineering data related to the installation and use of CPVC Fire Sprinkler Pipe is not provided in this manual. Follow the appropriate manufacturer's installation instructions. Contact Thermalfit if questions on any application are not addressed in this manual.

Thermalfit CPVC Fire Sprinkler products are NOT intended for outdoor applications. Outdoor installation could result in product failure and property damage and will not be covered under any warranty.

Design, Installation & Maintenance

CPVC fire sprinkler systems must be *engineered, installed, and maintained* in accordance with *local codes, standards, and this manual*. The intended service application must be determined by the installer and/or user prior to installation. All installation and maintenance personnel must be trained in the proper handling and installation requirements and precautions of a plastic piping system. It is strongly recommended that all installers receive proper installation training and that training be renewed every two (2) years.

Prior to assembly, all piping system components must be inspected for damage or irregularities. Mating components must be checked to assure the tolerances and engagements are compatible. Do not use any components that appear irregular or do not fit properly. Contact the appropriate manufacturer of the components product in question to determine usability. Consult all applicable codes and regulations for compliance prior to installation.

Prior to using CPVC solvent cements, review and follow all precautions found on the container labels, material safety data sheet, and standard practice for safe handling ASTM F402-88. It is the installer's responsibility to verify suitability of products used in combination according to each manufacturer's installation instructions. Engineering data related to the installation and use of CPVC Fire Sprinkler fittings provided in this manual is based on product manufactured by Thermalfit LLC. If products other than Thermalfit are used, follow the appropriate manufacturer's installation instructions.

Due to the critical safety and loss prevention uses of such systems, all information contained herein is considered vital to obtain proper system performance and must be read carefully and understood before starting the installation. The information contained within this manual is accurate at the time of publication to the best of our knowledge. However, it is not meant as a replacement for formal installer training. Thermalfit LLC does not make any guarantees regarding any information contained within this installation manual. Furthermore, Thermalfit LLC does not assume any liabilities resulting from the use or misuse of the information contained in this manual.

Installation Steps

NOTE: Avoid dangerous environments. If utilizing electrically powered tools for installation, be sure that the area is free of moisture or wetness that could create an unsafe condition. **Keep work area clean and well illuminated.**

Step 1 - Cut the Pipe as square as possible: The pipe must be cut as square as possible in order to provide the maximum bonding surface area. Cut the ends of the pipe square using either a wheel-type cutter, fine-toothed hand saw (16-18 teeth/inch), or power cut-off saw (carbide blade recommended). A ratchet-type cutter may also be used in temperatures above 50°F as long as you are careful not to split the pipe.



Step 2 – De-burr and Bevel the Pipe: No matter how you cut the pipe, there will still be burrs that can prevent contact between the pipe and fitting. You must remove all burrs from the inside and the outside of the pipe, and you must bevel the ends of the pipe 10-15 degrees. Please use a commercially available de-burring and beveling tool. The use of a mill file is possible, but is not recommended and may void the warranty in some cases.



Step 3 - Clean Joint Components: Wipe any loose dirt and moisture from the pipe end and from the socket of the fitting using a dry, clean rag. Never try to join moisture-wet surfaces, as this can reduce joint strength, and will dramatically increase the risk of system failure.



Step 4 – Do a “Dry-Fit” joint check: Lightly insert (do not force) the pipe into the fitting. Check to see if the pipe enters the fitting socket no less than 25% and no more than 75% of the way. If the pipe bottoms out with little interference, use extra solvent cement in making the joint.

Step 5 - Apply Cement: Apply the cement into the dry joining surface using a circular motion. Use an applicator that is a minimum of 50% of the size of the pipe diameter. The cement should be applied at temperatures no less than 40°F and no greater than 110°F. Always work in a well-ventilated area, and avoid ALL flames or other heat sources. All safety precautions listed in the solvent cement instructions must be followed, and the cement must not be expired. Also, never use solvent cement that has become discolored or jellied.

Apply a liberal coat to the outside of the pipe end. Additionally, apply a medium coat to the inside of the fitting socket. During the dry fit, if the pipe bottoms out in the fitting, apply a second coat of cement to the pipe end. For joints that are 1 1/4" or larger, always apply a second coat of cement to the pipe. Be careful to avoid puddling of the cement in the fittings or in the pipe, as puddled cement can cause excess softening and damage to the CPVC material.



Step 6 – Join Components: Immediately following cement application (and before the cement begins to set) insert the pipe into the fitting socket. Use a 1/4" turn twisting motion until the pipe meets the fitting pipe stop. Hold the joint together for at least 30 seconds to be sure that the pipe does not move or back out of the fitting socket.

Note that there must be a continuous bead of cement that forms around the circumference of the joint. If the bead is not continuous, this part must be cut and discarded from the system because insufficient cement was used. Wipe off any cement in excess of the bead with a cloth.

The assembly must be allowed to set, without any stress on the joint, for a minimum of 5 minutes. Following the initial set period, the assembly can be handled carefully, avoiding significant stresses to the joint.



Step 7 – Curing: The following tables show the minimum cure times (before pressure testing) that have been approved for Thermalfit CPVC products.

Maximum Test Pressure : 225 p.s.i

Nominal Pipe Size (Inches)	Ambient Temperature During Cure		
	60°F - 120°F (16°C - 49°C)	60°F - 120°F (16°C - 49°C)	60°F - 120°F (16°C - 49°C)
3/4 "	1 hour	4 hours	48 hours
1"	1-1/2 hours	4 hours	48 hours
1-1/4 " & 1-1/2 "	3 hours	32 hours	10 days
2"	8 hours	48 hours	Forbidden*
2-1/2 & 3"	24 hours	96 hours	Forbidden*

Maximum Test Pressure : 200 p.s.i

Nominal Pipe Size (Inches)	Ambient Temperature During Cure		
	60°F - 120°F (16°C - 49°C)	60°F - 120°F (16°C - 49°C)	60°F - 120°F (16°C - 49°C)
3/4 "	45 minutes	1-1/2 hours	24 hours
1"	45 minutes	2 hours	24 hours
1-1/4 " & 1-1/2 "	1-1/2 hours	16 hours	120 hours
2"	6 hours	26 hours	Forbidden*
2-1/2 & 3"	8 hours	72 hours	Forbidden*

Maximum Test Pressure : 100 p.s.i

Nominal Pipe Size (Inches)	Ambient Temperature During Cure		
	60°F - 120°F (16°C - 49°C)	60°F - 120°F (16°C - 49°C)	60°F - 120°F (16°C - 49°C)
3/4 "	15 minutes	15 minutes	30 minutes
1"	15 minutes	30 minutes	30 minutes
1-1/4 "	15 minutes	30 minutes	2 hours
1-1/2"	1-1/2 hours	16 hours	120 hours
2"	6 hours	36 hours	Forbidden*
2-1/2 & 3"	8 hours	72 hours	Forbidden*

* Note (Forbidden *): For fittings that are 2" or larger, solvent cement may be *applied* at temperatures under 40° F. However, the temperature must be raised above this for proper curing. Be sure to raise the ambient temperature above 40° F for the curing time recommended in this section before filling and pressurizing the system!

Sprinkler Head Installation

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. When installing sprinkler heads be sure to anchor or hold the sprinkler adapter fitting securely to avoid rotating the pipe in previously cemented connection.

When applying sealant, apply only to the male thread, and do not clog the waterway with excess sealant. Never use a combination of tape and paste sealants. There should be no solvent cement on sprinkler head and adapter threads. Do not allow any solvent cement to run and plug the sprinkler head orifice. Sprinklers must always be installed per the manufacturer's published installation instructions.

Pressure Testing

After the system is installed and any solvent cement is cured per the manufacturer's installation instructions, the system shall be hydrostatically tested per the requirements of the applicable NFPA Standard (NFPA 13, 13R or 13D). Never pressure test a system until all recommended cure times are met.

To pressure test, first fill the system with water. All air must be bled from the highest and farthest points in the run. In accordance with NFPA 13 and 13R, the system must be tested at 200 psi or 50 psi higher than the maximum system pressure for 2 hours. Sprinkler systems in one and two family dwellings and manufactured homes may be tested at the line pressure in accordance with the requirements established by NFPA 13D.

If a leak is found, then cut out and discard the entire joint, and install a new section using coupling

NEVER use compressed air or gas to test any CPVC thermoplastic piping product or system and do not use devices propelled by compressed air or gas to clear the system. These practices may result in explosive fragmentation of system piping and components causing serious or fatal bodily injury.

System Design

System design shall be in accordance with standard industry practice for fire sprinkler system and the manufacturer's instruction. The design shall take into consideration such factors as pressure and flow requirements, friction loss, operation temperatures, support spacing, joining methods, and thermal expansion and contraction.

The CPVC sprinkler system shall be hydraulically calculated and designed using a Hazen-Williams C-Factor of 150 and in accordance with the Standard for Installation of Sprinkler System, NFPA 13. The maximum temperature is 150° F, and the maximum pressure is 175 psi.

FM design limitation: In order to comply with FM requirements, all fittings discussed in this manual are to be completely separated from the protected area by non-removable, fire resistant barriers. These barriers must be ones that cannot be removed without substantial cosmetic damage. The barriers must have a minimum finish fire rating of 15 minutes when tested per ASTM E119, except for the minimal exposure at the sprinkler connection.

This installation manual provides instructions for handling and installing a Thermalfit fire sprinkler system as well as information regarding system design. Before commencing installation, a user must understand and confirm all applicable National Fire Protection Association (NFPA) guidelines, and must consult with the local authority having jurisdiction regarding local code approval and installation requirements for CPVC fire sprinkler systems.

Concealed installations

In concealed installations, the minimum protection shall be one layer of 3/8-inch gypsum wallboard, 1/2-inch plywood soffits, or a suspended membrane ceiling with lay-in panels or tiles having a minimum weight of not less than 0.35 pounds per square foot when installed with metal support grids.

For residential occupancies as defined in NFPA 13R and 13D, the minimum protection may consist of one layer of 1/8" (12.7mm) plywood. During periods of remodeling and renovation, appropriate steps must be taken to protect the piping from fire exposure if the ceiling is temporarily removed.

The pipe and fittings shall be used in sprinkler systems employing sprinkler heads rated 225 degree F or lower, for pendent and horizontal sidewall heads.

Thermalfit CPVC fittings must never be installed in combustible concealed spaces requiring sprinklers, as reference in NFPA 13. NFPA 13R and 13D permit the omission of sprinklers from combustible concealed spaces, and Thermalfit fittings may be installed in these areas when sprinklering residential occupancies according to these standards.

Combustible Concealed Installations with Specific Use Sprinklers

In such cases, specific application sprinkler must be used in accordance with the UL Listing, and in accordance with the code requirements of the local authority having jurisdiction.

In accordance with the UL Listing, *Thermalfit* CPVC Fire Sprinkler Products can be used in specific light-hazard, combustible concealed and noncombustible concealed spaces that require sprinkler protection when installed with Tyco Fire Products Model CC1 – 2.8 K-Factor or Model CC2 – 5.6 K-Factor Combustible Concealed Space Sprinklers, Specific Application Upright, or UL Listed Viking Microfast® COIN™ Quick Response Combustible Interstitial Space Upright Sprinklers for Specific Application.

The system must be installed in accordance with the applicable sprinkler manufacturer's information, Tyco Fire Products Model CC1 – 2.8 K-Factor Combustible Concealed Space Sprinkler Technical Data Sheet (dated July 2004), Tyco Fire Products Model CC2 – 5.6 K-Factor Combustible Concealed Space Sprinkler Technical Data Sheet (dated April 2004) or Viking Microfast® COIN™ Quick Response Upright Sprinkler SIN VK900 (Specific Application) Technical Data Sheet (dated March 17, 2004).

Exposed installations (where sprinklers are required)

It is always acceptable to install *Thermalfit* CPVC products in areas where sprinklers are not required. In accordance with the UL Listing, *Thermalfit* CPVC Fire Sprinkler Products may be installed exposed when subject to the following additional limitations:

1. Exposed piping is to be installed below a smooth, flat, horizontal ceiling construction.
2. When using fittings in the 1-1/2 in. and greater size only Schedule 80 fittings may be used.
3. The end use application is limited to unobstructed construction.
4. For pendent sprinkler installations, the piping shall be mounted directly to the ceiling. For horizontal sidewall sprinkler installations, the piping shall be mounted directly to the sidewall.
5. Only the sprinkler combinations shown below are utilized, with limitations strictly observed:

Standard Coverage and Residential Sprinklers:

Listed quick response 170°F maximum temperature rated pendant sprinklers having deflectors installed within 8 in. from the ceiling, or Listed residential (170°F maximum temperature rated) pendant sprinklers located in accordance with their Listing, and a maximum distance between sprinklers not to exceed 15 ft.

Listed quick response 170°F maximum temperature rated horizontal sidewall sprinklers having deflectors installed within 6 in. from the ceiling and within 6 in. from the sidewall, or Listed residential (170°F maximum temperature rated) horizontal sidewall sprinklers located in accordance with their Listing and a maximum distance between sprinklers not to exceed 14 ft.

Listed quick response 200°F maximum temperature rated horizontal sidewall sprinklers having deflectors installed within 12 in. from the ceiling and within 6 in. from the sidewall, or Listed residential (200°F maximum temperature rated) horizontal sidewall sprinklers located in accordance with their Listing and a maximum distance between sprinklers not to exceed 14 ft.

Listed quick response 155°F maximum temperature rated upright sprinklers having deflectors installed within 4 in. from the ceiling and a maximum distance between sprinklers not to exceed 15 ft. The distance from the ceiling to the centerline of the main run of pipe must not exceed 7 1/2". The distance from the centerline of a sprinkler head to a hanger must be 3".

Light Hazard Extended Coverage and Residential Sprinklers:

Listed light hazard, extended coverage, quick response, 155°F maximum temperature rated pendant sprinklers, or Listed residential (155°F maximum temperature rated) pendant sprinklers, having deflectors installed within 8 in. from the ceiling and a maximum distance between sprinklers not to exceed 20 ft. with an application density of at least 0.10 gpm/sqft.

Listed light hazard, extended coverage, quick response, 175°F maximum temperature rated horizontal sidewall sprinklers having deflectors installed within 12 in. from the ceiling and within 6 in. from the sidewall, and a maximum distance between sprinklers not to exceed 16 ft. with an application density of at least 0.10 gpm/sqft.

Listed light hazard, extended coverage, quick response, 165°F maximum temperature rated horizontal sidewall sprinklers, or Listed residential (165°F maximum temperature rated) horizontal sidewall sprinklers, having deflectors installed within 12 in. from the ceiling and within 6 in. from the sidewall, and a maximum distance between sprinklers not to exceed 18 ft. with an application density of at least 0.10 gpm/sqft.

Listed light hazard, extended coverage, quick response, 155°F maximum temperature rated horizontal sidewall sprinklers (manufactured by Reliable Automatic Sprinkler Co. Inc. SIN RA0362) having deflectors installed within 12 in. from the ceiling and within 6 in. from the sidewall, and a maximum distance between sprinklers not to exceed 24 ft. and a minimum flow per sprinkler of 40 gpm.

Return Air Plenum Installations

Thermalfit CPVC Fire Sprinkler Products meet the combustibility requirements for thermoplastic sprinkler pipe, as described in the Standard for Installation of Air Conditioning and Ventilating Systems, NFPA 90A. Thermalfit CPVC Fire Sprinkler Products may be installed in the plenum space adjacent to, but not over, an opening in the ceiling, such as a ventilation grill.

Garage Installations

Thermalfit CPVC Fire Sprinkler Products may be used in garages requiring sprinklers (as defined in NFPA 13R) subject to the following requirements:

1. Use a minimum protection of either one layer of 1/2" thick plywood or 3/8" thick gypsum.
2. Use a Listed pendent or sidewall sprinklers with a maximum temperature rating of 225°F.

In accordance with NFPA 13D, "Sprinklers shall not be required in garages, open attached porches, carports, and similar structures." Since sprinklers are not required by NFPA 13D garages, these installations do not fall within the scope of the listing. However, *Thermalfit* CPVC fittings may be installed in NFPA 13D garages with the approval of the local authority having jurisdiction.

Basement Installations

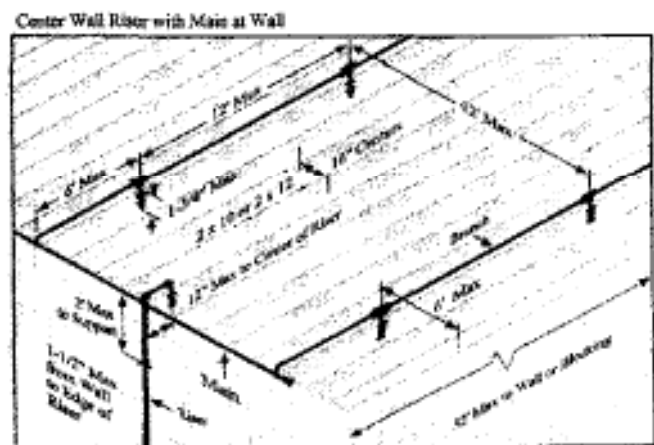
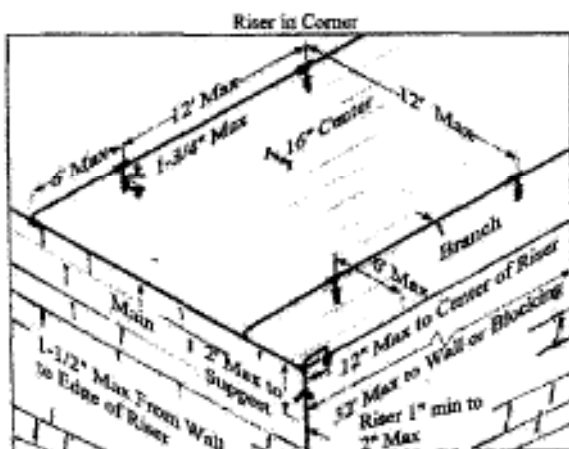
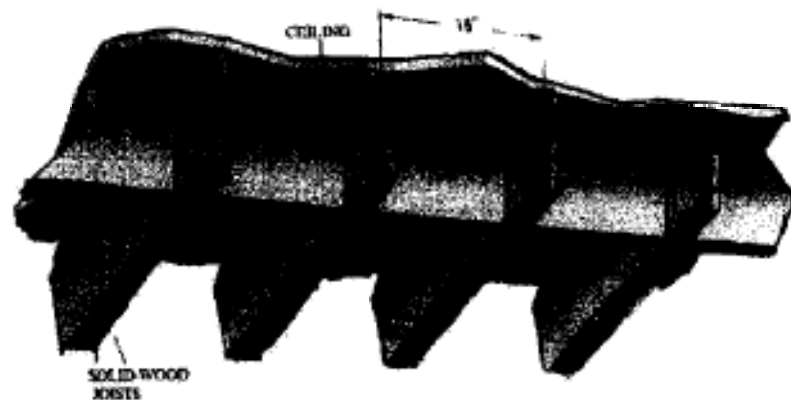
Thermalfit CPVC fittings may be installed without protection in unfinished basements in accordance with NFPA 13D. The ceiling shall be horizontal and constructed utilizing nominal 2 in. x 10 in. solid wood joists or nominal 2 in. x 12 in. solid wood joists on 16 in. centers.

When installing 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 conditions shall not exceed 175 psi.

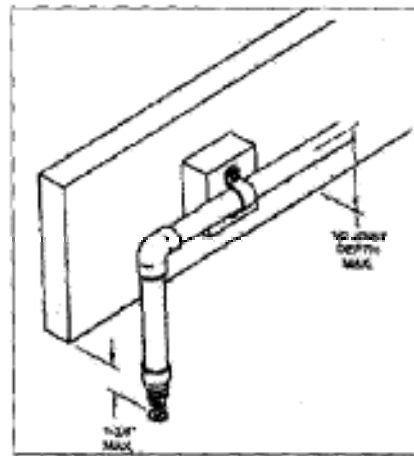
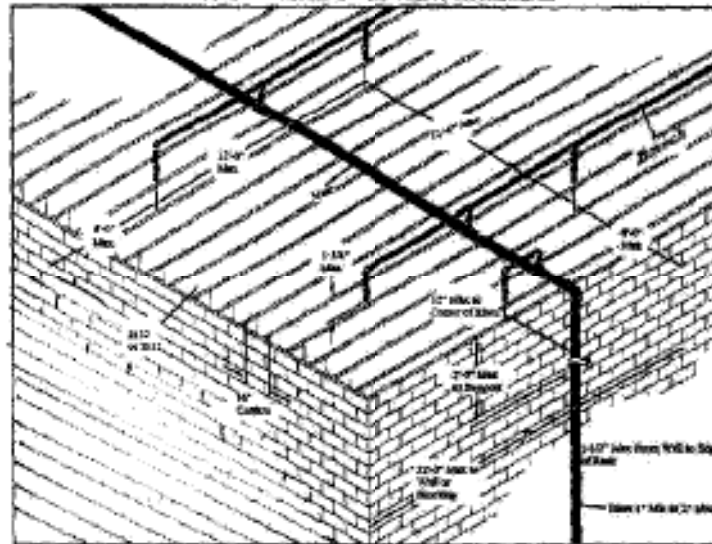
Thermalfit CPVC fittings may only be used in basements where the quantity and combustibility of contents is low and where fires with relatively low rates of heat release are expected. The installation is also subject to the following additional limitations:

1. There must be a distance of between 7 and 8 feet from the floor to the bottom of the solid wood joists.
2. If the total protected area exceeds 1,000 square feet, blocking must be used to divide the area into individual compartments of 1000 square feet or less.

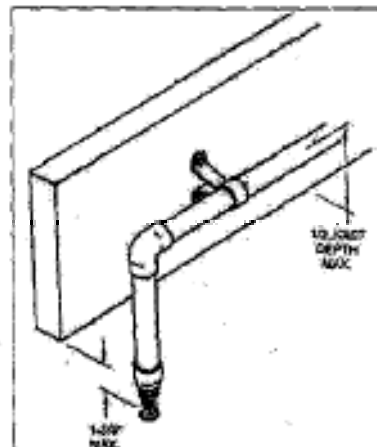
3. The maximum length along the joist shall not exceed 32 feet. If the maximum length along the joist exceeds 32 feet, blocking must be used. The blocking must be constructed with plywood (minimum 1/2 in.) and must be the full depth of the wood joists.
4. The sprinklers must not be spaced more than 12 feet apart.
5. This type of installation requires the use of Listed residential pendent sprinklers with a maximum temperature rating of 155°F and a minimum K-factor of 3.0
6. The system is to be designed based upon the Listed flows for the sprinkler selected except the sprinkler flow must not be less than 11 gpm per sprinkler or the UL Listed flow for the sprinkler.
7. Sprinklers must be installed with the deflectors below the solid wood joists to allow for the future installation of a finished ceiling. The deflector must be no more than 1 3/4" below the solid wood joist.
8. When installing Thermalfit CPVC Fire Sprinkler Products perpendicular (system mains) to the solid wood joists, UL Listed support devices for thermoplastic sprinkler piping or other UL Listed support devices shall be used which mount the piping directly to the bottom of the solid wood joists. In addition, it is acceptable to cut holes in the solid wood joists at or below the center of the depth of the solid wood joist for support. Holes must be oversized to allow for movement and must be located in an area that will not compromise joist integrity. Consult the authority having jurisdiction for more information regarding structural integrity.
9. When installing Thermalfit CPVC Fire Sprinkler Products parallel (branch lines) to the solid wood joists, the pipe and fittings must be installed in the cavity below the bottom of the ceiling and above the bottom of the joist. Branch lines must be located at or below the center of the depth of the solid wood joist. UL Listed support devices must be used to mount piping directly to nominal 2 in. wood blocking. In addition, UL Listed support devices can be used that offset the pipe a nominal distance of 1-1/2 in. from the solid wood joists.
10. When using fittings in the 1-1/2 in. and greater size only Schedule 80 fittings may be used.



Center Wall Riser with Center Room Main



Branches Supported with Blocking



Branches Supported with Hangers

Attic Installations with Specific Use Sprinklers

In accordance with the UL Listing, Thermalfit CPVC Fire Sprinkler Products may be installed within the attic space provided the attic space is protected with UL Listed Tyco Fire Products Specific Application Attic Sprinklers. Specific Application Attic Sprinklers are sprinklers designed to provide protection of specific light hazard combustible, as well as non-combustible, attic spaces requiring sprinkler protection. When using the Specific Application Attic Sprinklers, Thermalfit CPVC Fire Sprinkler Products may be installed to feed the wet system sprinklers below the ceiling and exposed to feed wet system specific application attic sprinklers provided the system is installed in accordance with the Tyco Fire Products' Technical Data Sheet TFP610 (dated July 2005) for Specific Application Attic Sprinklers.

Fire Sprinkler System Risers

Thermalfit CPVC Fire Sprinkler Products may be used as system risers in accordance with NFPA 13D and 13R subject to the additional limitations below:

Concealed Installations:

Use a minimum protection of 1/2" thick plywood or 3/8" thick gypsum wallboard.

Protected Installations (option A):

1. Install the risers below a horizontal ceiling construction that is both smooth and flat.
2. Use a Listed residential pendent sprinkler.
3. Be sure that the distance from the sprinkler deflectors to the ceiling complies with the distance specified in the sprinkler Listing.
4. Use a Listed residential pendent sprinkler with a maximum temperature rating of 155°F and a minimum K-factor of 3.0 installed no more than 12" from the centerline of the riser.
5. The system is to be designed based upon the Listed flow for the sprinkler selected except the sprinkler flow must not be less than 11 gpm per sprinkler or the UL Listed flow for the sprinkler.
6. Support the riser vertically at a maximum of two feet from the ceiling.
7. The diameter of the riser must be no less than 1" and must be no more than 2".
8. The distance between the wall and the outside surface of the riser pipes must not exceed 1.5"

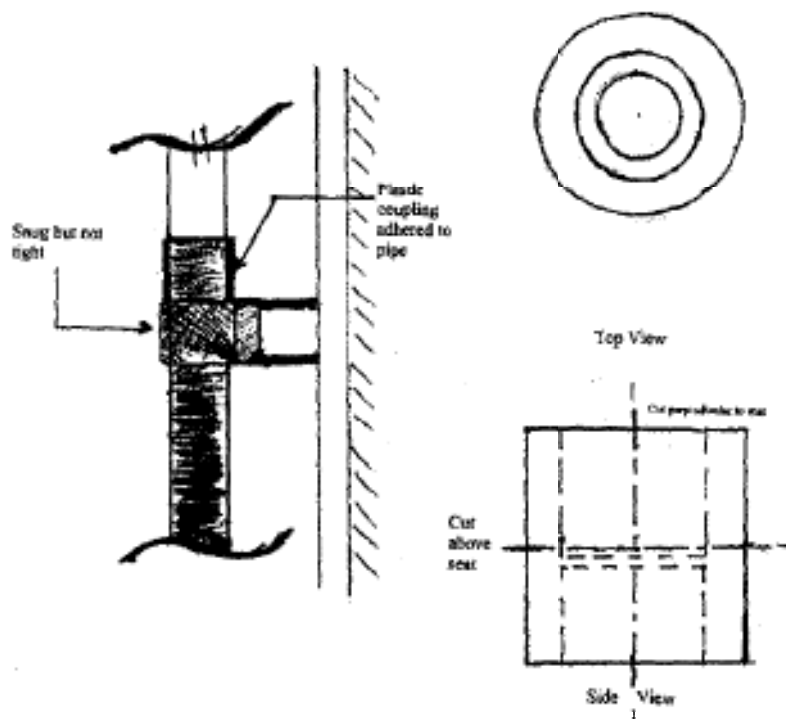
Protected Installations (option B):

1. Install the riser below a horizontal unfinished basement ceiling (in accordance with NFPA 13D)
2. This ceiling must be constructed using nominal 2 in. x 10 in. or nominal 2 in. x 12 in. exposed solid wood joists on 16 in. centers.
3. When using 2" x 12" joists, the maximum working pressure of the entire system when flowing must be equal to or less than 100 psi.
4. When using 2" x 12" joists, the maximum working pressure of the entire system when static must be equal to or less than 175 psi.
5. Use a Listed residential pendent sprinkler with a maximum temperature rating of 155°F and a minimum K-factor of 3.0 installed no more than 12" from the centerline of the riser.
6. In order to leave room for the later installation of a finished ceiling, leave no more than 1 3/4" between the sprinkler deflectors and the bottom of the solid wood joists.
7. The system is to be designed based upon the Listed flow for the sprinkler selected except the sprinkler flow must not be less than 11 gpm per sprinkler or the UL Listed flow for the sprinkler.
8. Support the riser vertically at a maximum of two feet from the bottom of the joist.
9. The diameter of the riser must be no less than 1" and must be no more than 2".
10. The distance between the wall and the outside surface of the riser pipes must not exceed 1.5"

Support limitations:

1. Support the risers on the horizontal connection close to the risers, using either hangers or pipe clamps.
2. Use only Listed hangers and pipe clamps.
3. When supporting the pipe vertically, place clamps below the shoulder of the fitting.
4. Never use riser clamps that depend on the compression of the pipe to support weight.
5. For vertical lines, use riser clamps or double bolt pipe clamps that are Listed for this purpose.
6. Be sure that the clamps do not exert compressive stresses on the pipe.
7. When feasible, locate clamps immediately below the fittings so that the shoulder of the fitting rests against the clamp.
8. Be sure that any hangers or straps used never distort, compress, cut, or abrade the piping.
9. Hangers and straps must allow for the free movement of the pipe. This is necessary because of the thermal expansion and contraction inherent in CPVC piping.

10. When necessary, an installer may modify a coupling and adhere it to the pipe to make a bearing support. When doing this, the shoulder of the fitting must rest on the clamp, and the recommended cure times must be followed. These modified riser collars are only be used for support, never to join two pieces of pipe.



General limitations:

1. Follow the installation requirements of NFPA 13, Sections 6-2.5 (2002 Edition).
2. Follow all other instructions in this manual (in addition to the limitations in this section)
3. All vertical piping must be maintained in straight alignment with supports at ten foot intervals or at each floor level (whichever is less).

Product Specifications

Thermalfit LLC CPVC Fired Sprinkler Products are made for use with Listed CPVC Fire Sprinkler Pipe produced in SDR 13.5 dimensions. These products are UL Listed and FM Approved for a rated working pressure of 175 psi at 150°F.

Hydraulic Design

Hydraulic calculations for the sizing CPVC Fire Sprinkler Products must be calculated using a Hazen-Williams value of 150. Calculations for pipe friction loss must be made according to NFPA Standard 13. Refer to the following table to find the friction loss allowance for fittings (expressed as equivalent pipe length).

	Equivalent Feet of Pipe				
	3/4"	1"	1-1/4"	1-1/2"	2"
Tee run	1	1	1	1	1
Tee Branch	3	5	6	8	10
90 Elbow	4	5	6	7	9
45 Elbow	1	1	2	2	2
Coupling	1	1	1	1	1

Support and Spacing

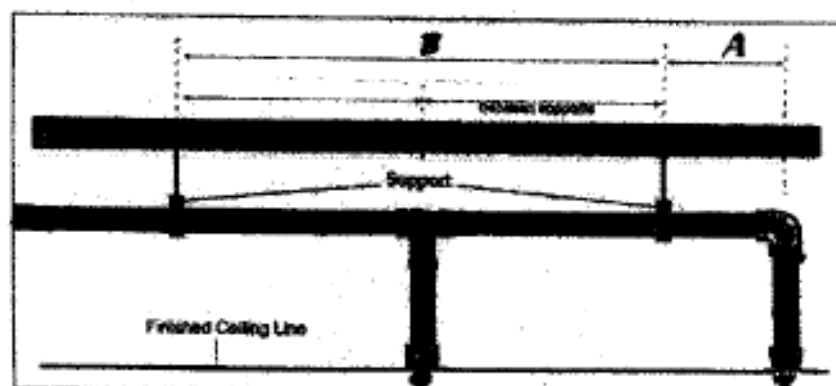
A significant reactive force can be exerted on the pipe when a sprinkler head activates. If a pipe is not secured properly, the activation of a pendant head can initiate a reactive force that causes the pipe to lift vertically. This is especially relevant when the sprinkler drop is from a small diameter pipe.

Hangers that are designed and listed for supporting the CPVC Fire Sprinkler pipe should be used. While it is possible to use some hangers that are designed for steel pipe, they may not only be used subject to the following limitations:

1. The hangers must have a minimum 1/2-inch, load-bearing surface.
2. They must not contain rough or sharp edges that contact the pipe.
3. They must not bind the pipe from axial movement.

Support all vertical runs so that the weight of the run is not on a joint or on a fitting. Support all horizontal runs so that the stress loads will not be placed on a fitting or a joint. Please refer to the following table for support spacing:

Nominal Pipe Size (inches)	Maximum Support Spacing	Wt. Water Filled Pipe Lbs/ft
3/4"	5.5 feet	0.427
1"	6.0 feet	0.674
1-1/4"	6.5 feet	1.078
1-1/2"	7.0 feet	1.412
2"	8.0 feet	2.223
2-1/2"	9.0 feet	3.254
3"	10.0 feet	4.831



Please refer to the following table for maximum support spacing distance
(See dimension "A" on above chart - End Line Sprinkler Head Drop Elbow)

Nominal Pipe Size (Inches)	Line Pressure under 100 psi	Line Pressure over 100 psi
3/4"	9"	6"
1"	12"	9"
1-1/4"	16"	12"
1-1/2-3"	24"	12"

Please refer to the following table for maximum support spacing distance
(See dimension "B" on above chart - Inline Sprinkler Head Drop Tee)

Nominal Pipe Size (Inches)	Line Pressure under 100 psi	Line Pressure over 100 psi
3/4"	48"	36"
1"	60"	48"
1-1/4"	72"	60"
1-1/2-3"	84"	84"

Band Hangers: *Band hangers are designed to support CPVC piping systems. They are used in conjunction with a hanging steel threaded rod that is suspended from a ceiling or other flat, horizontal surface. Before installing the hanger and restraint, the threaded rod must be leveled properly. A distance of 1/16" is required between the pipe and the threaded rod.*

Surge Restraints: *Surge restraints may be used in CPVC fire sprinkler systems. They provide surge protection for the system when installed with the band hanger.*

All pipe hangers must comply with NFPA 13, 13D or 13R, as applicable. Never use hanger items such as nail-on devices or plumber's tape.

Maintenance

Maintenance shall be in accordance with the standard for inspection, testing and maintenance of water based extinguishing systems as defined by NFPA 25.

Appendix A (Temperature Guidelines)

Ambient Temperature Limitations: CPVC Fire Sprinkler products are suitable for use in areas where ambient temperatures are within the range of 35° F (2° C) to 150° F (65° C).

High Temperature Areas: Thermalfit CPVC Fire Sprinkler products can be installed in areas, such as an attic, where the ambient temperature exceeds 150° F (65° C) only if ventilation is provided or if insulation is used around the product to maintain a cooler environment.

Heat Sources: Thermalfit CPVC Fire Sprinkler products must be installed so that the pipe or fittings are not closely exposed to heat producing sources (including but not limited to lights or steam lines). Also, CPVC products must never be installed directly over open ventilation grills.

Cold Temperature Areas: Thermalfit CPVC Fire Sprinkler products are meant to be used in areas where the ambient temperature remains above 35°F (2°C). These products can also be used in an area subject to freezing temperatures if the sprinkler system installation is protected from freezing. Many standard cold weather piping design and installation practices can be used to protect the system from freezing, including, but not limited to, the use of glycerin, insulation installation techniques, and pipe insulation.

Antifreeze solutions of water and USP or CP grade GLYCERIN are acceptable for use with Thermalfit CPVC Fire Sprinkler products. Refer to NFPA 13, NFPA 13R, NFPA 13D and consult the local authority having jurisdiction before using glycerin solutions in fire sprinkler applications. Do not use glycol-based antifreeze solutions. Glycol solutions are not chemically compatible with the CPVC material and can cause damage to the Sprinkler System.

Never allow a sprinkler system to freeze. A frozen system can damage the sprinkler heads, pipe, and fittings. Any damage caused because of a frozen system is not covered by the Thermalfit warranty

Appendix B (Storage and Handling)

Thermalfit CPVC pipe and fittings shall be stored indoors with a maximum storage temperature of 110°F (43°C). The fittings must be stored in their original containers to keep them free from dirt and to help reduce the possibility of damage.

Do not allow any CPVC product to be dropped, and do not allow anything to be dropped onto a CPVC product. Any improper handling could result in fitting damage (including but not limited to scratches splits, and gouges).

Thermalfit CPVC pipe and fittings must not be subjected to prolonged sun light exposure. **Never use CPVC pipe that has been stored outdoors unprotected and is faded in color.** The use of pipe and fittings that have been damaged in any way could cause serious personal injury, property damage, and product damage. Any damaged parts or pipe sections must be discarded.

Solvent Cement must be stored with a minimum storage temperature of 40°F and a maximum storage temperature of 90°F. The solvent cement must be kept out of direct sunlight, and in well ventilated areas. Refer to the manufacturer's instruction manual for further storage and handling requirements regarding the One-Step solvent cement.

Appendix C (Listing information)

THERMAFIT CPVC fire sprinkler system components are UL Listed for use in;

Light Hazard Occupancies as defined by NFPA 13

Residential Occupancies up to four stories in height as defined by NFPA 13R

One and two family dwellings and manufactured homes as defined by NFPA 13D

Additional Limitations:

- Always follow all applicable workplace safety requirements. Wear safety glasses, hardhat, and safety footwear.
- Always use tools that are designed for use with plastic pipe and fittings.
- Never use components that appear irregular or do not fit properly.
- Never use petroleum or solvent-based sealants, lubricants, or fire stop materials.
- Never expose CPVC fittings to edible oils, ketones, esters, or any petroleum-based chemicals.
- Never thread, groove, or drill CPVC pipe.
- Never paint CPVC fire sprinkler products.
- Never install tape, insulated wire or cable in direct contact with CPVC.
- Never pre-assemble the drop assembly with the sprinkler head prior to cementing all joints.
- Always design a CPVC system to allow for movement due to expansion and contraction.
- Never allow CPVC piping to come into contact with threaded rod.

Appendix D (Technical Reference)

ASTM F437 Specification for Threaded Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80

ASTM F438 Specification for Socket-Type Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 40

ASTM F439 Specification for Chlorinated Poly (Vinyl Chloride) (CPVC) Plastic Pipe Fittings, Schedule 80

NFPA 13 Standard for Installation of Sprinkler Systems

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

NFPA 13D Standard for the Installation of Sprinkler system in One and Two Family Home Dwellings and Manufactured Homes

UL 1887 Standard for Fire Test of Plastic Sprinkler Pipe for Visible Flame and Smoke Characteristics

UL 1821 Standard for Thermoplastic Sprinkler Pipe and Fittings for Fire Protection Service.