Understanding Column Header & Configuration Information

A variety of Column Header layouts are used to list product part numbers, options and product codes. The following are the most typical used:

Typical Fitting Column Header label identifies the following product particulars:

Part Number	The number used to order the part.
Size	Nominal diameter of pipe with which the fitting is to be used. NOTE: Fittings may be same size (only one size designation) or reducing (multiple sizes designated).
Standard Pack (Std Pk)	The quantity of parts packaged in an individual box or bag.
Master Carton (Mstr Ctn)	The total quantity of parts contained in individual boxes or bags which are packaged together.
Product Code (Prod Code)	This is a Product Group code and is not a calculation of discount. Product codes are not the same for all products contained in this product sourcebook.

Fitting Configuration Illustrations are accompanied by the product's name and an abbreviated configuration description of the fitting outlet connections. Illustrations are general representations of the fittings in the group, but may not be an exact depiction of all configurations listed. As with the nominal size designations, only one description is given when all outlets are the same. Reducing sizes list run configuration x branch configuration.

Example

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
401-080	8	2	0	040
401-100	10	1	0	041
401-100F	10	1	0	047

Product Name — **Tee**
Abbreviated Configuration Description — **Soc x Soc**

Where molded and fabricated fittings are available in certain catalog listings, the fabricated fittings may be identified by having a shaded background. In other cases, fabricated fittings may be identified using a foot note to the section.

Typical Valve Column Header label identifies the following product particulars. Headers are generally preceded by identification of material type and configuration descriptions. Again, variations exist according to product type and configurations.

Size	The nominal diameter of the pipe with which the valve is to be used.
Seal Type (i.e., EPDM, FKM)	Designated elastomer seal (O-ring, seat, Diaphragm, etc.) NOTE: Part Number is typically specified under the seal type columns. Certain products may have other column header designations under which part numbers are specified in a similar manner.
Standard Pack (Std Pk)	The quantity of parts packaged in an individual box or bag.
Master Carton (Mstr Ctn)	The total quantity of parts contained in individual boxes or bags which are packaged together.
Product Code (Prod Code)	This is a Product Group code and is not a calculation of discount. Product codes are not the same for all products contained in this Product sourcebook.

Valve Illustrations are photos. Photos are general representations of the valve or product specified, but may not depict all configurations listed.

Example

Product Type (Page Heading)

True Union 2000 Industrial Ball Valves

Material — **PVC Industrial**

End Connector	Size	EPDM	FKM	Std Pk	Mstr Ctn	Prod Code
Socket Ends	1/2	1829-005	1839-005	1	18	600

Part Number

Basic Technical Data In Section Prefaces

Typical Presentation Photo

Socket Style

Pressure Rating @ 73°F (23°C) Water

1/2"-4"	235 psi
6"- 8"	150 psi
Flanged	150 psi

Maximum Service Temperature
PVC=140°F (60°C)
CPVC=200°F (93°C)

Temperature/Pressure De-ratings Apply

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FlameGuard® System Overview

Spears® FlameGuard® . . . The Leader in Innovative CPVC Fire Sprinkler System Products

Corrosion Resistant CPVC Material Does Not Sustain Biological Growth

Unlike metal systems, **FlameGuard®** CPVC products never rust, scale or pit and do not sustain biological growth - a cause of Microbiologically Influenced Corrosion (MIC) which can destroy metal fire sprinkler systems from the inside out.

Superior Flow Characteristics for Lower Friction Losses

The smooth-wall interior surfaces of **FlameGuard®** CPVC systems result in reduced friction loss over metal systems. The design flow characteristics remain constant throughout the life of the product because there is no interior corrosion in the system due to microbiological activity.

Pressure Rated to 175 psi (1.21 Mpa) @ 150°F (66°C)

FlameGuard® CPVC Products are produced in combinations of Schedule 40 and Schedule 80 Fitting configurations conforming to ASTM F 438 or F 439 standards and **FlameGuard®** SDR 13.5 CPVC Fire Sprinkler Pipe conforming to ASTM F 442 standards. UL® Rated working pressure is 175 psi (1.21 Mpa) @ 150°F (66° C) (LPCB rated to 120°F) (49°C).

Easy Installation for Lower Costs

FlameGuard® CPVC system installations significantly reduce costs over conventional metal piping by virtually eliminating prefabrication. Systems can be fully installed on site using solvent cement joining methods.

UL® Listed for U.S. and Canada in NFPA 13, 13R & 13D Systems

FlameGuard® CPVC Fire Sprinkler Products are UL® listed for U.S. and Canada applications for Light Hazard occupancies as defined in NFPA 13, Residential occupancies up to and including 4-stories as defined in NFPA 13R, and Residential occupancies for one and two family dwellings and manufactured homes as defined in NFPA 13D. Consult Spears® **FlameGuard®** CPVC Fire Sprinkler Products Installation Instructions and NFPA Standards for additional applications including air plenum, system risers, concealed, exposed, underground, combustable attic, garage, basement and low pressure dry piping installations.

Full Limited Lifetime Warranty

FlameGuard® CPVC Fire Sprinkler Products carry a limited lifetime warranty against defects in material or workmanship. Consult Spears® warranty for additional details.

Pioneer in Molded-in Metal Insert Head Adapters

Spears® pioneered the development of the **FlameGuard®** molded-in-place metal thread insert for connection of sprinkler heads to CPVC fire sprinkler systems, plus Metal FIPT threaded female adapters for metal-to-plastic transitions.

Developed the Special Reinforced (SR) Head Adapters

Spears® **FlameGuard®** continuous improvement program developed the technology to produce a superior patented plastic threaded fitting - the Special Reinforced (SR) Design. This unique design incorporates a patented thermoplastic compression process that equalizes stresses generated by tapered thread joint make-up. All CPVC plastic body and threads provide a more uniform construction and improved corrosion resistance.

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® System Overview

Now, the Revolutionary TorqueSafe™ Gasket Sealed Head Adapter

• Requires NO thread sealants • Eliminates stress • Prevents over-tightening • Provides easy frame alignment • Spears® revolutionary design features a special molded-in-place Brass Thread Insert fitted with an elastomer gasket seal at the base of the threads. The gasket seal allows a modified thread design that eliminates radial stress and associated problems typical with tapered thread joint make up. The insert is designed to rotate for easy sprinkler frame alignment without over-tightening. Patent No. 7,458,613.

Full Assortment of Specialty Products & Fitting Configurations

Spears® **FlameGuard®** provides the specialty fittings needed in today's fire sprinkler systems, Such as the adjustable drop nipple for fine-tuning to finished ceiling height, and ringed head adapter for ease of locating during installation. Plus, Spears® **FlameGuard®** line offers a full assortment of CPVC fire sprinkler fitting configurations including Tees, Elbows, Flanges, Couplings, Caps, Male Adapters, Grooved Coupling Adapters and Unions, sizes 3/4" through 3"; with new 3/4" and 1" Repair Couplings.

Complete Size Range of CPVC Pipe

Spears® **FlameGuard®** CPVC Fire Sprinkler Pipe is available in sizes 3/4" to 3". Conforms to ASTM F 442 standard for SDR 13.5 CPVC pipe.

Spears® Solvent Cements & Thread Sealant

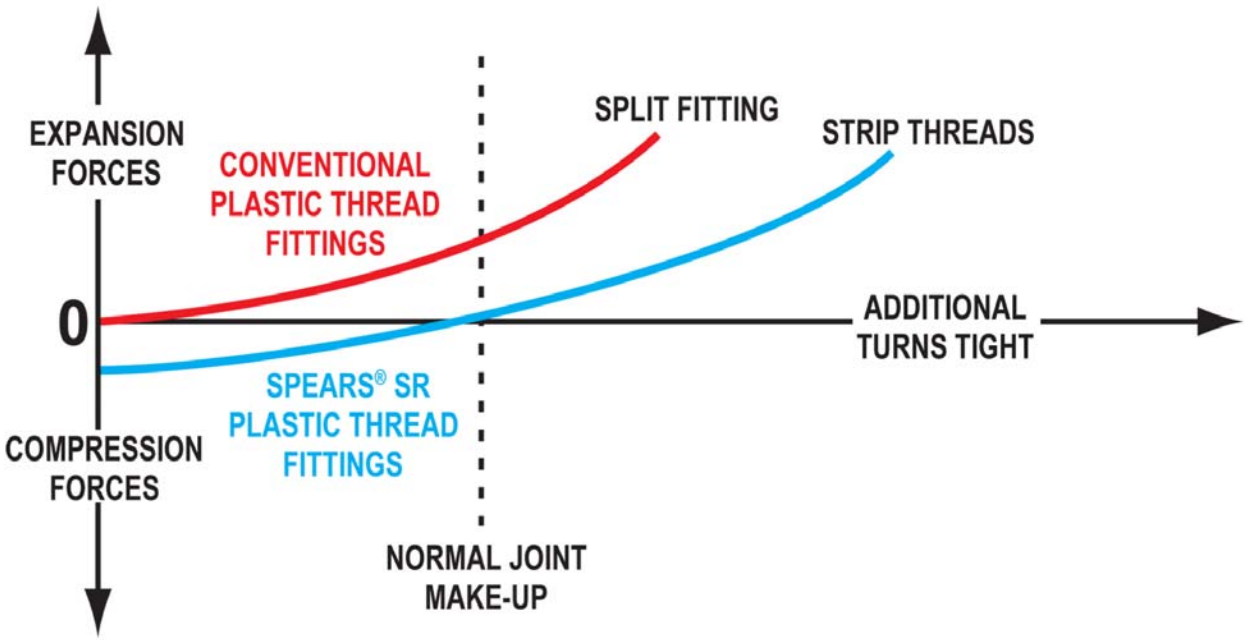
FlameGuard® products should be installed using Spears® FS-5 One-Step Solvent Cement. For threaded joints, use Spears® **BLUE 75™** Thread Sealant that has been tested for compatibility with **FlameGuard®** CPVC Fire Sprinkler Products. Spears® **TorqueSafe™** Gasket Sealed Adapter requires no sealant. Consult sprinkler head manufacturer prior to use.

SPEARS® Patented SR Design Sprinkler Head Adapters

SPEARS® Patented Special Reinforced (SR) plastic female thread design is one of the most significant advancements in the use of CPVC Fire Sprinkler System threaded fittings. Not just an added ring, this unique precompression design compensates for expansion forces generated from tapered pipe thread joint make-up. Radial stress is no longer a problem in normal installations and easily managed in severe over-tightening situations.

Contains and Compensates for Radial Stress...

Radial stress, generated by tightening of tapered pipe threads, exerts tremendous expansion force on female plastic thread fittings. When subjected to over-tightening - even accidentally - these forces can literally split the fitting. Spears® patented SR Adapter design not only alleviates this problem by containing expansion forces with its special reinforced collar, but additionally compensates for expansion stress through thermoplastic material compression. Stresses are equalized at normal joint make-up. The following graph illustrates this effect in a comparison of conventional plastic female thread fittings with Spears® SR adapters when taken to failure.



Another Quality SPEARS® Product Designed for Performance, Customer Satisfaction and Service.

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® CPVC Fire Sprinkler Products

PRODUCTS

See Manufacturer's Suggested Retail Price Sheet (MSRP-1) or Check Spears® On-line catalog @ www.spearsmfg.com for pricing

Contact Spears® for any information not found.

FlameGuard® CPVC Fire Sprinkler Piping Products

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Pipe - FlameGuard® CPVC Fire Sprinkler Plain End

SDR 13.5 10' Lengths

Price Per Foot

CP-007-10	3/4	260	0	071
CP-010-10	1	170	0	071
CP-012-10	1-1/4	90	0	071
CP-015-10	1-1/2	70	0	071
CP-020-10	2	50	0	071
CP-025-10	2-1/2	40	0	071
CP-030-10	3	30	0	071

Pipe - FlameGuard® CPVC Fire Sprinkler Plain End

SDR 13.5, 15' Lengths

Price Per Foot

CP-007	3/4	390	0	071
CP-010	1	255	0	071
CP-012	1-1/4	135	0	071
CP-015	1-1/2	105	0	071
CP-020	2	75	0	071
CP-025	2-1/2	60	0	071
CP-030	3	45	0	071

Tee

Socket x Socket x Socket

4201-007	3/4	20	220	070
4201-010	1	15	120	070
4201-012	1-1/4	10	0	070
4201-015	1-1/2	10	0	070
4201-020	2	10	0	070
4201-025	2-1/2	10	0	070
4201-030	3	5	0	070

GripLoc™ Tee

WARNING: DO NOT INSERT FINGERS
EPDM Gasket

Uses No Solvent Cement - NSF® Certified Lead Free
175 psi (1.21 Mpa) @ 150° F (66°C)

GL4201-007	3/4	15	0	134
GL4201-010	1	1	15	134

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Reducing Tee

Socket x Socket x Socket

4201-102	3/4X1	20	0	070
4201-125	1X3/4X3/4	15	150	070
4201-126	1X3/4X1	15	0	070
4201-131	1X3/4	20	0	070
4201-157	1-1/4X1X3/4	15	0	070
4201-158	1-1/4X1X1	15	0	070
4201-159	1-1/4X1X1-1/4	15	0	070
4201-167	1-1/4X3/4	15	0	070
4201-168	1-1/4X1	15	0	070
4201-169	1-1/4X1-1/2	10	0	070
4201-201	1-1/2X1-1/4X3/4	10	0	070
4201-202	1-1/2X1-1/4X1	10	0	070
4201-210	1-1/2X3/4	15	0	070
4201-211	1-1/2X1	10	0	070
4201-212	1-1/2X1-1/4	10	0	070
4201-213	1-1/2X2	10	0	070
4201-248	2X3/4	10	0	070
4201-249	2X1	10	0	070
4201-250	2X1-1/4	10	0	070
4201-251	2X1-1/2	10	0	070
4201-289	2-1/2X1	10	0	070
4201-290	2-1/2X1-1/4	10	0	070
4201-291	2-1/2X1-1/2	10	0	070
4201-292	2-1/2X2	10	0	070
4201-335	3X1	5	0	070
4201-336[1]	3X1-1/4	5	0	070
4201-337	3X1-1/2	5	0	070
4201-338	3X2	5	0	070
4201-339	3X2-1/2	6	0	070

[1] Outlet sized with Bushing

GripLoc™ Extension Tee

Socket x Socket x GripLoc™
WARNING: DO NOT INSERT FINGERS
EPDM Gasket

Uses No Solvent Cement - NSF® Certified Lead Free
175 psi (1.21 Mpa) @ 150° F (66°C)

GLS4201-010	1	1	15	134

SofTorque™ SR Sprinkler Head Tee - Gasket Sealed Special Reinforced Plastic Thread Style

Socket x SR Fipt - Stainless Steel Collar With Elastomer Seal - Use NO Thread Sealant

NSF® Certified Lead Free

4202-101GSR	3/4X1/2	50	0	076
4202-124GSR	1X3/4X1/2	50	0	076
4202-130GSR	1X1/2	20	0	076

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® CPVC Fire Sprinkler Piping Products

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

TorqueSafe™ Sprinkler Head Tee - Gasket Sealed Brass Thread Insert Style

Socket x Socket x Gasket Fipt With Elastomer Seal - Use NO Thread Sealant

4202-101 G	3/4X1/2	50	0	076
4202-124 G	1X3/4X1/2	50	0	076
4202-130 G	1X1/2	50	0	076
4202-131 G	1X3/4	50	0	076
4202-166 G	1-1/4X1/2	15	0	076
4202-209 G	1-1/2X1/2	10	0	076
4202-247 G	2X1/2	10	0	076

FIPT With Elastomer Seal - Use NO Thread Sealant.
Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head Tee - Brass Thread Insert Style

Socket x Socket x Fipt

4202-101	3/4X1/2	50	0	076
4202-124	1X3/4X1/2	50	0	076
4202-130	1X1/2	50	0	076
4202-010	1	10	40	076
4202-156	1-1/4X1X1/2	15	0	076
4202-166	1-1/4X1/2	15	0	076
4202-199	1-1/2X1-1/4X1/2	10	0	076
4202-209	1-1/2X1/2	10	0	076
4202-237	2X1-1/2X1/2	10	0	076
4202-247	2X1/2	10	0	076

Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head Tee - Special Reinforced Plastic Thread Style

Socket x Socket x SR Fipt - Stainless Steel Collar

NSF® Certified Lead-Free

4202-010SR	1	15	0	076
4202-101SR	3/4X1/2	50	0	076
4202-124SR	1X3/4X1/2	50	0	076
4202-130SR	1X1/2	50	0	076
4202-131SR	1X3/4	15	0	076
4202-156SR	1-1/4X1X1/2	15	0	076
4202-166SR	1-1/4X1/2	15	0	076
4202-168SR	1-1/4X1	15	0	076
4202-199SR	1-1/2X1-1/4X1/2	10	0	076
4202-209SR	1-1/2X1/2	25	0	076
4202-211SR	1-1/2X1-1/2X1	10	0	076
4202-237SR	2X1-1/2X1/2	10	0	076
4202-247SR	2X1/2	10	0	076
4202-287SR	2-1/2X1/2	10	0	076

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

SofTorque™ SR Sprinkler Head Tee - Gasket Sealed Special Reinforced Plastic Thread Style

Socket x SR Fipt x Socket - Stainless Steel Collar With Elastomer Seal - Use NO Thread Sealant

NSF® Certified Lead Free

4203-122GSR	1X1/2X1	50	0	076

TorqueSafe™ Sprinkler Head Tee - Gasket Sealed Brass Thread Insert Style

Socket x Gasket Fipt x Socket With Elastomer Seal - Use NO Thread Sealant

4203-122 G	1X1/2X1	50	0	076

FIPT With Elastomer Seal - Use NO Thread Sealant
Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head Tee - Brass Thread Insert Style

Socket x Fipt x Socket

4203-122	1X1/2X1	50	0	076

Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head Tee - Special Reinforced Plastic Thread Style

Socket x SR Fipt x Socket - Stainless Steel Collar

NSF® Certified Lead-Free

4203-122SR	1X1/2X1	50	0	076

Street Tee

Spigot x Socket x Socket

4244-007	3/4	15	105	070
4244-010	1	15	0	070
4244-012	1-1/4	10	0	070
4244-015	1-1/2	10	0	070
4244-020	2	10	0	070

90° Ell

Socket x Socket

4206-007	3/4	30	300	070
4206-010	1	20	200	070
4206-012	1-1/4	10	100	070
4206-015	1-1/2	10	0	070
4206-020	2	25	0	070
4206-025	2-1/2	5	0	070
4206-030	3	5	0	070

FlameGuard® CPVC Fire Sprinkler Piping Products

90° Ell - Sweep

Socket x Socket

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4206-010S	1	30	0	070

GripLoc™ 90° Ell

WARNING: DO NOT INSERT FINGERS
EPDM Gasket

Uses No Solvent Cement - NSF® Certified Lead Free
175 psi (1.21 Mpa) @ 150° F (66°C)

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
GL4206-007	3/4	20	0	134
GL4206-010	1	1	20	134

90° Reducing Ell

Socket x Socket

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4206-131	1X3/4	20	240	070
4206-168	1-1/4X1	15	0	070

SofTorque™ SR 90° Sprinkler Head Elbow - Gasket Sealed Special Reinforced Plastic Thread Style

Socket x SR Fipt - Stainless Steel Collar With Elastomer Seal - Use NO Thread Sealant

NSF® Certified Lead-Free

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4207-101GSR	3/4X1/2	20	140	076
4207-130GSR	1X1/2	20	80	076
4207-166GSR	1-1/4X1/2	15	60	076

TorqueSafe™ 90° Sprinkler Head Elbow - Gasket Sealed Brass Thread Insert Style

Socket x Gasket Fipt With Elastomer Seal - Use NO Thread Sealant

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4207-101 G	3/4X1/2	20	120	076
4207-130 G	1X1/2	15	90	076
4207-166 G	1-1/4X1/2	10	60	076

FIPT With Elastomer Seal - Use NO Thread Sealant.
Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head 90° Ell - Brass Thread Insert Style

Socket x Fipt

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4207-101	3/4X1/2	20	120	076
4207-130	1X1/2	15	90	076
4207-131	1X3/4	25	0	076

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Sprinkler Head 90° Ell - Brass Thread Insert Style (continued)

Socket x Fipt

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4207-166	1-1/4X1/2	10	60	076

Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head 90° Ell - Special Reinforced Plastic Thread Style

Socket x SR Fipt - Stainless Steel Collar

NSF® Certified Lead-Free

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4207-101SR	3/4X1/2	20	180	076
4207-130SR	1X1/2	10	150	076
4207-131SR	1X3/4	50	0	076
4207-166SR	1-1/4X1/2	25	0	076

90° Street Ell

Spigot x Socket

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4209-007	3/4	50	0	070
4209-010	1	50	0	070
4209-012	1-1/4	25	0	070
4209-015	1-1/2	10	0	070
4209-020	2	25	0	070

Side Outlet Ell

Socket x Socket x Socket

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4213-007	3/4	50	0	070
4213-010	1	25	0	070

22-1/2° Ell

Socket x Socket

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4216-007	3/4	20	360	070
4216-010	1	20	240	070
4216-012	1-1/4	20	0	070
4216-015	1-1/2	20	0	070
4216-020	2	20	0	070
4216-025	2-1/2	5	0	070
4216-030	3	5	0	070

22-1/2° Street Ell

Spigot x Socket

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
4242-007	3/4	50	0	070
4242-010	1	50	0	070
4242-012	1-1/4	20	0	070
4242-015	1-1/2	25	0	070
4242-020	2	20	0	070

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® CPVC Fire Sprinkler Piping Products

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
22-1/2° Street Ell (continued)				
Spigot x Socket				
4242-025	**2-1/2**	5	0	070
4242-030	**3**	5	0	070
45° Ell				
Socket x Socket				
4217-007	**3/4**	20	360	070
4217-010	**1**	15	240	070
4217-012	**1-1/4**	10	120	070
4217-015	**1-1/2**	10	0	070
4217-020	**2**	10	0	070
4217-025	**2-1/2**	5	0	070
4217-030	**3**	5	0	070
45° Street Ell				
Spigot x Socket				
4227-010	**1**	50	0	070
4227-012	**1-1/4**	25	0	070
4227-015	**1-1/2**	25	0	070
4227-020	**2**	20	0	070
Cross				
Socket x Socket x Socket x Socket				
4220-007	**3/4**	20	0	070
4220-010	**1**	15	0	070
4220-012	**1-1/4**	10	0	070
4220-015	**1-1/2**	10	0	070
4220-020	**2**	8	0	070
4220-025	**2-1/2**	5	0	070
4220-030	**3**	5	0	070
Reducing Cross				
Socket x Socket x Socket x Socket				
4220-131	**1X3/4**	20	0	070
4220-167	**1-1/4X3/4**	25	0	070
4220-210	**1-1/2X3/4**	15	0	070
4220-248	**2X3/4**	10	0	070
4220-289	**2-1/2X1**	15	0	070

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
Coupling				
Socket x Socket				
4229-007	**3/4**	25	500	070
4229-010	**1**	25	250	070
4229-012	**1-1/4**	10	160	070
4229-015	**1-1/2**	10	100	070
4229-020	**2**	20	0	070
4229-025	**2-1/2**	10	0	070
4229-030	**3**	5	0	070
Reducer Coupling				
Socket x Socket				
4229-131	**1X3/4**	15	270	070
4229-167	**1-1/4X3/4**	25	0	070
4229-168	**1-1/4X1**	10	140	070
4229-210	**1-1/2X3/4**	25	0	070
4229-211	**1-1/2X1**	10	70	070
4229-212	**1-1/2X1-1/4**	10	120	070
4229-248	**2X3/4**	10	80	070
4229-249	**2X1**	25	0	070
4229-250	**2X1-1/4**	10	60	070
4229-251	**2X1-1/2**	10	100	070
4229-291	**2-1/2X1-1/2**	10	0	070
4229-292	**2-1/2X2**	10	0	070
4229-337	**3X1-1/2**	5	0	070
4229-339	**3X2-1/2**	10	0	070
GripLoc™ Coupling				
WARNING: DO NOT INSERT FINGERS				
EPDM Gasket				
Uses No Solvent Cement - NSF® Certified Lead Free				
175 psi (1.21 Mpa) @ 150° F (66°C)				
GL4229-007	**3/4**	1	36	134
GL4229-010	**1**	1	20	134
GL4229-020	**2**	1	10	134
Grooved Coupling Adapter				
Groove x Socket				
4233-012	**1-1/4**	10	40	076
4233-015	**1-1/2**	10	40	076
4233-020	**2**	8	32	076
4233-025	**2-1/2**	5	0	076
4233-030	**3**	5	0	076
Not intended to convey or dispense water for human consumption through drinking or cooking				

FlameGuard® CPVC Fire Sprinkler Piping Products

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

QuickTorque™ SR Female Sprinkler Head Adapter - Gasket Sealed Special Reinforced Metal Thread Style

Socket x SR Fipt - Stainless Steel Collar With Elastomer Seal - Use NO Thread Sealant

NSF® Certified Lead Free

4235-101GMR	**3/4X1/2**	50	0	076
4235-130GMR	**1X1/2**	50	0	076

SofTorque™ SR Female Sprinkler Head Adapter - Gasket Sealed Special Reinforced Plastic Thread Style

Socket x SR Fipt - Stainless Steel Collar With Elastomer Seal - Use NO Thread Sealant

NSF® Certified Lead-Free

4235-101GSR	**3/4X1/2**	50	0	076
4235-130GSR	**1X1/2**	50	0	076

TorqueSafe™ Female Sprinkler Head Adapter - Gasket Sealed Brass Thread Insert Style

Socket x Gasket Fipt With Elastomer Seal - Use NO Thread Sealant

4235-101 G	**3/4X1/2**	50	0	076
4235-130GS	**1X1/2**	50	0	076
4235-131 G	**1X3/4**	50	0	076

FIPT With Elastomer Seal - Use NO Thread Sealant.
Not intended to convey or dispense water for human consumption through drinking or cooking

GripLoc™ TorqueSafe™ Female Head Adapter - Gasket Sealed Brass Thread Insert Style

WARNING: DO NOT INSERT FINGERS
EPDM Gasket

Uses No Solvent Cement or Thread Sealant

GL4235-101 G	**3/4X1/2**	25	0	134
GL4235-130 G	**1X1/2**	25	0	132

FIPT With Elastomer Seal - Use NO Thread Sealant
Not Intended to convey or dispense water for human

Female Adapter - Brass Thread Insert Style

Socket x Fipt

4235-007	**3/4**	15	90	076
4235-010	**1**	15	90	076
4235-012	**1-1/4**	15	60	076
4235-015	**1-1/2**	10	40	076
4235-020	**2**	8	32	076

Not intended to convey or dispense water for human consumption through drinking or cooking

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Female Sprinkler Head Adapter - Brass Thread Insert Style

Socket x Fipt

4235-101	**3/4X1/2**	50	0	076
4235-130	**1X1/2**	50	0	076
4235-131	**1X3/4**	50	0	076

Not intended to convey or dispense water for human consumption through drinking or cooking

Female Sprinkler Head Adapter - Special Reinforced Plastic Thread Style

Socket x SR Fipt - Stainless Steel Collar

NSF® Certified Lead-Free

4235-101SR	**3/4X1/2**	50	200	076
4235-130SR	**1X1/2**	50	0	076
4235-131SR	**1X3/4**	50	0	076

Female Sprinkler Head Adapter - Special Reinforced Plastic Thread Style with Socket Body Wrench Flats

Socket x SR Fipt - Stainless Steel Collar

NSF® Certified Lead-Free

W4235-101SR	**3/4X1/2**	50	0	076
W4235-130SR	**1X1/2**	50	0	076

Female Sprinkler Head Adapter - Brass Thread Insert Style with Long Body

Socket x Fipt

L4235-130	**1X1/2**	50	0	076

Not intended to convey or dispense water for human consumption through drinking or cooking

Female Sprinkler Head Adapter - Brass Thread Insert Style with Positioning Ring

Socket x Fipt

R4235-101	**3/4X1/2**	50	0	076

Not intended to convey or dispense water for human consumption through drinking or cooking

Female Sprinkler Head Adapter - Special Reinforced Plastic Thread Style with Positioning Ring

Socket x SR Fipt - Stainless Steel Collar

R4235-101SR	**3/4X1/2**	25	300	076

Female Adapter - Special Reinforced Plastic Thread Style

Socket x SR Fipt - Stainless Steel Collar

NSF® Certified Lead-Free

4235-007SR	**3/4**	25	300	076

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® CPVC Fire Sprinkler Piping Products

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
Female Adapter - Special Reinforced Plastic Thread Style (continued)				
Socket x SR Fipt - Stainless Steel Collar				
4235-010SR	**1**	25	200	076
4235-012SR	**1-1/4**	10	60	076

Transition Male Adapter with Brass Thread

Mipt x Socket

NSF® Certified Lead-Free

4236-007	**3/4**	40	160	076
4236-010	**1**	10	60	076
4236-012	**1-1/4**	10	40	076
4236-015	**1-1/2**	10	40	076
4236-020	**2**	8	32	076

TorqueSafe™ Female Spigot Sprinkler Head Adapters - Gasket Sealed Brass Thread Insert Style

Spigot x Gasket Fipt With Elastomer Seal - Use NO Thread Sealant

4238-101 G	**3/4X1/2**	50	200	076
4238-130 G	**1X1/2**	50	0	076

FIPT With Elastomer Seal - Use NO Thread Sealant.
Not intended to convey or dispense water for human consumption through drinking or cooking

SofTorque™ Reducer Bushing - Gasket Sealed Plastic Thread Style

Spigot x Fipt - With Elastomer Seal - Use NO Thread Sealant

4238-130GSR	**1X1/2**	50	300	076

TorqueSafe™ Bushing - Gasket Sealed Brass Thread Insert Style

Spigot x Gasket Fipt With Elastomer Seal - Use NO Thread Sealant

4238-130BR G	**1X1/2**	50	200	076

FIPT With Elastomer Seal - Use NO Thread Sealant.
Not intended to convey or dispense water for human consumption through drinking or cooking

Bushing - with Brass Thread Insert

Spigot x Fipt

4238-130BR	**1X1/2**	50	200	076

Not intended to convey or dispense water for human consumption through drinking or cooking

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Spigot Female Sprinkler Head Adapters - Brass Thread Insert Style

Spigot x Fipt

4238-101	**3/4X1/2**	50	200	076
4238-130	**1X1/2**	50	0	076

Not intended to convey or dispense water for human consumption through drinking or cooking

SofTorque™ Spigot Female Adapter - Gasket Sealed Special Reinforced Plastic Thread Style

Spigot x SR Fipt - Stainless Steel Collar With Elastomer Seal - Use NO Thread Sealant

NSF® Certified Lead Free

4278-101GSR	**3/4X1/2**	50	0	076
4278-130GSR	**1X1/2**	50	0	076

Spigot Female Adapter - Brass Thread Insert Style

Spigot x Fipt

4278-007	**3/4**	25	150	076
4278-010	**1**	15	90	076

Not intended to convey or dispense water for human consumption through drinking or cooking

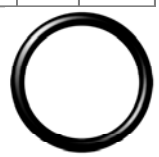
Spigot Female Adapter - Special Reinforced Plastic Thread Style

Spigot x SR Fipt - Stainless Steel Collar

NSF® Certified Lead-Free

4278-007SR	**3/4**	25	300	076
4278-010SR	**1**	50	0	076

Replacement Gaskets for all TorqueSafe™ Gasket Sealed Head Adapters



Pack of 25 EPDM Gaskets

For Use in 1/2" or 3/4" Gasket Sealed Threads

RGSK-005	**1/2**	1	100	299
RGSK-007	**3/4**	1	100	299

Spigot Female Sprinkler Head Adapters - Special Reinforced Plastic Thread Style

Spigot x SR Fipt - Stainless Steel Collar

NSF® Certified Lead-Free

4238-101SR	**3/4X1/2**	50	400	076
4238-130SR	**1X1/2**	50	0	076

FlameGuard® CPVC Fire Sprinkler Piping Products

Part Number	Size	L - Max	Std Pk	Mstr Ctn	Prod Code

Adjustable Sprinkler Head Adapters - Special Reinforced Plastic Thread Style

Socket x SR Fipt - Stainless Steel Collar
TRAVEL = 1-9/16"

NSF® Certified Lead-Free

42001SR	**3/4X1/2**	8-1/4	12	0	076
42011SR	**1X1/2**	8-3/8	12	0	076

L-Max = Maximum Adjustable Length

Adjustable Sprinkler Head Adapters - Special Reinforced Plastic Thread Style

Spigot x SR Fipt - Stainless Steel Collar
TRAVEL = 1-5/8"

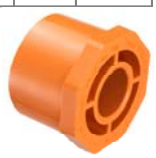
NSF® Certified Lead-Free

42004SR	**3/4X1/2**	8-1/4	12	0	076
42014SR	**1X1/2**	8-1/4	12	0	076

L-Max = Maximum Adjustable Length

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Reducer Bushing - Flush Style



Spigot x Socket

4237-131	**1X3/4**	50	700	070
4237-167	**1-1/4X3/4**	25	200	070
4237-168	**1-1/4X1**	25	350	070
4237-210	**1-1/2X3/4**	25	125	070
4237-211	**1-1/2X1**	25	150	070
4237-212	**1-1/2X1-1/4**	25	300	070
4237-248	**2X3/4**	10	150	070
4237-249	**2X1**	10	160	070
4237-250	**2X1-1/4**	10	160	070
4237-251	**2X1-1/2**	10	160	070
4237-290	**2-1/2X1-1/4**	10	40	070
4237-291	**2-1/2X1-1/2**	10	40	070
4237-292	**2-1/2X2**	15	0	070
4237-338	**3X2**	10	0	070
4237-339	**3X2-1/2**	10	0	070

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Transition Bushing

IPS Spigot x CTS Socket

4240-101	**3/4X1/2**	50	300	070
4240-130	**1X1/2**	50	300	070

Cap

Socket

4247-007	**3/4**	25	400	070
4247-010	**1**	25	450	070
4247-012	**1-1/4**	10	60	070
4247-015	**1-1/2**	10	160	070
4247-020	**2**	10	60	070
4247-025	**2-1/2**	5	40	070
4247-030	**3**	5	0	070

GripLoc™ Cap

WARNING: DO NOT INSERT FINGERS
EPDM Gasket

Uses No Solvent Cement - NSF® Certified Lead Free
175 psi (1.21 Mpa) @ 150° F (66°C)

GL4247-007	**3/4**	1	25	134
GL4247-010	**1**	1	50	134

Test Plug - O-ring Sealed

Mipt – For Pressure Testing Only. NOT for use with TorqueSafe™ or Z4235 Series Adapters

FTP-005	**1/2**	50	400	079

DO NOT use with Tape or Paste thread sealants

Test Plug Replacement O-ring

Buna-N, For O-ring Sealed Test Plug Only

Pack of 100

BPB-116	**116**	1	10	891

For Use With FTP-005 Test Plug

Test Plug for TorqueSafe™ & SofTorque™ Gasket Sealed Head Adapters

Mipt – For Pressure Testing Only. Use ONLY with Gasket Sealed Adapters

FTP-005GS	**1/2**	50	400	079

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® CPVC Fire Sprinkler Piping Products

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Test Plug - White PVC

Mipt - For Pressure Testing Only

4250-005	**1/2**	50	400	070
Requires use of a thread sealant				

Flange - One Piece

Socket - 4 Bolt Holes - 175 psi (1.21 Mpa) @ 150° F (66°C)

4251-007	**3/4**	25	0	070
4251-010	**1**	15	0	070
4251-012	**1-1/4**	15	0	070
4251-015	**1-1/2**	15	0	070
4251-020	**2**	10	0	070
4251-025	**2-1/2**	10	0	070

Blind Flange

4 Bolt Holes - 175 psi (1.21 Mpa) @ 150° F (66°C)

4253-007	**3/4**	25	0	070
4253-010	**1**	15	0	070
4253-012	**1-1/4**	15	0	070
4253-015	**1-1/2**	15	0	070
4253-020	**2**	10	0	070
4253-025	**2-1/2**	10	0	070
4253-030	**3**	10	0	070

Flange - Van Stone Style

Socket - 4 Bolt Holes - 175 psi (1.21 Mpa) @ 150° F (66°C)

4254-030	**3**	10	0	070

Flange - Van Stone Style

Spigot - 4 Bolt Holes - 175 psi (1.21 Mpa) @ 150° F (66°C)

4256-007	**3/4**	25	0	070
4256-010	**1**	15	0	070
4256-012	**1-1/4**	15	0	070
4256-015	**1-1/2**	15	0	070
4256-020	**2**	10	0	070
4256-025	**2-1/2**	10	0	070
4256-030	**3**	10	0	070

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Union

Socket x Socket

175 psi (1.21 Mpa) @ 150° F (66°C)

4257-007	**3/4**	10	80	070
4257-010	**1**	10	40	070
4257-012	**1-1/4**	5	20	070
4257-015	**1-1/2**	5	0	070
4257-020	**2**	5	0	070

Transition Union - Metal Thread Insert Style

Socket x Fipt

175 psi (1.21 Mpa) @ 150° F (66°C)

4259-010BR	**1**	10	0	076
4259-012BR	**1-1/4**	5	20	076
4259-015BR	**1-1/2**	5	0	076
4259-020BR	**2**	5	0	076
Not intended to convey or dispense water for human consumption through drinking or cooking				

Part Number	Size	Travel - T	Std Pk	Mstr Ctn	Prod Code

Short Repair Couplings

Spigot x Socket

175 psi (1.21 Mpa) @ 150° F (66°C)

SH118-07CO	**3/4**	2	30	0	025
SH118-10CO	**1**	2-1/8	35	0	025
Unit Must Be Thrust Blocked **T = Repair Coupling Travel**					

GripLoc™ Repair Coupling

WARNING: DO NOT INSERT FINGERS
EPDM Gasket

Uses No Solvent Cement - NSF® Certified Lead Free
175 psi (1.21 Mpa) @ 150° F (66°C)

SG118-07CO	**3/4**	2-15/16	1	25	134
SG118-10CO	**1**	2-15/16	1	25	134

FlameGuard® CPVC Fire Sprinkler Piping Products

Part Number	Size	Travel - T	Std Pk	Mstr Ctn	Prod Code

GripLoc™ Repair Coupling (continued)

WARNING: DO NOT INSERT FINGERS
EPDM Gasket
Unit Must Be Thrust Blocked
T = Repair Coupling Travel

FlameGuard® CPVC Drain & Check Valves For NFPA 13D Applications Only

Application: FlameGuard® CPVC Orange Check Valves and PVC/CPVC True Union Drain Valves are for use in configuring CPVC Fire Sprinkler System connection to water supply (riser/drain assembly) in NFPA 13D installations only. These valves are not UL Listed and NOT for use in any other locations within the fire sprinkler system.

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

True Union Industrial Drain Valve With Locking Handle

Socket x Socket

CPVC Gray Valve with CPVC Orange End Connector

1822-007CFG	**3/4**	1	18	004
1822-010CFG	**1**	1	12	004
1822-012CFG	**1-1/4**	1	8	004
1822-015CFG	**1-1/2**	1	8	004
1822-020CFG	**2**	1	4	004
Not UL Listed				

True Union Standard Drain Valves

Socket x Socket

PVC Gray Valve with CPVC Orange End Connector

3622-007FG	**3/4**	1	18	608
3622-010FG	**1**	1	12	608
Not UL Listed				

Compact 2000 Drain Valve

Socket x Socket

6622-007CO	**3/4**	10	80	004
6622-010CO	**1**	10	0	004
Not UL Listed				

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

CPVC Swing Check Valves

Socket x Socket

S1520-10CO	**1**	20	0	004
S1520-12CO	**1-1/4**	12	0	004
S1520-15CO	**1-1/2**	12	0	004
Not UL Listed				

CPVC Special Reinforced Thread Inlet Swing Check Valves

SR Fipt x Socket

S1520-10FSRSCO	**1**	20	0	004
S1520-12FSRSCO	**1-1/4**	12	0	004
S1520-15FSRSCO	**1-1/2**	12	0	004
Not UL Listed				

General Installation Information: Socket end connections should be installed using Spears® FS-5 One-Step Cement for use with Spears® CPVC Fire Sprinkler Products. Threaded connections should be made using Spears® **BLUE 75™** Thread Sealant tested for compatibility with CPVC materials. PVC True Union Drain Valves are to be installed with system connection to Valve CPVC End Connector. Swing check valves are designed for horizontal installations, but may be installed in up-flow only vertical position. Check valves MUST be installed with the valve's FLOW arrow pointing in the direction of the flow. Do not install valve upside down.

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® CPVC Fire Sprinkler Piping Products

Blue 75™ Thread Sealant

Part Number	Size	Std Pk	Mstr Ctn	Prod Code
SB75-005	1/4 Pint	24	0	895
SB75-010	1/2 Pint	24	0	895
SB75-020	Pint	12	0	895
SB75-030	Quart	12	0	895

FS-5 One-Step Cement

FS5-020	Pint	12	0	703
FS5-030	Quart	12	0	703

Empty Cans

With Cap/Lid - order Daubers separately

MT-654	Pint	12	0	710
MT-651	Quart	12	0	710
MT-653	Quart	12	0	710

[1] 1-3/4 Screw Neck
[2] TT Paint Type

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Brush

For Pint and Quart Cans

KD-110	4-1/2" Length	25	0	710
KD-112	5-1/2" length	25	0	710

1" Brush w/1-3/4" Screw Cap, for pipe size 3/4" - 2"

Roller - Small Cap

Fits 1-3/4" Neck Quart Cans (MT-651). Replaceable cover. For pipe size 3" to 6".

6020	4" length	24	0	710

Roller Replacement Covers

Fits Rollers with Heavy Handles #5520, #6020 & #6520. Sold as Pack of 2, full pack only.

5520-1	Fits 5520 & 6020 Roller	1	75	710

Cap Dauber

DP-75	3/4" for Pint	50	0	710
DP-125	1-1/4" for Pint	50	0	710
DQ-125	1-1/4" for Quart	50	0	710

* 3/4" Diameter fits Pint Cans, for pipe size 3/4"
** 1-1/2" Diameter fits Pint Cans, for pipe size 1-1/2"
***1-1/2" Diameter fits Quart Cans, for pipe size 1-1/2"

Can-Mate Dauber

Adjustable Plastic Applicator with Telescoping Stem for use with Standard Pint and Quart Cans.

CM-75	3/4"	50	0	710
CM-150	1-1/4"	50	0	710

3/4" Diameter fits Pint or Quart Cans, for pipe sizes 3/4" - 1-1/4"
1-1/4" Diameter fits Pint or Quart Cans, for pipe sizes 1-1/2" - 3"

FlameGuard® CPVC Fire Sprinkler Piping Products

Part Number	Size	Std Pk	Mstr Ctn	Prod Code

Deburring Tool

Cone Type for pipe 1/2" - 2"

DEB-2	**1/2" to 2" Pipe**	1	6	710

Spears® Sprinkler Head Adapter Removal Kit

Occasionally a Sprinkler Head Adapter may need to be removed for relocation, extension or repair. Kit includes Cutter, Deburring Tool and Wrench. Cutter provides easy cutting of pipe from the inside (using a power drill) to remove adapters without disturbing ceiling or side wall. Deburring Tool allows removal of burrs in cut pipe. Wrench is designed to hold Spears® TorqueSafe™ Head Adapter brass insert from rotating to aid in sprinkler head removal from adapter, if required.

Complete Kit

Inside Pipe Cutter, Deburring Tool and Wrench

SHRK-005	**3/4" & 1" Pipe**	1	15	299

Inside Pipe Cutter Only

GSC-005	**3/4" & 1" Pipe**	80	0	299

Deburring Tool Only

GSB-005	**3/4" & 1" Pipe**	25	0	299

Wrench Only

GSW-005	**For 1/2**	1	50	299

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® CPVC Fire Sprinkler Products Technical Information

ENGINEERING GUIDE

Contact Spears® for any information not found.

FlameGuard® CPVC Fire Sprinkler Products Technical Information

ENGINEERING GUIDE

Contact Spears® for any information not found.

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Complete System of Pipe, Fittings & Solvent Cement
Corrosion Resistant • Superior Flow • Ease of Installation

SPEARS® FlameGuard® CPVC FIRE SPRINKLER PRODUCTS

Spears® **FlameGuard®** CPVC Fire Sprinkler Products provide a cost effective alternative to metal systems with advantages of high corrosion resistance, improved system hydraulics, ease of installation and quick assembly with readily available tools. CPVC Fire Sprinkler Systems are based on proven products that have been in continuous service for over 40 years. Spears® **FlameGuard®** products are approved by UL®, FM® Global, LPCB and Certified by NSF International for potable water use. Check local codes for restrictions and limitations.

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® General Information

The information contained in this section is based on current information and Product design at the time of publication and is subject to change without notification. Our ongoing commitment to product improvement may result in some variation. No representations, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications or results to be obtained therefrom. For verification of technical data or additional information not contained herein, please contact Spears® Technical Services Department [West Coast: (818) 364-1611-East Coast: (678) 985-1263].

General Information

RECOMMENDATIONS FOR INSTALLERS AND USERS:

Plastic piping systems should be **ENGINEERED, INSTALLED** and **OPERATED** in accordance with **ESTABLISHED DESIGN AND ENGINEERING STANDARDS AND PROCEDURES** for plastic piping systems. Suitability for the intended service application should be determined by the installer and/or user prior to installation of a plastic piping system. All installation and maintenance personnel should be trained in the proper handling and installation requirements and precautions of plastic piping systems. **PRIOR TO ASSEMBLY, all piping system components should be inspected for damage or irregularities. Mating components should be checked to assure tolerances and engagements are compatible. Do not use any components that appear irregular or do not fit properly. Contact the appropriate manufacturer of the component product in question to determine usability. Consult all applicable codes and regulations for compliance prior to installation.**

Installation must be made in accordance with Spears® Manufacturing Company
FlameGuard® CPVC Fire Sprinkler Piping Products Installation Instructions - FG-3

NOTE - Individual or group instruction in correct solvent welding procedures is available by contacting your local distributor or your servicing Spears® Regional Distribution Center.

SOLVENT CEMENT CONNECTIONS - Spears® Manufacturing Company recommends the use of Spears® FS-5 One Step solvent cement for joining Spears® products. Use of solvent cementing products not approved for CPVC fire sprinkler systems, or failure to follow installation instructions will automatically void the warranty.

THREADED CONNECTION - Spears® Manufacturing Company recommends the use of Spears® **BLUE 75™** Thread Sealant. This product has been tested by Spears® and the sealant manufacturer for compatibility with the Spears® CPVC fire sprinkler products. Consult the sprinkler head manufacturer before using this product. **WARNING: OTHER PIPE JOINT COMPOUNDS OR PASTES MAY CONTAIN SUBSTANCES THAT COULD CAUSE STRESS CRACKING IN THE CPVC OR OTHER FITTING COMPONENTS.** Care must be taken to avoid over torquing - generally 1 to 2 turns beyond finger tight is all that is required to make up a threaded connection. Factory testing has indicated 10-25 ft. lbs. of torque is adequate to obtain a leak free seal.

Gasket Sealed Thread Connections - This type of connection can only be made with Spears® TorqueSafe™ style Gasket Sealed Female Sprinkler Adapters. DO NOT USE ANY TYPE OF THREAD SEALANT WHEN INSTALLING THIS TYPE OF ADAPTER. Tape or paste may impair proper sealing and function. Testing has shown that hand tight until snug is all that is needed to seal this special connection.

Installation Training Available - Contact Spears® Technical Services for Details

FlameGuard® Products must be installed in accordance with Spears® CPVC Fire Sprinkler Piping Products Installation Instructions, National Fire Protection Association Standards 13, 13R, 13D, and in accordance with local codes. Code requirements and field conditions may differ. It is the responsibility of the installing contractor to ensure that the product is suitable to meet these requirements.

Dimension Reference

G = (LAYING LENGTH) Intersection of center lines to bottom of socket/thread; 90° elbows, tees, crosses; ± 1/32 inch.
H = Intersection of center lines to face of fitting; 90° elbows tees, crosses; ±1/32 inch.
J = Intersection of center lines to bottom of socket/thread; 45° elbows; ±1/32 inch
L = Overall length of fittings; ± 1/16 inch.
M = Outside diameter of socket/thread hub; ± 1/16 inch.
N = Socket bottom to socket bottom; couplings; ± 1/16 inch.
Q = Width of flats; ±1/16 inch.
W = Height of cap; ± 1/16 inch.

CPVC FIRE SPRINKLER PIPE SDR 13.5 (ASTM F 442)

Part Number	Nominal Size		Average O.D.		Average I.D.		Approx. Weight Lbs./Ft.
	Inches	(mm)	Inches	(mm)	Inches	(mm)	
CP-007	3/4	(19.1)	1.050	(26.7)	.874	(22.5)	0.168
CP-010	1	(25.4)	1.315	(33.4)	1.101	(28.2)	0.262
CP-012	1-1/4	(31.8)	1.660	(42.2)	1.394	(35.6)	0.418
CP-015	1-1/2	(38.1)	1.900	(48.3)	1.598	(40.7)	0.548
CP-020	2	(50.8)	2.375	(60.3)	2.003	(50.9)	0.859
CP-025	2-1/2	(63.5)	2.875	(73.0)	2.423	(61.5)	1.257
CP-030	3	(76.2)	3.500	(88.9)	2.950	(75.0)	1.867

"Lead Free" low lead certification - unless otherwise specified, all Spears® FlameGuard® fittings specified here-in are certified by NSF International to ANSI/NSF® Standard 61, Annex G and is in compliance with California's Health & Safety Code Section 116825 (commonly known as AB1953) and Vermont Act 193. Weighted average lead content <=0.25%. Spears® PVC and CPVC Pipe, Fittings and Valves have always been lead-free and Certified by NSF International for use in potable water systems. Spears® offers a wide range of lead-free specialty fittings and transition adapters for plumbing applications. However, certain brass threaded adapter fittings for applications that are not intended to convey water for human consumption through drinking or cooking are still produced and available.

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Spears® PVC and CPVC Materials

PVC: Polyvinyl Chlorides (PVC) is one of the most widely used plastic piping materials. PVC is environmentally sound, provides long service life, is light weight and easy to install, has superior corrosion resistance, is cost effective, and widely accepted by codes. PVC pipe is manufactured by extrusion and PVC fittings are manufactured by injection molding or fabrication. PVC is an amorphous thermoplastic material with physical properties that make it suitable for a wide variety of pressure and non-pressure applications and can be compounded for optimum performance. PVC pipe and fittings are used for drain-waste-vent (DWV), sewers, water mains, water service lines, irrigation, conduit, and various industrial installations.

Spears® high quality PVC compounds give optimum chemical and corrosion resistance with a full range of pressure handling capabilities. Spears® PVC materials are certified by NSF International to applicable standards, including NSF® Standard 61 for use in potable water service, certified lead-free, and to ASTM STD D1784, Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds that specifies Cell Classification for minimum physical property requirements. These include resin type, impact strength, tensile strength, modulus of elasticity in tension, heat deflection temperature and flammability. Spears® minimum PVC Cell Classification is 12454 for rigid (unplasticized) PVC.

The ASTM Type and Grade is PVC Type I, Grade I and the typical long and short term strength designation of material for pressure piping is PVC 1120.

See Industry Standards and Test Methods, Physical Properties and Chemical Resistance sections for additional information.

Spears® PVC Pipe & Systems Product Lines

EverTUFF® Industrial Schedule 80 Pressure Pipe & Fittings
EverCLEAR™ PVC Schedule 40 & Schedule 80 Pipe & Fittings
Spears® Low Extractable Ultra Pure Water Piping & Fittings
Spears® PVC Duct & Fittings
Spears® PVC Double Containment Pipe & Fittings
Spears® Supplemental PVC Fittings, Valves & Accessories

CPVC: Chlorinated polyvinyl chloride (CPVC) is created by post chlorination of the PVC polymer. This produces up to a 60°F higher heat handling capability than PVC and greater fire resistance, plus a broad range of chemical resistance. CPVC is excellent for use in process piping, hot and cold water service, corrosive waste drainage and other elevated temperature applications. CPVC provides relatively low cost compared to alternative materials for similar use. CPVC pipe is manufactured by extrusion and CPVC fittings are manufactured by injection molding or fabrication. Spears® produces a variety of CPVC pipe, fittings, valves, system accessories and specialty systems.

Spears® high quality CPVC compounds give optimum chemical and corrosion resistance with a full range of pressure handling capabilities. Spears® CPVC materials are certified by NSF International to applicable standards, including NSF® Standard 61 for use in potable water service, certified lead-free, and to ASTM STD D1784, Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds that specifies Cell Classification for minimum physical property requirements. These include resin type, impact strength, tensile strength, modulus of elasticity in tension, heat deflection temperature and flammability. Spears® minimum CPVC Cell Classification is 23447 for rigid (unplasticized) CPVC.

The ASTM Type and Grade is CPVC Type IV, Grade I and the typical long and short term strength designation of material for pressure piping is CPVC 4120.

See Industry Standards and Test Methods, Physical Properties and Chemical Resistance sections for additional information.

Spears® CPVC Pipe & Systems Product Lines

EverTUFF® Industrial Schedule 40 & Schedule 80 CPVC Pressure Pipe & Fittings
EverTUFF® CTS CPVC Hot and Cold Water Plumbing Distribution Pipe & Fittings
LabWaste® CPVC Corrosive Waste Drainage System Pipe & Fittings
FlameGuard® CPVC Fire Sprinkler Products Pipe & Fittings
Spears® CPVC Duct & Fittings
Spears® CPVC Double Containment Pipe & Fittings
Spears® Supplemental CPVC Fittings, Valves & Accessories

"Lead Free" low lead certification - unless otherwise specified, all Spears® Plastic Piping specified here-in are certified by NSF International to ANSI/NSF® Standard 61, Annex G and is in compliance with California's Health & Safety Code Section 116825 (commonly known as AB1953) and Vermont Act 193. Weighted average lead content <=0.25%.

Temperature Limitations: PVC & CPVC

The maximum operating temperature for PVC pipe is 140°F and the maximum operating temperature for CPVC pipe is 200°F. As temperatures increase, impact strength typically increases while tensile strength and pipe stiffness decrease resulting in reduced applicable pressure ratings. Physical properties of PVC and CPVC pipe are generally specified at 73°F per applicable ASTM material test standards. The maximum allowable pressure at elevated temperatures is determined by multiplying the 73°F pressure rating by the applicable material de-rating factor for the elevated use temperature shown in the following chart:

De-Rating Factors

PVC Pipe		CPVC Pipe	
Temp (°F)	Working De-Rating Factor	Temp (°F)	Working De-Rating Factor
73	1.00	73-80	1.00
80	0.88	90	0.91
90	0.75	100	0.82
100	0.62	110	0.72
110	0.51	120	0.65
120	0.40	130	0.57
130	0.31	140	0.50
140	0.22	150	0.42
---	---	160	0.40
---	---	170	0.29
---	---	180	0.25
---	---	200	0.20

Appropriate temperature de-rating factors must be applied at temperatures other than 73°F based on the material selected.

Multiply the collapse pressure rating of the selected pipe at 73°F, by the appropriate de-rating factor to determine the collapse pressure rating of the pipe at the elevated temperature chosen.

FLOW VELOCITY & FRICTION LOSS

Friction Loss Through Pipe

The Hazen-Williams equation below is widely used to calculate friction loss for water through PVC and CPVC pipe

$$f = .2083 \times \left(\frac{100}{C}\right)^{1.852} \times \frac{G^{1.852}}{di^{4.8655}}$$

Where: f = friction head of feet of water per 100' for the specific pipe size and I.D.
C = a constant for internal pip roughness. 150 is the commonly accepted value for PVC and CPVC pipe.
G = flow rate of gallons per minute (U.S gallons).
di = inside diameter of pipe in inches.

Allowance for Friction Loss in Fittings

Equivalent Feet (meters) of Pipe

	3/4" 26.7 mm	1" 33.7 mmPart No.	1-1/4" 42.4 mm	1-1/2" 48.3 mm	2" 60.3 mm	2-1/2" 73.0 mm	3" 88.9 mm
Tee Run	1 (0,3)	1 (0,3)	1 (0,3)	1 (0,3)	1 (0,3)	2 (0,6)	2 (0,6)
Tee Branch	3 (0,9)	5 (1,5)	6 (1,8)	8 (2,4)	10 (3,1)	12 (3,7)	15 (4,6)
90° Elbow	4 (1,2)	5 (1,5)	6 (1,8)	7 (2,1)	9 (2,7)	12 (3,7)	13 (4,0)
45° Elbow	1 (0,3)	1 (0,3)	2 (0,6)	2 (0,6)	2 (0,6)	3 (0,9)	4 (1,2)
Coupling	1 (0,3)	1 (0,3)	1 (0,3)	1 (0,3)	1 (0,3)	2 (0,6)	2 (0,6)

Water Velocities

Velocities for water in feet per second at different GPM's and pipe inside diameters can be calculated as follows:

$$V = .3208 \frac{G}{A}$$

Where:
V = velocity in feet per second
G = gallons per minute
A = inside cross sectional area in square inches

CAUTION: Flow velocities in excess of 5.0 feet per second are not recommended for closed-end systems. Contact Spears® Technical Services for additional information.

Hangers & Supports

Since CPVC Fire Sprinkler pipe is rigid, it requires fewer supports than flexible, plastic systems. Spears® recommends use of hangers that are designed and listed for supporting the CPVC Fire Sprinkler pipe. However, some hangers designed for steel pipe may be used if their suitability is clearly established. These hangers must have a minimum 1/2-inch, load-bearing surface, and they must be selected to accommodate the specifi pipe size. In addition, they cannot contain rough or sharp edges that contact the pipe, and they must not bind the pipe from axial movement. Vertical runs must be supported so that the weight of the run is not on a fitting or a joint.

Horizontal runs must be braced so that the stress loads (caused by bending or snaking pipe) will not be placed on a fitting or a joint. Support spacing is shown in the following table. See "Snaking/Deflection of Pipe" in this manual for information regarding bending or snaking CPVC Fire Sprinkler Pipe.

Pipe Size Nominal Inches	Maximum Support Spacing feet (meters)	Wt. Water Filled Pipe lbs/ft (kg/m)
3/4 (DN20)	5-1/2 (1,7)	0.427 (0,635)
1 (DN25)	6 (1,8)	0.674 (1,003)
1-1/4 (DN32)	6-1/2 (2,0)	0.674 (1,078)
1-1/2 (DN40)	7 (2,1)	1.412 (2,101)
2 (DN50)	8 (2,4)	2.223 (3,308)
2-1/2 (DN65)	9 (2,7)	3.254 (4,842)
3 (DN80)	10 (3,0)	4.831 (7,189)

FLOW VELOCITY & FRICTION LOSS

SDR 13.5

Flow Rate (Gallons/ Minute)	cubic ft/sec	1/2" Velocity (ft/s)	1/2" Friction Head Loss (ft water/ 100ft)	1/2" Friction Pressure (psi/ 100ft)	3/4" Velocity (ft/s)	3/4" Friction Head Loss (ft water/ 100ft)	3/4" Friction Pressure (psi/ 100ft)	1" Velocity (ft/s)	1" Friction Head Loss (ft water/ 100ft)	1" Friction Pressure (psi/ 100ft)	1-1/4" Velocity (ft/s)	1-1/4" Friction Head Loss (ft water/ 100ft)	1-1/4" Friction Pressure (psi/ 100ft)	1-1/2" Velocity (ft/s)	1-1/2" Friction Head Loss (ft water/ 100ft)	1-1/2" Friction Pressure (psi/ 100ft)	2" Velocity (ft/s)	2" Friction Head Loss (ft water/ 100ft)	2" Friction Pressure (psi/ 100ft)	2-1/2" Velocity (ft/s)	2-1/2" Friction Head Loss (ft water/ 100ft)	2-1/2" Friction Pressure (psi/ 100ft)	3" Velocity (ft/s)	3" Friction Head Loss (ft water/ 100ft)	3" Friction Pressure (psi/ 100ft)	Flow Rate (Gallons/ Minute)
GPM		1/2"			3/4"			1"			1-1/4"			1-1/2"			2"			2-1/2"			3"			GPM
1	0.002	0.85	1.03	0.45	0.54	0.34	0.15																			1
2	0.004	1.69	2.05	0.89	1.07	0.68	0.29	0.68	0.40	0.17	0.42	0.13	0.06	0.32	0.065	0.028	0.20	0.03	0.013							2
5	0.011	4.22	11.58	5.01	2.68	3.82	1.65	1.69	1.24	0.54	1.05	0.39	0.17	0.80	0.20	0.088	0.51	0.075	0.033	0.35	0.038	0.016	0.24	0.02	0.009	5
7	0.016	5.91	21.24	9.20	3.75	7.01	3.03	2.36	2.28	0.99	1.47	0.72	0.31	1.12	0.37	0.16	0.72	0.125	0.054	0.49	0.53	0.023	0.33	0.03	0.012	7
10	0.022	8.44	40.46	17.52	5.35	13.34	5.78	3.37	4.33	1.87	2.10	1.37	0.59	1.60	0.71	0.31	1.02	0.24	0.10	0.70	0.09	0.039	0.47	0.04	0.017	10
15	0.033	4"			8.03	28.27	12.24	5.06	9.18	3.97	3.15	2.91	1.26	2.40	1.50	0.65	1.53	0.50	0.22	1.04	0.20	0.087	0.70	0.08	0.035	15
20	0.045	0.57	0.04	0.017	10.70	48.17	20.86	6.74	15.64	6.77	4.21	4.96	2.91	3.20	2.55	1.10	2.04	0.85	0.37	1.39	0.34	0.15	0.94	0.13	0.056	20
25	0.056	0.71	0.06	0.026	5"			8.43	23.65	10.24	5.26	7.49	3.24	4.00	3.85	1.67	2.55	1.29	0.56	1.74	0.51	0.22	1.17	0.19	082	25
30	0.067	0.85	0.08	0.035	0.56	0.03	0.013	10.11	33.15	14.35	6.31	10.50	4.55	4.80	5.40	2.34	3.05	1.80	0.78	2.09	0.71	0.31	1.41	0.27	0.12	30
35	0.078	0.99	0.11	0.048	0.65	0.04	0.017				7.36	13.97	6.05	5.60	7.19	3.11	3.57	2.40	1.04	2.44	0.95	0.41	1.64	0.36	0.16	35
40	0.089	1.14	0.14	0.060	0.74	0.05	0.022				8.41	17.90	7.75	6.40	9.20	3.98	4.08	3.07	1.33	2.78	1.21	0.52	1.88	0.46	0.20	40
45	0.100	1.28	0.17	0.074	0.84	0.06	0.026	6"			9.46	22.26	9.64	7.20	11.44	4.95	4.59	3.82	1.65	3.13	1.51	0.65	2.11	0.58	0.25	45
50	0.111	1.42	0.21	0.091	0.93	0.07	0.030	0.66	0.03	0.013	10.52	27.05	11.71	8.00	13.91	6.02	5.10	4.64	2.01	3.48	1.83	0.79	2.35	0.70	0.30	50
60	0.134	1.70	0.29	0.13	1.12	0.10	0.043	0.79	0.04	0.017				9.60	19.50	8.44	6.12	6.50	2.81	4.18	2.57	1.11	2.82	0.98	0.42	60
70	0.156	1.99	0.38	0.16	1.30	0.14	0.061	0.92	0.06	0.026							7.14	8.65	3.75	4.87	3.42	1.48	3.29	1.31	0.57	70
75	0.167	2.13	0.44	0.19	1.40	0.16	0.069	0.98	0.07	0.030							7.65	9.83	4.26	5.22	3.88	1.68	3.52	1.49	0.65	75
80	0.178	2.27	0.49	0.21	1.49	0.18	0.078	1.05	0.08	0.035							8.16	11.08	4.80	5.57	4.37	1.89	3.76	1.68	0.73	80
90	0.201	2.56	0.61	0.26	1.67	0.22	0.095	1.18	0.09	0.039							9.18	13.78	5.97	6.27	5.44	2.36	4.23	2.09	0.90	90
100	0.223	2.84	0.74	0.32	1.86	0.27	0.12	1.31	0.11	0.048							10.20	16.75	7.25	6.96	6.61	2.86	4.70	2.54	1.10	100
125	0.279	3.55	1.13	0.49	2.33	0.40	0.18	1.64	0.17	0.074										8.70	10.01	4.33	5.88	3.84	1.66	125
150	0.334	4.26	1.58	0.68	2.79	0.56	0.24	1.97	0.24	0.10										10.44	14.01	6.07	7.04	5.37	2.33	150
175	0.390	4.97	2.10	0.91	3.26	0.75	0.33	2.30	0.32	0.14													8.22	7.15	3.10	175
200	0.446	5.68	2.69	1.16	3.72	0.96	0.42	2.62	0.41	0.18													9.39	9.15	3.96	200
250	0.557	7.10	4.07	1.76	4.66	1.46	0.63	3.28	0.62	0.27													11.74	13.86	6.00	250
300	0.668	8.52	5.69	2.46	5.58	2.03	0.88	3.93	0.87	0.38																300
350	0.780	9.94	7.58	3.29	6.52	2.70	1.17	4.59	1.16	0.50																350
400	0.891	11.36	9.70	4.20	7.44	3.46	1.50	5.24	1.48	0.64																400
450	1.003				8.37	4.31	1.87	5.90	1.84	0.80																450
500	1.114				9.30	5.24	2.27	6.56	2.23	0.97																500
750								9.83	4.73	2.05																750
1000	2.228							13.11	8.06	3.49																1000

NOTE: Spears® recommends that Flow Velocities be maintained at or below 5 feet per second in large diameter piping systems (i.e. 6" diameter and larger) to minimize the potential for hydraulic shock. Refer to Spears® engineering section entitled "Hydraulic Shock" for additional information. Friction loss data based on utilizing mean wall dimensions to determine average ID; actual ID may vary.

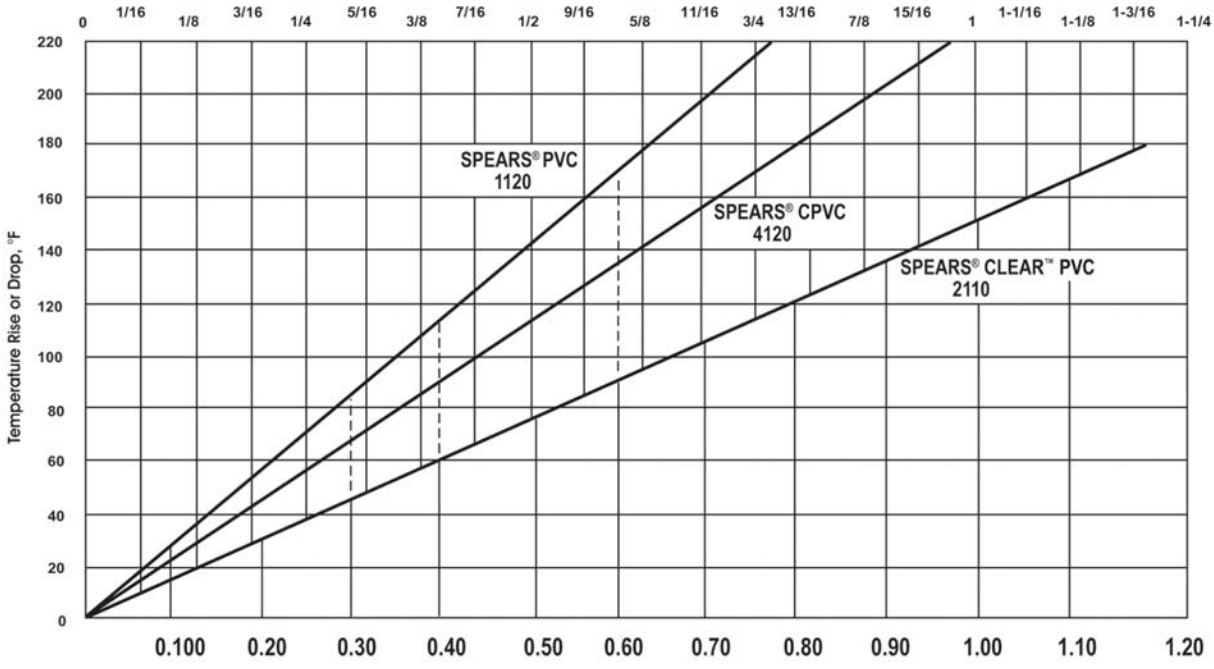
Thermal Expansion & Contraction

Piping systems expand and contract with changes in temperature. Thermoplastic piping expands and contracts more than metallic piping when subjected to temperature changes - as much as ten times that of steel. The effects of thermal expansion and contraction must be considered during the design phase, particularly for systems involving long runs, hot water lines, hot drain lines, and piping systems exposed to environmental temperature extremes. Installation versus working temperature or summer to winter extremes must be considered and addressed with appropriate system design to prevent damage to the piping system.

The degree of movement (change in length) generated as the result of temperature changes, must be calculated based on the type of piping material and the anticipated temperature changes of the system. The rate of expansion does not vary with pipe size. This movement must then be compensated for by the construction of appropriate sized expansion loops, offsets, bends or the installation of expansion joints. This absorbs the stresses generated, minimizing damage to the piping.

The following chart depicts the amount of linear movement (change in length, inches) experienced in a 10 foot length of pipe when exposed to various temperature changes.

Highly important is the change in length of plastic pipe with temperature variation. This fact should always be considered when installing pipe lines and allowances made accordingly.



Change in Length (inches) of a 10' Length of Pipe

The data furnished herein is based on information furnished by manufacturers of the raw material. This information may be considered as a basis for recommendation, but not as a guarantee. Materials should be tested under actual service to determine suitability for a particular purpose.

Calculating Linear Movement Caused by Thermal Expansion

The change in length caused by thermal expansion or contraction can be calculated as follows:

$\Delta L = 12\ y\ l\ (\Delta T)$

Where

ΔL = Expansion or contraction in inches
y = Coefficient of linear expansion of piping material selected
l = Length of piping run in feet
ΔT = (T1 - T2) temperature change °F

Where:

T1 = Maximum system temperature and
T2 = System temperature at installation or minimum system temperature

Coefficient of Linear Expansion (y) of Various Spears® Piping Products (in/in/°F) per ASTM D 696

Pipe Material	y
PVC Pressure Pipe (all schedules & SDR's) and PVC Duct	2.9×10^{-5}
CPVC Schedule 40 & Schedule 80 Pressure Pipe	3.2×10^{-5}
CPVC Duct	3.2×10^{-5}
CTS CPVC Plumbing Pipe	3.2×10^{-5}
Clear PVC Schedule 40 & Schedule 80 Pipe	4.1×10^{-5}
Spears® Low Extractable UPW Pipe	3.9×10^{-5}

Example 1: Calculate the change in length for a 100 foot straight run of 2" Schedule 80 PVC pipe operating at a temperature of 73°F; installed at 32°F.

$\Delta L = 12\ y\ l\ (\Delta T)$

Where:

ΔL = linear expansion or contraction in inches

$y = 2.9 \times 10^{-5}$ in/in/°F

l = 100ft

ΔT = 41°F (73°F - 32°F)

ΔL = 12 in/ft x 0.000029 in/in/°F x 100 ft x 41°F

ΔL = 1.43"

In this example the piping would expand approximately 1-1/2" in length over a 100 foot straight run once the operating temperature of 73°F was obtained.

Example 2: 100 foot straight run of 2" Schedule 80 CPVC pipe operating temperature 180°F; installed at 80°F

$\Delta L = 12\ y\ l\ (\Delta T)$

Where:

ΔL = Linear expansion or contraction in inches

$y = 3.2 \times 10^{-5}$ in/in/°F

l = 100 ft

ΔT = 100°F (180°F - 80°F)

ΔL = 12 in/ft x 0.000032 in/in/°F x 100ft x 100°F

ΔL = 3.84"

In this example the piping would expand approximately 4" in length over a 100 foot straight run once the operating temperature of 180°F was obtained.

Compensating for Movement Caused by Thermal Expansion/Contraction

Thermal expansion/ contraction are usually absorbed by the system at changes of direction. Long, straight runs are more susceptible to measurable movement with changes in temperature and the installation of expansion joints, expansion loops or offsets is required. This will allow the system to absorb expansion/contraction forces without damage.

Once the change in length (ΔL) has been determined, the length of an offset, expansion loop, or bend can be calculated as follows:

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

Where:

ℓ = Length of expansion loop in inches

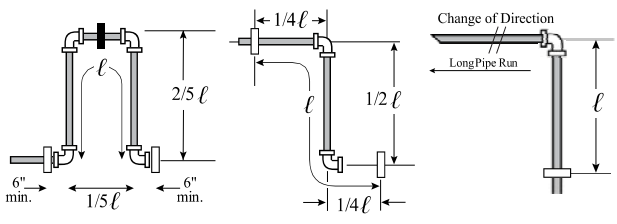
E = Modulus of elasticity

D = Average outside diameter of pipe

ΔL = Change in length of pipe due to temperature change

S = Working stress at max. temperature

LOOP **Offset** **Bend**



Hangers or guides should only be placed in the loop, offset, or change of direction as indicated above, and must not compress or restrict the pipe from axial movement. Piping supports should restrict lateral movement and should direct axial movement into the expansion loop configuration. Do not restrain "change in direction" configurations by butting up against joists, studs, walls or other structures. Use only solvent-cemented connections on straight pipe lengths in combination with 90° elbows to construct the expansion loop, offset or bend. The use of threaded components to construct the loop configuration is not recommended. Expansion loops, offsets, and bends should be installed as nearly as possible at the midpoint between anchors. Concentrated loads such as valves should not be installed in the developed length. Calculated support guide spacing distances for offsets and bends must not exceed recommended hanger support pacing for the maximum anticipated temperature. If that occurs, the distance between anchors will have to be reduced until the support guide spacing distance is equal to or less than the maximum recommended support spacing distance for the appropriate pipe size at the temperature used.

Example: 2" Schedule 80 CPVC pipe operating temperature 180°F; installed at 80°F where ΔL = 3.84"

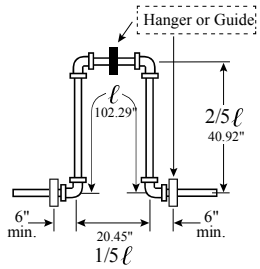
$$\ell = \sqrt{\frac{3ED\,(\Delta L)}{2S}}$$

$$\ell = \sqrt{\frac{3 \times 214{,}000 \times 2.375 \times 3.84}{2 \times 500}}$$

ℓ = 76.51"

2/5 ℓ = 30.60"

1/5 ℓ = 15.30"



Thermal Stress

Compressive stress in piping restrained from expanding can damage the piping system and in some cases damage hangers and supports. The amount of stress generated is dependent on the pipe material's coefficient of thermal expansion and its tensile modulus using the following equation:

S = EyΔT

Where

S = Stress induced in the pipe

E = Modulus of Elasticity at maximum system temperature

y = Coefficient of thermal expansion

ΔT = Total temperature change of the system

The stress induced must not exceed the pipe material maximum allowable working stress (fiber stress). Increases in temperature will reduce the allowable stress as shown the table.

Example: 100 foot straight run of 2" Schedule 80 CPVC pipe operating temperature 180°F; installed at 80°F:

ΔL = 12 yl (ΔT) Where:

ΔL = Linear expansion or contraction in inches

y = 3.2 x 10^{-5} in/in/°F

l = 100ft

ΔT = 100°F (180°F - 80°F)

ΔL = 12 in/ft x 0.000032 in/in/°F x 100 foot x 100°F

ΔL = 3.84"

The piping would expand approximately 4" in length in a 100 ft straight run

The equation for determining induced stress can then be used:

S = EyΔT

Where:

S = Stress induced in the pipe

E = Modulus of Elasticity at 180°F = 214,000

y = Coefficient of thermal expansion = 3.2 x 10^{-5} in./in./°F

ΔT = Total temperature change of the system = 100°F

S = 214,000 x .000032 x 100

S = 685 psi

From chart, maximum allowable stress for CPVC at 180°F is 500 psi; Stress generated from this expansion in a restrained piping system exceeds the maximum allowable stress and will result in failure of the piping, unless compensation is made for thermal expansion.

Maximum Allowable Working (Fiber) Stress and Tensile Modulus at Various Temperatures

Temp (°F)		Maximum Allowable Working (Fiber) Stress, psi	Tensile Modulus of Elasticity, psi
PVC	73	2,000	400,000
	80	1,760	396,000
	90	1,500	375,000
	100	1,240	354,000
	110	1,020	333,000
	120	800	312,000
	130	620	291,000
	140	440	270,000
CPVC	73	2,000	364,000
	90	1,820	349,000
	100	1,640	339,000
	110	1,500	328,000
	120	1,300	316,000
	140	1,000	290,000
	160	750	262,000
	180	500	214,000
	200	400	135,000

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Plastic piping systems must be engineered, installed, operated and maintained in accordance with accepted standards and procedures. It is absolutely necessary that all design, installation, operation and maintenance personnel be trained in proper handling, installation requirements and precautions for installation and use of plastic piping systems before starting.

Handling & Storage

Spears® products are packaged and shipped with care to avoid damage. Pipe and fittings should be stored and protected from direct exposure to sunlight. All pipe and accessories should be stored above ground and fully supported so as not to bend or excessively deflect under its own weight. Proper stacking techniques are necessary. Improper stacking can result in instability that may result in pipe damage or personnel injury.

Use care when transporting and storing the product to prevent damage. Piping products should not be dropped or have objects dropped on them. Do not drag pipe over articles or across the ground and do not subject pipe to external loads or over stacking. If extended storage in direct sunlight is expected, pipe should be covered with an opaque material while permitting adequate air circulation above and around the pipe as required to prevent excessive heat accumulation.

Spears® products should not be stored or installed close to heat-producing sources. PVC storage should not exceed 150°F and CPVC storage should not exceed 210°F. Handling techniques for PVC and CPVC pipe considered acceptable at warm temperatures may be unacceptable at very cold temperatures. When handling pipe in cold weather, consideration must be given to its lower impact strength. In subfreezing temperatures, extra caution in handling must be taken to prevent impact damage.

All pipe should be inspected for any scratches, splits or gouges before use. Damaged sections must be cut out and discarded.

Plastic Piping Tools

Basic Tools used with Plastic Piping

Use tools that have been specifically designed for use with thermoplastic pipe and fittings when installing. A variety of tools that are designed for cutting, beveling, and assembling plastic pipe and fittings, are readily available through local wholesale supply houses dealing in plastic pipe and fittings.

•**Warning** Tools normally used with metal piping systems, such as hacksaws, water pump pliers, pipe wrenches, etc., can cause damage to plastic pipe and fittings. Visible and hidden fractures, scoring or gouging of material, and over tightening of plastic threaded connections are some of the common problems resulting from the use of incorrect tools and procedures.

Pipe Cutters

Pipe must be square-cut to allow for the proper joining of pipe end and the fitting socket bottom. Wheel type pipe cutters designed for plastic pipe provides easy and clean cuts on smaller pipe sizes. Care should be used with similar ratchet-type cutters to avoid damage to pipe. A slightly raised edge left on the outside of the pipe end after cutting with either device must be removed.

Pipe Cutters for Large Diameter Pipe

Blade cutters made for use with large diameter plastic pipe are easy to adjust and operate for square, burrless cuts. Blades with carbide edges will provide longer life. With one style blade cutter, pipe ends may also be beveled for solvent joints while being cut by using an optional bevel tool in place of one cutter blade.

Hand Saws

A miter box or similar guide can be used with a fine-toothed saw blade (16 to 18 teeth per inch) having little or no set (maximum 0.025 inch).

Power Saws

Power saws are quite useful in operations where a large quantity of pipe is being cut. Blades designed for plastic pipe MUST be used. A cutting speed of 6,000 RPM, using ordinary hand pressure is recommended.

Pipe Beveling Tools

Power beveling tools, as well as hand beveling tools designed for use with plastic pipe are available. Pipe ends must be beveled (chamfered) to allow easy insertion of the pipe into the fitting and to help spread solvent cement and to prevent scraping cement from the inside of the fitting socket. A recommended bevel of 1/16" to 3/32" at a 10° to 15° angle can be achieved using a plastic pipe beveling tool, but can also be accomplished using a file designed for use on plastic.

Deburring Tools

Special plastic pipe deburring tools remove burrs from pipe ends quickly and efficiently. All burrs must be removed from the inside, as well as the outside, of the pipe ends to properly spread solvent cement when joining pipe and fitting.

Strap Wrenches

Strap wrenches with nylon straps treated for slip resistance and designed for use with plastic pipe provide gripping power for turning without scratching or deforming the pipe.

Chain Vises

Chain vises can be used to hold pipe. Vises made with jaws engineered for use with plastic pipe provide holding power without damage to the pipe.

Pullers & Joining Devices

Pipe and fitting pullers are available for joining large diameter plastic pipe and fittings. These tools are designed to allow the pipe to be inserted to the proper insertion depth, maintain proper alignment during assembly, and hold freshly solvent-cemented connections to prevent the fitting from backing-off until the initial set time is achieved.

Joining Methods -Solvent Cement Welding

Solvent cement welding is the most widely used joining method for PVC and CPVC pipe and fittings. Other methods such as threads, flanges and groove adapters can also be used. These are specifically useful where it is anticipated that the joint will have to be disassembled in the future.

Solvent Cement Safety Precautions

Solvent cement products are flammable and contain chemical solvents. Appropriate safety precautions must be taken BEFORE APPLYING PRIMER AND CEMENT. Read the cement can label!

•**CAUTION**

Virtually all solvent cements and primers for plastic pipe are flammable and should not be used or stored near heat, spark or open flames. Do not smoke during use. Eliminate all ignition sources. Primer and PVC cement should be stored in closed containers in the shade at temperatures between 40°F and 110° F; CPVC cement at temperatures between 40°F and 90°F. Use of a can with applicator attached to its lid is recommended. ***Verify expiration dates stamped on cements and primers prior to use.***

Avoid breathing vapors. *They should be used only with adequate ventilation. Explosion-proof general mechanical ventilation is recommended. In confined or partially enclosed areas, a ventilating device should be used. Containers should be kept tightly closed when not in use, and covered as much as possible when in use.*

Avoid contact with skin and eyes. May be absorbed through the skin; wearing PVA coated protective gloves and an impervious apron are recommended. May cause eye injury. Use eye protection and avoid eye contact. In case of contact, flush with plenty of water for 15 minutes. If irritation persists, get medical attention. If swallowed, call a physician immediately and follow precautionary statement given on side panel of cement container. Keep out of reach of children.

Refer to Solvent Cement Safety Data Sheet (SDS)

Use Caution with Welding Torches or other equipment where sparks might be involved at construction sites where plastic pipe has recently been solvent welded. Flammable vapors from cemented joints can stay within a piping system for some time. In all cases, lines should be flushed and purged to remove solvent vapors before welding.

Use Caution with Calcium Hypochlorite. Do not use a dry granular calcium hypochlorite as a disinfecting material for water purification in potable water piping systems. Granules or pellets of calcium hypochlorite (including their vapors) may react violently with solvent cements and primers if a water solution is not used. Chlorinated water solutions are nonvolatile and may be pumped into the piping system. Dry granular calcium hypochlorite should not be stored or used near solvent cements or primers.

Actually, solvent cementing is no more dangerous than putting gasoline in your automobile.

Solvent Cement and Primer Spills

Protect work areas prior to starting by using drop cloths in the event of a spill. Accidental spills should be wiped up immediately before the cement sets. Cement and/or primer spills can cause irreparable damage depending on the type of surface affected. Consult the manufacturer of the affected surface for possible suggestions.

Basic Solvent Cement Joints

The following is a general description of basic techniques used to make solvent cement joints. Adjustments will need to be made to method and tools used according to size of piping, but the same principles apply. Additional guidance can be found in ASTM D 2855, Standard Practice for Making Solvent-Cemented Joints with Poly (Vinyl Chloride) (PVC) Pipe and Fittings. **Important:** Installers should verify that they can make satisfactory joints under varying conditions and should receive training in installation and safety procedures.

To consistently make good joints in PVC and CPVC piping products, the following should be carefully understood:

1. The joining surfaces of pipe and fitting must be softened and made semi-fluid.

2. Sufficient cement must be applied to fill the gap between pipe and fitting.

3. Assembly of pipe and fittings must be made while the surfaces are still wet and fluid.

4. Joint strength develops as the cement dries (cures). In the tight part of the joint (interference area) the surfaces will fuse together; in the loose part the cement will bond to both surfaces.

Cutting the Pipe

PVC or CPVC pipe can be cut easily with a ratchet cutter, wheel-type plastic pipe cutter (**NOTE:** be sure to remove any raised ridge produced by wheel cutters), a power saw, or any other fine-tooth saw. It is important that the cutting tools being used are designed for plastic pipe. To ensure that the pipe is cut square, use a miter box when cutting with a saw. Cutting pipe as square as possible provides the maximum bonding surface area.

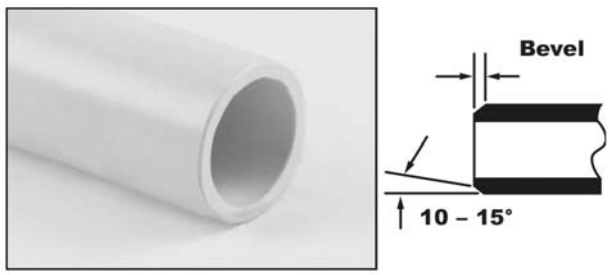
Be careful not to split the tube if using a ratchet-type cutter, especially in temperatures below 50°F. If any damage or cracking is evident, cut off at least 2" of the pipe beyond any visible crack.

Deburring & Beveling

Burrs and filings can prevent contact between the tube and the fitting during assembly and must be removed from the outside and the inside of the pipe. A deburring/chamfering tool (or file) is suitable for this purpose:

Burrs Being Removed from Outside & Inside

A slight bevel (chamfer) must be placed at the outsided end of the pipe to ease the entry of the tube into the socket and minimize the chance of cement being wiped off the fitting:



Bevel Outside End

Fitting & Joining Preparation

1. Using a clean, dry rag, wipe any loose dirt and moisture from the fitting's socket and pipe end. Moisture can slow the cure time, and at this stage of assembly, excessive moisture can reduce joint strength.

2. Check the dry fit of the pipe and fitting. The pipe should enter the fitting's socket easily 1/4 - 3/4 of the way (interference fit) , or at least have interference between pipe and fitting bottom (net fit). **DO NOT** use any components that appear irregular or do not fit properly. Contact Spears® regarding any questions about usability.

3. Measure socket depth and mark on pipe for reference during cement application.

4. It is advisable to additionally mark pipe and fitting for alignment orientation position, especially with larger fittings.

Solvent Cementing Assembly

Verify the expiration date located on the solvent cement can. The cement can be used for a period of 2 years from the date stamped on the can. When cementing pipe and fittings in extremely cold temperatures, make sure the cement has not "JELLED." Jelled or expired cement must be discarded in an environmentally friendly fashion, in accordance with local regulations. To prolong the life of solvent cement, keep the containers tightly closed when not in use, and cover the container as much as possible during use. If an unopened solvent cement container is subjected to freezing temperatures, the cement may become extremely thick. Place the closed container in a room temperature area where, after a short time period, the cement will return to a usable condition. **DO NOT** attempt to heat solvent cement. The cement must be applied when the pipe and fittings are clean and free from any moisture and debris.

Primer Use - Softening of pipe and fitting joining surfaces can be achieved by the cement itself or by using a suitable primer. A primer will usually penetrate and soften the surfaces more quickly than the cement alone. However, special "one-step" cements formulated for use without primers are available. Check local codes (where required) for acceptable applications.

Apply Primer - USING AN APPLICATOR THAT IS AT LEAST 1/2 THE SIZE OF THE PIPE DIAMETER, vigorously scrub joining surface of fitting, of pipe and then again of fitting. Work quickly to apply 2-3 coats in this manner. SOLVENT CEMENT SHOULD THEN BE APPLIED WHILE PRIMER IS STILL WET.

Apply Solvent Cement - USING AN APPLICATOR THAT IS AT LEAST 1/2 THE SIZE OF THE PIPE DIAMETER, WORK THE CEMENT INTO THE JOINING SURFACES USING A CONTINUOUS, CIRCULAR MOTION.

Use sufficient cement, but avoid puddling the cement on or within the fitting and pipe. Puddled cement causes excess softening and damage to the PVC or CPVC material. If interference fit was at the bottom of the socket, use extra cement and make a 2nd application to pipe. WORK QUICKLY SO THAT PIPE AND FITTING CAN BE JOINED WHILE CEMENT IS STILL WET.

Apply the cement in the sequence pictured below:

1. Apply a coat to the pipe to depth of fitting socket

Work the cement into the joining surfaces using a continuous, circular motion.

2. Apply a medium coat to the fitting socket

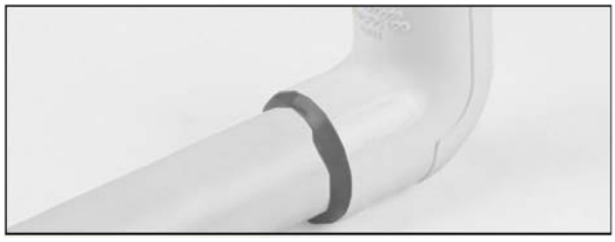
Avoid puddling the cement in the sockets and avoid getting cement in other sockets or threaded connections.

3. Apply a second coat to the pipe

end for sizes 1-1/4 inch and larger joints, or if interference fit was at socket bottom during dry-fit.

Assemble Joint

Immediately insert pipe into the fitting socket while rotating the pipe 1/4 turn. Align the fitting in the proper orientation at this time. Make sure the pipe bottoms out at the fitting's stop. Hold the assembly for at least 30 seconds to ensure initial bonding. Tapered pipe sockets can result in pipe backing out of the joint if not held under constant pressure A bead of cement must be present around the pipe and fitting juncture. If this bead is not continuous around the socket's shoulder, insufficient cement was applied and the joint must be disassembled or cut out and replaced.



Any cement, in excess of the bead, can be wiped off with a dry, clean rag.

Set and Cure Times

SET TIME: The initial set time is the recommended waiting period before handling newly assembled joints. After initial set, the joints will withstand the stresses of normal installation. However, a badly misaligned installation will cause excessive stresses in the joint, pipe and fittings.

CURE TIME: The cure time is the recommended waiting period before pressurizing newly assembled joints.

The following basic guidelines should be used:

- The set and cure times for solvent cement depend on pipe size, temperature, relative humidity, and tightness of fit. Drying time is faster for drier environments, smaller pipe sizes, high temperatures, and tighter fits.
- Special care must be taken when assembling products in low temperatures (below 40°F) or high temperatures (above 80°F).
- Extra set and handling times must be allowed in colder temperatures. When cementing pipe and fittings in cold temperatures, make sure the cement has not "JELLED." Jelled cement must be discarded.
- In higher temperatures, make sure both surfaces to be joined are still wet with cement during assembly.
- The assembly must be allowed an initial set, without any stress on the joint
- Following the initial set period, the assembly can be handled carefully by avoiding stress on the joint.

Average Set Times

Temp. Range	Pipe Sizes 1/2"- 1-1/4"	Pipe Sizes 1-1/2"- 2"	Pipe Sizes 2-1/2"- 8"	Pipe Sizes 10"- 15"	Pipe Sizes 16"- 24"
60° - 100°F	2 Min.	5 Min.	30 Min.	2 Hrs.	4 Hrs.
40° - 60°F	5 Min.	10 Min.	2 Hrs.	8 Hrs.	16 Hrs.
0° - 40°F	10 Min.	15 Min.	12 Hrs.	24 Hrs.	48 Hrs.

Average Cure Times

Relative Humidity 60% or Less*	Pipe Sizes 1/2" - 1-1/4"		Pipe Sizes 1-1/2" - 2"		Pipe Sizes 2-1/2" - 8"		Pipe Sizes 10" - 15"	Pipe Sizes 16" - 24"
Temperature Range During Assembly and Cure Periods	Up to 160 psi	Above 160 to 370 psi	Up to 160 psi	Above 160 to 315 psi	Up to 160 psi	Above 160 to 315 psi	Up to 100 psi	Up to 100 psi
60° - 100°F	15 Min.	6 Hrs.	30 Min.	12 Hrs.	1-1/2 Hrs.	24 Hrs.	48 Hrs.	72 Hrs
40° - 60°F	20 Min.	12 Hrs.	45 Min.	24 Hrs.	4 Hrs.	48 Hrs.	96 Hrs.	6 Days
0° - 40°F	30 Min.	48 Hrs.	1 Hr.	96 Hrs.	72 Hrs.	8 Days	8 days	14 Days

•NOTE **In damp or humid weather allow 50% more cure time. The cure schedules shown are suggested as guides only. They are based on laboratory test data, and should not be taken to be the recommendations of all cement manufacturers. Individual solvent cement manufacturer's recommendations for the particular cement being used should be followed.**

Special Considerations for Working with Solvent Cement Welding

Handling of Cement

Keep cement containers covered while not in use. Cement with the lid left off can become thick and viscous, or gel like. This condition is typically a result of tetrahydrofuran (THF) solvent evaporation and the cement is useless. Do not try to restore the cement by stirring in a thinner. Smaller containers of cement are recommended to be used, especially in warm or hot weather. Prior to opening cans of cement, shake vigorously to properly mix resin and solvents. Solvents contained in PVC and CPVC cements are highly flammable and should not be used near an open flame. The area in which the cement is being used should be well ventilated, and prolonged breathing of the fumes should be avoided, as well as contact with the skin or eyes. Verify the expiration dates stamped on the cements and primers prior to use.

CEMENT AND PRIMER SHELF LIFE

Spears® Products	Shelf Life	Spears® Products	Shelf Life
Primers / Cleaners	3 years	CPVC Solvent Cement	2 years
PVC Solvent Cement	3 years	ABS Solvent Cement	3 years

Hot Weather Use

Problems can be avoided when solvent cementing in 95°F or higher temperatures by taking a few special precautions. Solvent cements evaporate faster at elevated temperatures and can dry out prematurely. This is especially true when there is a hot wind blowing. Dry cement on pipe or fitting socket prior to assembly will not bond. If the pipe has been in direct sunlight for any length of time, surface temperatures may be 20°F to 30°F above air temperature. Solvents attack these hot surfaces faster, deeper and dry out quicker. As a result, it is very important to avoid puddling inside sockets, assemble immediately while wet and to wipe off excess cement at the joint exterior.

Tips for Solvent Cementing in High Temperatures:

1. Store solvent cements in a cool or shaded area prior to use.
2. If possible, store the fittings and pipe, or at least the ends to be solvent welded, in a shady area before cementing.
3. Cool surfaces to be joined by wiping with a damp rag. HOWEVER, be sure that surfaces are dry prior to applying solvent cement.
4. Try to do the solvent cementing in cooler morning hours.
5. Make sure that both surfaces to be joined are still wet with cement when putting them together.

Cold Weather Use

Solvent Cements and primers have excellent cold weather stability and are formulated to have well balanced drying characteristics even in subfreezing temperatures. Good solvent cemented joints can be made in very cold conditions provided proper care and a little common sense are used. In cold weather, solvents penetrate and soften surfaces more slowly than in warm weather. The plastic is also more resistant to solvent penetration, therefore, it becomes more important to pre-soften surfaces. A longer cure time is necessary due to slower evaporation.

Tips for Solvent Cementing in Cold Temperatures:

1. Prefabricate as much of the system as possible in a heated work area.
2. Store cements in a warmer area when not in use and make sure they remain fluid.
3. Take special care to remove moisture, including ice and snow.
4. Use special care to ensure joining surfaces are adequately softened; more than one application may be necessary.
5. Allow a longer cure period before the system is used.

Effects of Tolerances and Fits

PVC pipe and fittings are manufactured to applicable ASTM Standards to produce an interference fit when assembled. However, minimum and maximum allowable tolerances permitted for pipe and fitting can result in variations. For example, fitting with the maximum diameter and the pipe with the minimum diameter, may result in a loose fit. Applying two coats of solvent cement will help assure a good joint. Conversely, if the pipe diameter is on the maximum side and the fitting on the minimum side, the interference may be too great and sanding of the pipe O.D. may be necessary to permit entrance.

Always check dry fits prior to making a joint. If fit is loose, multiple coats and use of an extra heavy bodied cement may be required. Mating components should be checked to assure that tolerances and engagements are compatible (see preceding Basic Solvent Cement Joints instructions). Inspect all pipe and fittings for damage or irregularities. Do not use any components that appear irregular or do not fit properly. Contact the appropriate manufacturer of the product in question to determine usability.

Large Diameter Pipe

Basic Solvent Cement Joint instructions apply to all sizes of pipe, but when making joints larger than 4", the use of two persons is recommended to properly apply cement and immediately assemble the joint while the cemented surfaces are still wet. Alignment of large diameter pipe and fittings during joining is critical since there is a greater potential for movement in the upper portion of a tapered socket that can result in misalignment. Special tools are commercially available for joining large diameter pipe.

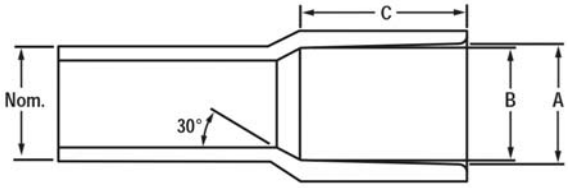
Be sure to use an appropriate size roller applicator with large diameter pipe, along with a heavy or extra-heavy bodied cement that is medium to slow setting. These have increased gap filling capability and allow somewhat longer assembly time. However, applications of heavy coats of solvent cement and speed in making the joint is important. Under a damp or wet condition, solvent cement may absorb some moisture. Excessive moisture can slow down the cure and reduce joint strength. Spears® CPVC-24 heavy body or PVC-19 extra-heavy body solvent cements are excellent for joining large diameter pipe (see Solvent Cement Selection Guide in following sections).

Belled End Pipe

Commercially available belled end pipe can be used to eliminate the need for couplings. Where belled end pipe is used, it is suggested that the interior surface of the bell be penetrated exceptionally well with the primer.

•**NOTE** some manufacturers use a silicone release agent on the belling plug, and a residue of this agent can remain inside the bell. Silicone will contaminate the joint and not allow proper solvent cement welding. All silicone residue must be removed in the cleaning process prior to solvent cementing.

Belled-End Pipe Dimensions



Nominal Size (in.)	A		B		C.
	Min.	Max.	Min.	Max.	Min.
1-1/4	1.675	1.680	1.648	1.658	1.870
1-1/2	1.905	1.914	1.880	1.888	2.000
2	2.381	2.393	2.363	2.375	2.250
2-1/2	2.882	2.896	2.861	2.875	2.500
3	3.508	3.524	3.484	3.500	3.250
4	4.509	4.527	4.482	4.500	4.000
5	5.573	5.593	5.543	5.563	4.000
6	6.636	6.658	6.603	6.625	6.000
8	8.640	8.670	8.595	8.625	6.000
10	10.761	10.791	10.722	10.752	8.000
12	12.763	12.793	12.721	12.751	8.500
14	14.030	14.045	13.985	14.000	9.000
16	16.037	16.052	15.985	16.000	10.000
18	18.041	18.056	17.985	18.000	12.000
20	20.045	20.060	19.985	20.000	12.000
24	24.060	24.075	24.000	24.015	14.000

Estimated Quantities of Solvent Cement

A variety of conditions can affect the amount of solvent cement required for making reliable joints. These include pipe size, tolerances, socket depths as well as installation conditions and type of cement used. Fitting sockets are tapered for proper assembly, which produces a slight gap at the socket entrance when installed with pipe. As pipe sizes increase, heavier bodied cements should be used for increase gap filling capabilities. It is best to use liberal amounts of solvent cement since insufficient cement use is one of the most common reasons for joint failure. The following information on cement usage is a recommendation only and other factors or unanticipated conditions may be encountered. Quantities are based on use with average socket lengths of Spears® molded and fabricated fittings.

Standard Pipe Joints

Fitting Size (in.)	Joints per Pint	Joints per Quart	Joints per Gallon
1/2	150	300	1200
3/4	100	200	800
1	63	125	500
1-1/4	70	140	560
1-1/2	45	90	360
2	30	60	240
2-1/2	25	50	200
3	20	40	160
4	15	30	120
6	5	10	40
8	3	5	20
10	---	2-3	4-6
12	---	1-2	2-4

Large Diameter Pipe Joints

Fitting Size (in.)	Quarts per Joint	Joints per Gallon
14	0.75	5.33
16	1.25	3.20
18	1.50	2.67
20	2.00	2.00
24	2.75	1.45

Supplemental Information on Solvent Cementing

Applicators

A wide variety of daubers, brushes, and rollers are available. For proper solvent cement welding of pipe and fittings, the cement applicator must be no less than half the size of the pipe. Sufficient cement cannot be applied using daubers attached to the cement can lid on large diameter products (> 3"dia.) The following chart shows a variety of Spears® applicator sizes for use on different pipe diameters.

SPEARS® APPLICATOR SELECTION GUIDE

For proper solvent cement welding of pipe and fittings, the cement applicator must be no less than half the size of the pipe

DAUBERS	Pipe Diameters						
	1/4"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2" - 2-1/2"
3/8" Dauber	•	•	•				
1/2" Dauber			•	•			
3/4" Dauber					•	•	
1-1/4" Dauber							•

ROLLERS & SWABS	SIZE	FOR PIPE DIAMETERS
3020	3" Roller	3" - 6"
6020	4" Roller	3" - 8"
7020	7" Roller	6" +
5520	4" Roller	6" +
6520	6" Roller	6" +
4020	4" Swab	6" +
5020	4" Swab	3" - 8"
4520	4" Swab	6" +

Cleaners

Cleaners can be used to remove dirt, oil and grease from the bonding surfaces of PVC, CPVC, ABS and Styrene pipe and fittings. Use of a cleaner is recommended before priming of pipe and fittings.

Primers

The use of Primer is necessary to penetrate and dissolve the surface of the pipe and fitting prior to the application of cement. Special "one-step" cements formulated for use without primers are available. Check cement instructions and local codes (where required) for acceptable applications. Primer must be applied to both the pipe and fittings. Apply multiple coats of primer to the fitting socket and to the outside of the pipe ensuring that the entire surface is wet. Solvent cement must be applied immediately after primer while the surfaces are still tacky.

Solvent Cements

Solvent cements are produced for joining a variety of commercially available pipe and fitting materials, including PVC, CPVC and ABS plastics. Solvent cements are typically formulated using tetra hydro furan (THF). When properly applied, this solvent dissolves the mating surfaces of the pipe and fittings. Cyclohexanone is a typical retardant used to slow the rate of solvent evaporation. Immediate joining of the wet mating surfaces in one minute or less is essential to eliminate dry spots that will not bond. The bond interface is strongest at the area of interference fit where the softened semi-fluid surfaces of the pipe and fitting chemically fuse. Plastic resin fillers (dissolved PVC or CPVC) in the cement fill the gaps between pipe and fitting. Cements are available in clear, white, gray and other colors to match the pipe or for specific application. **Inert pigments are used for coloration.** For example, white cements are made from titanium dioxide while gray cements are made from titanium dioxide and carbon black. As the solvent evaporates, pipe and fitting joint "cures", except for some residual solvent that dissipates over time. The resulting fused area is why this method is called "solvent cement welding" although no heat is applied to melt and fuse the bonded areas as in metal welding.

Solvent cements are formulated in regular bodied, medium bodied, heavy bodied, extra heavy bodied and specialty cements. Different types of cements have different set and cure times. Low VOC products - with lesser VOC emissions - will contribute to cleaner air and better workplace conditions. All Spears® solvent cement and primer products are certified as Low VOC.

1. Regular Bodied - Cements for smaller diameters (i.e.< 4") and thin-wall classes and Schedule 40 piping with interference fits. Generally referred to as "regular body" such as Spears® PVC-00 and PVC-02 cements, these cements are fast setting.

2. Medium Bodied - Cements for smaller diameters (i.e. < 4") for all classes, Schedule 40 and Schedule 80 pipe with interference fits such as Spears® PVC-05 and PVC-21 cements. These cements have better gap filling capability than regular bodied cement and are also considered fast setting

3. Heavy Bodied & Extra Heavy Bodied - Cements for both small and large diameters of heavier-wall Schedule 80 and Schedule 120 products. Heavy-body such as Spears® PVC-11 and CPVC-24 cements are classified as medium setting and extra heavy-body such as Spears® PVC-19 cement is classified as slow setting. These cements are formulated to fill larger gaps, dry slower and typically take longer to dry in order to provide more time to assemble joints.

4. Specialty Cements - Specialty cements formulated for use with specific products and applications, but can also be used with other applications of similar products . Examples include special cements such as Spears® PVC-25 Wet-N-Dry; transition cements such as Spears® MULTIPURPOSE-90 and Spears® ABS TO PVC-94; product specific cements such as Spears® ABS-71 and ABS-73; and one-step specialty cements. **One-step cements do not require the use of primer prior to the application of the cement. Examples include Spears® FS-5 one-step cement for use with FlameGuard® CPVC Fire Sprinkler Products,** Spears® LW-4 one-step cement for use with **LabWaste®** CPVC Chemical Drainage Systems; Spears® **EverTUFF®** CTS-5 for use with CPVC hot and cold water plumbing systems, and Spears® LX-5 Low Extractable PVC cement for use in high purity applications (i.e. Spears® LOW EXTRACTABLE PVC products). In addition, special application cements such as Spears® CPVC-24 is formulated for improved chemical resistance to caustics and chemical applications with both PVC and CPVC products. In fact, CPVC-24 is one of the most versatile solvent cements on the market today!

Selecting the appropriate solvent cement and primer for the type of products being joined is important. The following selection guide can be used in selecting the right Spears® solvent cement and primer for your application.

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Joining Method - Threaded Connections

Threaded connections require the application of a thread sealant that is compatible with PVC and CPVC material. Spears® recommends the use of Spears® Blue 75™ Thread Sealant.

CAUTION - Use only thread sealants recommended for PVC or CPVC plastic. Other joint compounds or pastes may contain substances that could cause stress cracks in PVC or CPVC materials.

Apply sealant to the male threads only. Make sure all threads are covered. **DO NOT** clog the waterway with excess sealant. If PTFE tape must be used, Spears® recommends a thickness of at least .0035" that meets or exceeds military specification, MIL-T-27730A. **DO NOT** use a combination of tape and thread sealant on the same joint. Apply PTFE tape in the direction of the threads by starting with the first full thread and continuing over the entire thread length. Make sure all threads are covered. Generally, 2 - 3 wraps are sufficient to produce a watertight connection

DO NOT over-torque any threaded connections. Generally, one to two turns beyond finger-tight are required for a threaded connection. Use a smooth-jawed wrench or strap wrench when installing threaded connections.

Threading Pipe

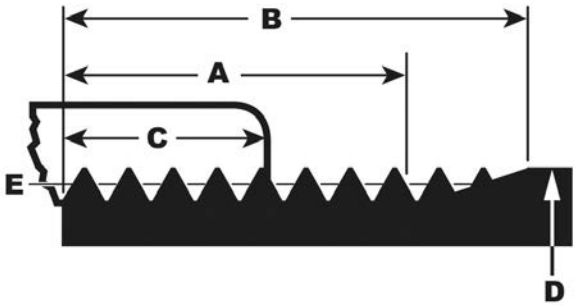
PVC and CPVC pipe can be threaded using either standard hand pipe stocks or power-operated equipment. Since rigid PVC plastic pipe has the same outside diameter as standard steel pipe in comparable sizes, standard steel pipe taps and dies can be used. A cut thread or deep scratch results in a stress concentration point. As a result, only Schedule 80 and Schedule 120 pipe should be threaded. A 50% pressure de-rating is applied to threaded pipe to compensate for this. **DO NOT** thread Schedule 40 pipe. For optimum results in threading, use new taps and dies; but in any case, they should be cleaned and sharpened and in good condition. Power threading machines should be fitted with dies having a 5° negative front rake and ground especially for this type of pipe; tapered guide sleeves are not required. For hand stocks the dies should have a negative front rake of 5° to 10°. Dies which have been designed for use on brass or copper pipes may be used successfully. Carboloy dies give longer service. (Taps should be ground with a 0° to 10° negative rake, depending upon the size and pitch of the thread. Die chasers should have a 33° chamfer on the lead; a 10° front or negative rake; and a 5° rake on the back or relief edge.). Self-opening die heads and collapsible taps, power threading machines and a slight chamfer to lead the tap or dies will speed production; however, taps and dies should not be driven at high speeds or with heavy pressure.

A tapered plug should be inserted into the pipe when threading, to hold the pipe round and to prevent the die from distorting and digging into the pipe wall. This ensures uniform thread depth all the way around. Pipe for threading should be held in a suitable pipe vise, but saw-tooth jaws should not be used. Flanges and close nipples should be threaded in jigs or tapping fixtures. To prevent crushing or scoring the pipe, some type of protective wrap, such as canvas, emery paper, or a light metal sleeve should be used; rounding of chuck jaws will also be helpful. Rigid PVC or CPVC plastic pipe should be threaded without use of lubricants. Standard cutting oils can cause stress cracking in plastics and should not be used. Water-soluble oil or plain water is recommended. Degreasing with any solvents is not recommended, nor should solvents be used in any cleanup. Always clear cuttings from the die.

DO NOT OVER THREAD - To obtain a tight, leak proof joint, the thread dimensions shown in the table should be used. If pipe is over threaded, fittings cannot be run on far enough to make a tight seal.

American National Standards Institute Code B1.20.1 covers dimensions and tolerances for tapered pipe threads. **Only Schedule 80 or heavier wall pipe should be threaded.**

Angle between sides of thread is 60 degrees. Taper of thread, on diameter, is 3/4 inch per foot. The basic thread depth is 0.8 x pitch of thread and the crest and root are truncated an amount equal to 0.033 x pitch, excepting 8 threads per inch which have a basic depth of 0.788 x pitch and are truncated 0.045 x pitch at the crest and 0.033 x pitch at the root.



PIPE THREADS

Nominal Size (in.) (Max.) (In.)	Outside Diameter (in.) D	Number of Threads Per Inch	Normal Engagement By Hand (in.) C	Length of Effective Thread (in.) A	Total Length: End of pipe to vanish point (in.) B	Pitch Diameter at end of Internal Thread (in.) E	Depth of Thread (Max.) (in.)
1/8	0.405	27	0.180	0.2639	0.3924	0.37476	0.02963
1/4	0.540	18	0.228	0.4018	0.5946	0.49163	0.04444
3/8	0.675	18	0.240	0.4078	0.6006	0.62701	0.04444
1/2	0.840	14	0.320	0.5337	0.7815	0.77843	0.05714
3/4	1.050	14	0.339	0.5457	0.7935	0.98887	0.05714
1	1.315	11-1/2	0.400	0.6828	0.9845	1.23863	0.06957
1-1/4	1.660	11-1/2	0.420	0.7068	1.0085	1.58338	0.06957
1-1/2	1.900	11-1/2	0.420	0.7235	1.0252	1.82234	0.06957
2	2.375	11-1/2	0.436	0.7565	1.0582	2.29627	0.06957
2-1/2	2.875	8	0.682	1.1375	1.5712	2.76216	0.10000
3	3.500	8	0.766	1.2000	1.6337	3.38850	0.10000
4	4.500	8	0.844	1.3000	1.7337	4.38713	0.10000
5	5.563	8	0.937	1.4063	1.8400	5.44929	0.10000
6	6.625	8	0.958	1.5125	1.9462	6.50597	0.10000

Which Threaded Joint Sealant to Use?

- Tape sealants are more susceptible to improper installation
- Paste sealants are more likely to contain incompatible chemicals
- Either type – Paste or Tape – must be properly used but NEVER use both!
- Do not use paste or tape on Gasket Sealed Head Adapters

The Best Choice For Threaded Joints

Spears ® Recommends a Compatible Paste

Paste–type thread sealants fill the threads better than tape. Application is less critical, as long as the sealant is compatible with the particular plastic used. Some "pipe dopes" and pastes can cause chemical stress cracking. Spears® BLUE 75™ thread sealant has been specially formulated and tested for use with these plastic piping components.

The Problem with Using TFE Tape Sealants

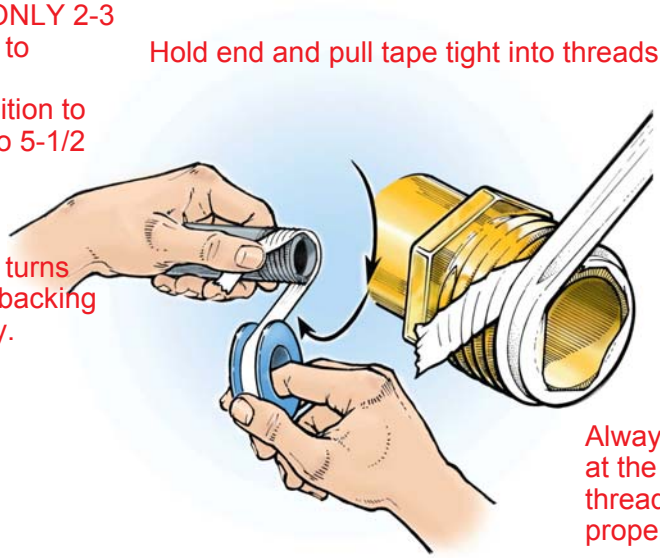
TFE tape sealants require special attention on application. Failure to follow the instructions below can result in female thread breaks due to excessive tape use, difficult assembly due to insufficient tape, leaks due to failure to cover starting threads, and leaks due to incorrectly applied tape that bunches at the thread entrance. Since TFE tape is a really good lubricant, care must be taken not to over-tighten taped joints.

If You MUST Use Tape Sealant, Use It Correctly!

Wrap Tape In Direction of Threads (clockwise for right-hand thread):

- For Head Adapters, use ONLY 2-3 wraps of tape and tighten to specified torque.
- For Female Adapter transition to metal pipe, use ONLY 5 to 5-1/2 wraps of tape.

Joint Assembly:
Tighten threaded joints 1-2 turns beyond finger tight. Avoid "backing up" the wrenched assembly. DO NOT over-tighten.



Joining Method - Flanged Connections

PVC and CPVC flanges are available in several designs, including solid one-piece flanges, two piece Van Stone style flanges featuring a moveable ring for bolt alignment, and blind flanges for capping off a piping run. Flanges are available in socket, spigot and threaded configurations and are coupling devices designed for joining IPS (Iron Pipe Size) plastic piping systems where frequent disassembly may be required, can be used as a transitional fitting for joining plastic to metal piping systems, and for connection to other flanged type valves and equipment. A gasket is used between flanges to form a water-tight seal. Proper gasket material should be selected for fluids compatibility. Most plastic flanges carry a maximum working pressure rating of 150 psi non-shock for water at 73°F. Pressure ratings may vary according to size and construction of the flange. Consult flange manufacturer.

Gaskets

Select appropriate size and bolt pattern gasket. Full faced, 1/8" thick elastomer gaskets with a Shore "A" Durometer of approximately 70 are recommended. Verify that the gasket material is suitable for use with the application fluids.

Bolt Patterns & Selection

Most PVC and CPVC flanges are produced with ANSI B16.5 Bolt Patterns for Class 125/150 flanges. Optional Class 300 bolt patterns (NOT a 300 psi rating), certain ANSI/Metric dual pattern flanges, and metric bolt patterns can be produced. Proper bolt size, number and length should be selected for the specific flanges and equipment being assembled. Bolt length requirements will vary according to the flange or equipment manufacturer. Always use 2-wide flat washers for each bolt, one under the bolt head and one under the nut (do not use thin "fender" washers).

Bolt Torque

Threads should be cleaned and well lubricated (**WARNING:** Use only bolt lubricants compatible with PVC or CPVC material). Actual field conditions may require variations in these recommendations. **UNNECESSARY OVER TORQUING WILL DAMAGE THE FLANGE.** Torque should always be applied in approximately 5 ft-lb. increments using a 180° opposing sequence.

Flange Make-up

Follow proper solvent cementing and/or threaded component procedures as applicable to join the flange to the pipe. Once a flange is joined to pipe, the method for joining two flanges is as follows:

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

2. With gasket in place, align the bolt holes of the mating flanges by rotating the ring into position.

3. Insert all bolts, washers (two standard flat washers per bolt), and nuts.

4. Make sure the faces of the mating surfaces are flush against gasket prior to bolting down the flanges.

5. 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 Torque value shown in the following table using a 180° opposing sequence.

6. Care must be taken to avoid "bending" the flange when joining a Spears® flange to a "raised face" flange, or a wafer-style valve. Do not use bolts to bring together improperly mated flanges.

Recommended Flange Bolt Torque for Plastic Flanges

Flange Size (in.)	No. of Bolt Holes	Bolt Dia. (in.)	Min. Bolt Length (in.)[1]	Torque ft.-lb.
1/2	4	1/2	2	12
3/4	4	1/2	2	12
1	4	1/2	2-1/4	12
1-1/4	4	1/2	2-1/4	12
1-1/2	4	1/2	2-1/2	12
2	4	5/8	3	25
2-1/2	4	5/8	3-1/4	25
3	4	5/8	3-1/4	25
4	8	5/8	3-1/2	25
6	8	3/4	4	40
8	8	3/4	4-1/2	40
10	12	7/8	5	64
12	12	7/8	5	95
14	12	1	6	110
16	16	1	6-1/2	110
18	16	1-1/8	6-1/2	110
20[2]	20	1-1/8	5-1/2	110
24[2]	20	1-1/4	5-1/2	110

Note:

1 -Minimum bolt length is based on connecting two (2) Spears® flanges, two flat washers, gasket and nut. Adjustments will need to be made to accommodate valves and other equipment.

2 -Bolt Length for Spears® Fabricated 20 inch & 24 inch Flanges with Plastic Rings

Joining Method - Mechanical Grooved Couplings

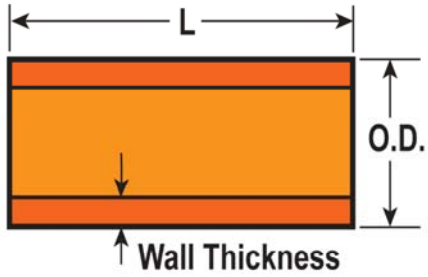
In many installations where transition to metal pipe, or where disassembly is a prime factor, metallic grooved style couplings with gasket seal can be used to join PVC and CPVC pipe to alternate IPS size piping materials. In addition to the ease of disassembly, this type of connection also allows for a certain degree of angular adjustment and expansion/contraction. Special rolled-groove pipe can be joined, but easy to use molded Grooved Coupling Adapters then can be solvent cemented to plain end pipe are available for use with metallic grooved couplings.

Only flexible style metallic grooved couplings are recommended for use with plastic pipe. Rigid style couplings should not be used as these can provide a compressive/shear load to plastic pipe resulting in failure. Always check the compatibility of the grooved coupling gasket material with the intended application fluids.

•NOTE A gasket/joint lubricant is recommended to prevent pinching the gasket and to assist the seating and alignment processes during assembly of grooved couplings. Certain lubricants may contain a petroleum base or other chemicals, which will cause damage to the plastic pipe, gasket and adapter. Always verify the suitability for use of the selected lubricant with the lubricant manufacturer.

Pipe - FlameGuard® CPVC Fire Sprinkler Plain End

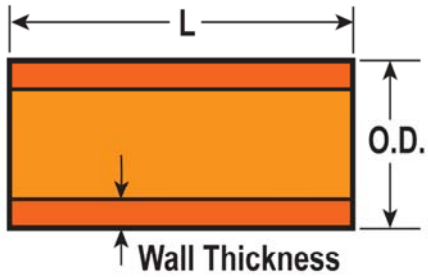
SDR 13.5 10' Lengths



Part Number	Size	L	AVG.O.D.	Minimum Wall	Approx. Wt. (Lbs./Ft)
CP-007-10	3/4	10	1.050	.078	.16
CP-010-10	1	10	1.315	.097	.26
CP-012-10	1-1/4	10	1.660	.123	.39
CP-015-10	1-1/2	10	1.900	.141	.52
CP-020-10	2	10	2.375	.176	.85
CP-025-10	2-1/2	10	2.875	.213	1.25
CP-030-10	3	10	3.500	.259	1.86

Pipe - FlameGuard® CPVC Fire Sprinkler Plain End

SDR 13.5, 15' Lengths



Part Number	Size	L	AVG.O.D.	Minimum Wall	Approx. Wt. (Lbs./Ft)
CP-007	3/4	15	1.050	.078	.16
CP-010	1	15	1.315	.097	.26
CP-012	1-1/4	15	1.660	.123	.39
CP-015	1-1/2	15	1.900	.141	.52
CP-020	2	15	2.375	.176	.85
CP-025	2-1/2	15	2.875	.213	1.25
CP-030	3	15	3.500	.259	1.86

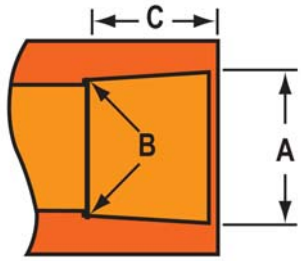
Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® Product Weights & Dimensions

Socket Dimensions

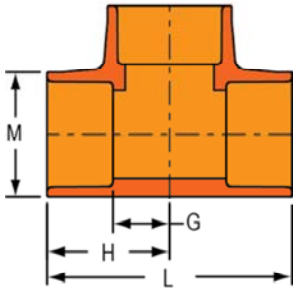
SCH 40 - ASTM F438
SCH 80 - ASTM F439



Size	Socket Entrance A	Socket Bottom B	Tolerance	SCH 40 Minimum Socket Length C	SCH 80 Minimum Socket Length C
3/4	1.058	1.046	± .004	.719	1.000
1	1.325	1.130	± .005	.875	1.125
1-1/4	1.670	1.655	± .005	.938	1.250
1-1/2	1.912	1.894	± .006	1.094	1.375
2	2.387	2.369	± .005	1.156	1.500
2-1/2	2.889	2.868	± .007	1.750	1.750
3	3.516	3.492	± .008	1.875	1.875

Tee

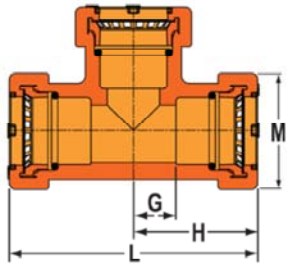
Socket x Socket x Socket



Part Number	Size	G	H	L	M	Approx. Wt. (Lbs.)
4201-007	3/4	9/16	1- 1/2	2-31/32	1- 5/16	.11
4201-010	1	7/8	1-13/16	3- 5/8	1- 5/8	.19
4201-012	1-1/4	29/32	2- 1/8	4- 1/4	2	.29
4201-015	1-1/2	1- 5/32	2-35/64	5- 3/32	2-11/32	.53
4201-020	2	1-13/32	2-15/16	5- 7/8	2- 7/8	.79
4201-025	2-1/2	1-23/32	3- 1/2	7	3-15/32	1.61
4201-030	3	2- 1/16	3-31/32	7-15/16	4- 5/32	2.50

GripLoc™ Tee

WARNING: DO NOT INSERT FINGERS
EPDM Gasket
Uses No Solvent Cement - NSF® Certified Lead Free

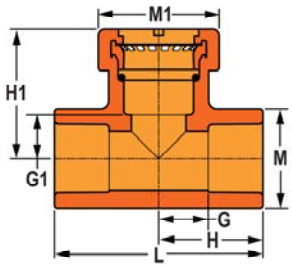


Part Number	Size	G	H	L	M	Approx. Wt. (Lbs.)
GL4201-010	1	27/32	2-1/2	5	2-5/16	.67

Socket x GripLoc™ Tee

Socket x GripLoc™

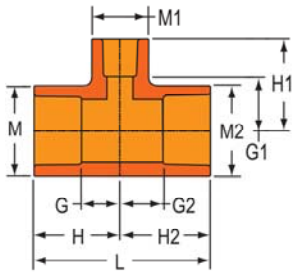
Uses No Solvent Cement On GripLoc™ Branch - Cement Sockets on Tee Run Only, NSF® Certified Lead Free 175 psi (1.21 Mpa) @ 150°F (66°C)



Part Number	Size	G	G1	H	H1	L	M	M1	Approx. Wt. (Lbs.)
GLS4201-010	1	15/16	7/8	2	2-1/2	4	1-7/8	2-5/16	.48

Reducing Tee

Socket x Socket x Socket



Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
4201-102	3/4X1	3/4	11/16	3/4	1-11/16	1-3/4	1-11/16	3- 13/32	1- 5/16	1-5/8	1- 5/16	.12
4201-125	1X3/4X3/4	23/32	13/16	23/32	1-25/32	1-13/16	1-21/32	3-7/16	1-19/32	1-5/16	1- 5/16	.15
4201-126	1X3/4X1	23/32	23/32	3/4	1-27/32	1-27/32	1-3/4	3-19/32	1-5/8	1-5/8	1-5/16	.17
4201-131	1X3/4	11/16	13/16	11/16	1-13/16	1-7/8	1-13/16	3- 5/8	1- 5/8	1- 5/16	1- 5/8	.16
4201-157	1-1/4X1X3/4	11/16	1- 1/32	11/16	1-15/16	2- 1/32	1-13/16	3-25/32	2- 3/32	1-13/32	1-23/32	.32
4201-158	1-1/4X1X1	27/32	29/32	25/32	2- 1/16	2- 1/32	1-29/32	3-15/16	1-31/32	1- 5/8	1- 5/8	.25
4201-159	1-1/4X1X1-1/4	31/32	7/8	31/32	2- 7/32	2- 1/8	2- 3/32	4-11/32	2- 3/32	2- 3/32	1-23/32	.36
4201-167	1-1/4X3/4	21/32	1	21/32	1-29/32	2	1-29/32	3-13/16	2	1- 5/16	2	.21
4201-168	1-1/4X1	13/16	1	13/16	2- 1/16	2-1/8	2- 1/16	4- 1/8	2	1-5/8	2	.24
4201-169	1-1/4X1-1/2	1- 1/8	15/16	1- 1/8	2- 3/8	2-11/32	2- 3/8	4- 3/4	2- 3/32	2-11/32	2- 3/32	.50
4201-201	1-1/2X1-1/4X3/4	11/16	1-3/32	11/16	2- 1/16	2- 3/32	1-15/16	4	2- 5/16	1- 3/8	2- 1/16	.40
4201-202	1-1/2X1-1/4X1	27/32	1- 1/32	1	2- 7/32	2- 5/32	2- 1/4	4-15/32	2- 5/16	1-11/16	2- 1/16	.42
4201-210	1-1/2X3/4	11/16	1- 1/32	11/16	2- 1/16	2- 1/32	2- 1/16	4- 5/32	2-11/32	1-3/8	2-11/32	.39
4201-211	1-1/2X1	13/16	1-3/32	13/16	2- 3/16	2-1/4	2- 3/16	4- 3/8	2-11/32	1-3/4	2-11/32	.41
4201-212	1-1/2X1-1/4	1-1/32	1	1-1/32	2-13/32	2-1/4	2-13/32	4-13/16	2-11/32	2-1/8	2-11/32	.48
4201-213	1-1/2X2	1-9/32	1-1/4	1-9/32	2-21/32	2-3/4	2-21/32	5-11/32	2-11/32	2-7/8	2-11/32	.64
4201-248	2X3/4	11/16	1-7/16	11/16	2- 7/32	2- 7/16	2- 7/32	4- 7/16	2-27/32	1- 3/8	2-27/32	.51
4201-249	2X1	27/32	1-13/32	27/32	2-11/32	2- 9/16	2-11/32	4-23/32	2- 7/8	1- 3/4	2- 7/8	.57
4201-250	2X1-1/4	1-1/32	1-11/32	1-1/32	2-9/16	2-19/32	2-9/16	5- 3/32	2-7/8	2-3/32	2-7/8	.64
4201-251	2X1-1/2	1- 3/16	1-7/16	1- 3/16	2-11/16	2-27/32	2-11/16	5- 3/8	2-7/8	2-3/8	2-7/8	.79
4201-289	2-1/2X1	7/8	1-11/16	7/8	2- 5/8	2-13/16	2- 5/8	5- 1/4	3-1/2	1-23/32	3-1/2	1.03
4201-290	2-1/2X1-1/4	1- 1/32	1-23/32	1- 1/32	2-27/32	3	2-27/32	5-11/16	3-1/2	2- 3/32	3-1/2	1.13
4201-291	2-1/2X1-1/2	1- 3/16	1- 7/16	1- 3/16	2-15/16	3-1/8	2-15/16	5- 7/8	3-1/2	2-11/32	3-1/2	1.25
4201-292	2-1/2X2	1-13/32	1- 5/8	1-13/32	3- 3/16	3- 1/8	3- 3/16	6-3/8	3- 1/2	2- 7/8	3- 1/2	1.37
4201-335	3X1	7/8	1-13/16	7/8	2- 3/4	3	2- 3/4	5-15/32	4- 3/16	1-23/32	4- 3/16	1.33
4201-336[1]	3X1-1/4	1- 3/8	2-5/16	1- 3/8	3- 5/16	3- 5/8	3- 5/16	6- 5/8	4- 3/16	2- 7/8	4- 3/16	1.88
4201-337	3X1-1/2	1- 5/32	2- 1/16	1- 5/32	3- 1/32	3- 7/16	3- 1/32	6- 3/32	4- 3/16	2- 3/8	4- 3/16	1.46
4201-338	3X2	1- 7/16	1-15/16	1- 7/16	3- 5/16	3- 7/16	3- 5/16	6-5/8	4- 3/16	2- 7/8	4- 3/16	1.67
4201-339	3X2-1/2	1- 3/4	2	1- 3/4	3- 5/8	3-3/4	3- 5/8	7- 1/4	4- 3/16	3-17/32	4- 3/16	2.11

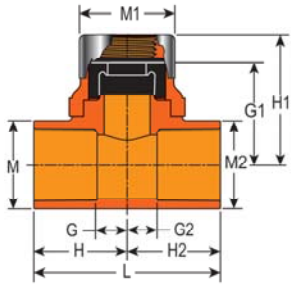
[1] Outlet sized with Bushing

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

SofTorque™ SR Sprinkler Head Tee - Gasket Sealed Special Reinforced Plastic Thread Style

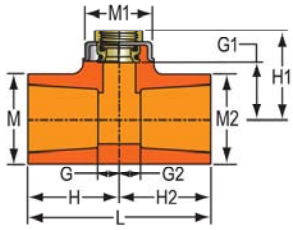
Socket x SR Fipt - Stainless Steel Collar With Elastomer Seal - Use NO Thread Sealant
NSF® Certified Lead Free



Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
4202-101GSR	3/4X1/2	7/16	1-1/2	7/16	1-3/8	1-7/8	1-3/8	2-3/4	1-5/16	1-3/8	1-5/16	.16
4202-130GSR	1X1/2	7/16	1-5/8	7/16	1-1/2	2	1-1/2	3	1-5/8	1-3/8	1-5/8	.20

TorqueSafe™ Sprinkler Head Tee - Gasket Sealed Brass Thread Insert Style

Socket x Socket x Gasket Fipt
With Elastomer Seal - Use NO Thread Sealant

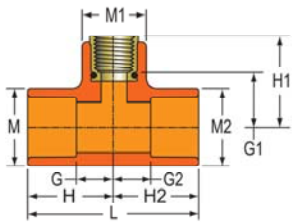


Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
4202-101 G	3/4X1/2	7/16	1-5/32	7/16	1- 7/16	1-9/16	1-7/16	2-7/8	1- 3/8	1- 3/8	1- 3/8	.22
4202-124 G	1X3/4X1/2	7/16	1-9/32	9/16	1- 9/16	1-11/16	1- 9/16	3- 1/8	1-11/16	1- 3/8	1- 3/8	.25
4202-130 G	1X1/2	7/16	1-9/32	7/16	1- 9/16	1-11/16	1- 9/16	3- 1/8	1-23/32	1- 3/8	1-23/32	.28
4202-131 G	1X3/4	17/32	1-7/32	17/32	1-11/16	1-5/8	1-11/16	3-3/8	1-23/32	1-9/16	1-23/32	.37
4202-166 G	1-1/4X1/2	7/16	1- 9/16	7/16	1-11/16	1-15/16	1-11/16	3- 3/8	2- 1/16	1- 3/8	2- 1/16	.34
4202-209 G	1-1/2X1/2	1/2	1-11/16	1/2	1- 7/8	2- 3/32	1- 7/8	3- 3/4	2-5/16	1- 3/8	2-5/16	.40
4202-247 G	2X1/2	1/2	1-15/16	1/2	2	2-11/32	2	4	2-27/32	1- 3/8	2-27/32	.53

Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head Tee - Brass Thread Insert Style

Socket x Socket x Fipt

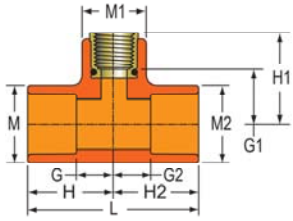


Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
4202-101	3/4X1/2	7/16	1-3/32	7/16	1-7/16	1- 5/8	1-7/16	2-7/8	1-3/8	1- 3/16	1-3/8	.20
4202-124	1X3/4X1/2	7/16	1-1/4	9/16	1- 9/16	1-13/16	1- 9/16	3- 1/8	1-23/32	1- 3/16	1- 3/8	.24
4202-130	1X1/2	7/16	1-1/4	7/16	1- 9/16	1-13/16	1- 9/16	3- 1/8	1- 23/32	1- 3/16	1- 23/32	.26
4202-010	1	21/32	1-1/4	21/32	1-25/32	1-29/32	1-25/32	3-19/32	1-23/32	1-23/32	1-23/32	.37
4202-156	1-1/4X1X1/2	3/8	1-1/2	9/16	1-11/16	2- 1/32	1-11/16	3- 3/8	2- 3/32	1- 3/16	1-23/32	.29
4202-166	1-1/4X1/2	7/16	1-15/32	7/16	1-11/16	2-1/32	1-11/16	3-3/8	2- 3/32	1- 3/16	2- 3/32	.25
4202-199	1-1/2X1-1/4X1/2	1/2	1-5/8	9/16	1- 7/8	2- 3/16	1-13/16	3-11/16	2-5/16	1- 3/16	2- 1/16	.36
4202-209	1-1/2X1/2	1/2	1-5/8	1/2	1- 7/8	2- 3/16	1- 7/8	3- 3/4	2- 5/16	1-3/16	2-5/16	.37

Sprinkler Head Tee - Brass Thread Insert Style

(Continued)

Socket x Socket x Fipt

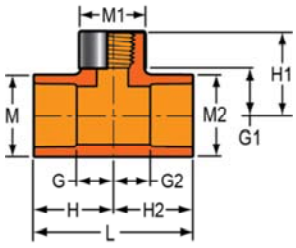


Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
4202-237	2X1-1/2X1/2	1/2	1-7/8	17/32	2	2-7/16	1-15/16	3-15/16	2- 7/8	1- 3/16	2-11/32	.46
4202-247	2X1/2	1/2	1-7/8	1/2	2	2- 7/16	2	4	2-27/32	1-3/16	2-27/32	.50

Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head Tee - Special Reinforced Plastic Thread Style

Socket x Socket x SR Fipt - Stainless Steel Collar
NSF® Certified Lead-Free

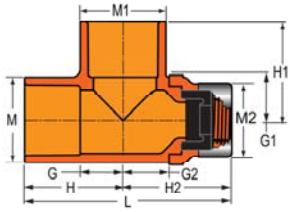


Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
4202-010SR	1	21/32	3/4	21/32	1-25/32	1- 5/8	1-25/32	3-19/32	1-23/32	1-11/16	1-23/32	.27
4202-101SR	3/4X1/2	19/32	25/32	19/32	1-19/32	1- 7/16	1-19/32	3- 7/32	1-3/8	1- 3/16	1-3/8	.15
4202-124SR	1X3/4X1/2	7/16	29/32	9/16	1-19/32	1- 5/8	1- 9/16	3- 5/32	1-23/32	1- 3/16	1-3/8	.19
4202-130SR	1X1/2	7/16	29/32	7/16	1- 9/16	1- 5/8	1- 9/16	3- 1/8	1-23/32	1- 3/16	1-23/32	.19
4202-131SR	1X3/4	5/8	13/16	5/8	1-13/16	1-17/32	1-13/16	3-5/8	1-23/32	1-3/8	1-23/32	.22
4202-156SR	1-1/4X1X1/2	7/16	1- 3/16	9/16	1-21/32	1- 7/8	1-23/32	3-3/8	2- 3/32	1- 3/16	1-23/32	.25
4202-166SR	1-1/4X1/2	7/16	1- 1/8	7/16	1-11/16	1-27/32	1-11/16	3- 3/8	2- 3/32	1- 3/16	2- 3/32	.26
4202-168SR	1-1/4X1	27/32	1- 1/32	27/32	2-1/8	1-29/32	2-1/8	4-1/4	2- 3/32	1-11/16	2- 3/32	.35
4202-199SR	1-1/2X1-1/4X1/2	1/2	1-1/4	21/32	1-7/8	2	1-27/32	3-23/32	2-11/32	1- 3/16	2- 3/32	.33
4202-209SR	1-1/2X1/2	1/2	1- 1/4	1/2	1- 7/8	1-31/32	1- 7/8	3- 3/4	2-11/32	1- 3/16	2-11/32	.34
4202-211SR	1-1/2X1-1/2X1	27/32	1- 3/16	27/32	2- 7/32	2- 3/32	2- 7/32	4-7/16	2-11/32	1-23/32	2-11/32	.44
4202-237SR	2X1-1/2X1/2	17/32	1- 9/16	9/16	2- 1/32	2- 1/4	1- 15/16	3-31/32	2- 7/8	1- 3/16	2-11/32	.45
4202-247SR	2X1/2	1/2	1-17/32	1/2	2	2-1/4	2	4	2- 7/8	1- 3/16	2- 7/8	.48
4202-287SR	2-1/2X1/2	17/32	1- 3/4	17/32	2- 9/32	2- 1/2	2- 9/32	4-19/32	3- 1/2	1-3/16	3- 1/2	.77

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

SofTorque™ SR Sprinkler Head Tee - Gasket Sealed Special Reinforced Plastic Thread Style

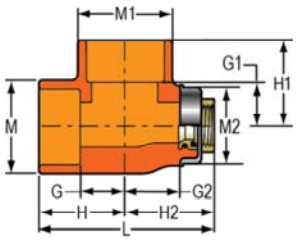
Socket x SR Fipt x Socket - Stainless Steel Collar
With Elastomer Seal - Use NO Thread Sealant
NSF® Certified Lead-Free



Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
4203-122GSR	1X1/2X1	13/16	13/16	1-5/8	1-27/32	1-27/32	1-31/32	3-13/16	1-5/8	1-5/8	1-3/8	.22

TorqueSafe™ Sprinkler Head Tee - Gasket Sealed Brass Thread Insert Style

Socket x Gasket Fipt x Socket
With Elastomer Seal - Use NO Thread Sealant

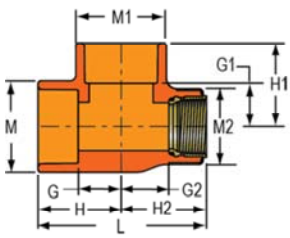


Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
4203-122 G	1X1/2X1	19/32	13/16	1-13/32	1-19/32	1-27/32	1- 3/4	3-11/32	1- 5/8	1- 5/8	1- 3/8	.26

Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head Tee - Brass Thread Insert Style

Socket x Fipt x Socket

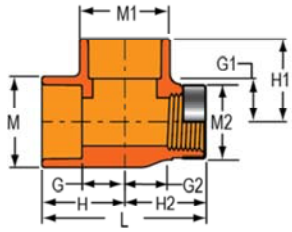


Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
4203-122	1X1/2X1	11/16	11/16	1-13/32	1-19/32	1-19/32	1-29/32	3-1/2	1-11/16	1-3/4	1-3/16	.24

Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head Tee - Special Reinforced Plastic Thread Style

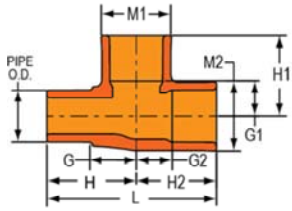
Socket x SR Fipt x Socket - Stainless Steel Collar
NSF® Certified Lead-Free



Part Number	Size	G	G1	G2	H	H1	H2	L	M	M1	M2	Approx. Wt. (Lbs.)
4203-122SR	1X1/2X1	23/32	23/32	1- 3/32	1-19/32	1- 5/8	1-25/32	3-13/32	1- 3/4	1- 3/4	1- 3/16	.21

Street Tee

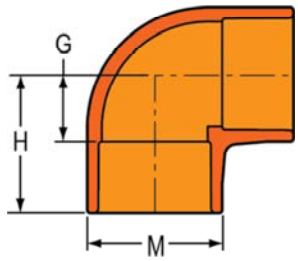
Spigot x Socket x Socket



Part Number	Size	G	G1	G1	G2	H	H1	H2	H2	L	M1	M2	Approx. Wt. (Lbs.)
4244-007	3/4	7/8	5/8	3/4	27/32	1-13/16	1- 11/16	2	1- 7/8	3- 5/8	1-13/32	1-13/32	.16
4244-010	1	1- 1/16			7/8	2- 3/16	1-15/16			4- 3/16	1- 23/32	1- 23/32	.27
4244-012	1-1/4	1- 5/16	15/16		1	2- 9/16	2- 1/4	2- 9/32		4-27/32	2- 3/32	2- 3/32	.41
4244-015	1-1/2	1-13/16	1- 1/8		1- 1/8	2- 3/4	2- 9/16	2- 5/8		5-3/8	2-11/32	2-11/32	.55
4244-020	2	1-3/4	1- 5/16		1-13/32	3- 1/4	2-7/8	2-15/16		6- 5/32	2- 7/8	2- 7/8	.83

90° Ell

Socket x Socket

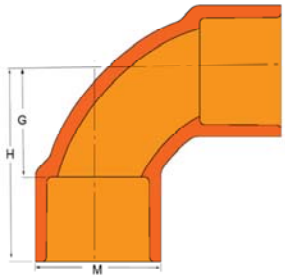


Part Number	Size	G	H	M	Approx. Wt. (Lbs.)
4206-007	3/4	9/16	1- 1/2	1- 5/16	.07
4206-010	1	3/4	1- 5/8	1- 5/8	.12
4206-012	1-1/4	15/16	2-3/16	2	.21
4206-015	1-1/2	1- 5/32	2-17/32	2-11/32	.41
4206-020	2	1-13/32	2-29/32	2- 7/8	.62
4206-025	2-1/2	1-1/2	3- 3/8	3- 1/2	1.14
4206-030	3	2-1/16	4	4-3/16	1.70

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

90° Elbow, Sweep

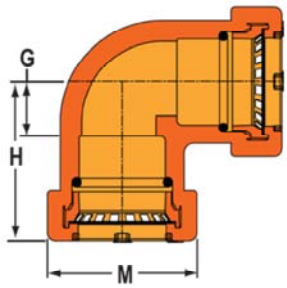
Socket x Socket



Part Number	Size	G	H	M	Approx. Wt. (Lbs.)
4206-010S	1	1-5/16	2-3/8	1-5/8	.15

GripLoc™ 90° Ell

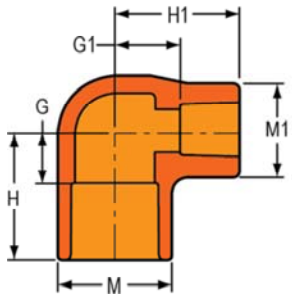
WARNING: DO NOT INSERT FINGERS
EPDM Gasket
Uses No Solvent Cement - NSF® Certified Lead Free



Part Number	Size	G	H	M	Approx. Wt. (Lbs.)
GL4206-010	1	27/32	2-1/2	2-5/16	.38

90° Reducing Ell

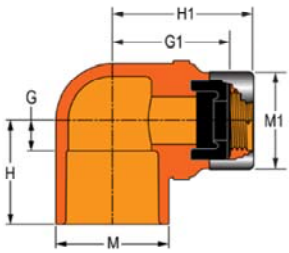
Socket x Socket



Part Number	Size	G	G1	H	H1	M	M1	Approx. Wt. (Lbs.)
4206-131	1X3/4	21/32	13/16	1-25/32	1-13/16	1-19/32	1- 5/16	.11

SofTorque™ SR 90° Sprinkler Head Elbow - Gasket Sealed Special Reinforced Plastic Thread Style

Socket x SR Fipt - Stainless Steel Collar
With Elastomer Seal - Use NO Thread Sealant
NSF® Certified Lead-Free

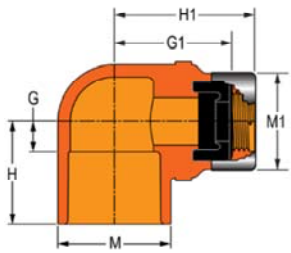


Part Number	Size	G	G1	H	H1	M	M1	Approx. Wt. (Lbs.)
4207-101GSR	3/4X1/2	7/16	1-17/32	1-3/8	1-27/32	1-11/32	1-3/8	.16
4207-130GSR	1X1/2	7/16	1-11/16	1-1/2	2	1-21/32	1-3/8	.18

(Continued)

SofTorque™ SR 90° Sprinkler Head Elbow - Gasket Sealed Special Reinforced Plastic Thread Style

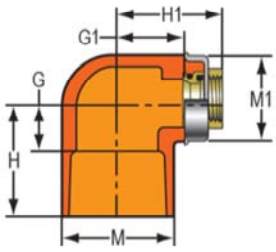
Socket x SR Fipt - Stainless Steel Collar
With Elastomer Seal - Use NO Thread Sealant
NSF® Certified Lead-Free



Part Number	Size	G	G1	H	H1	M	M1	Approx. Wt. (Lbs.)
4207-166GSR	1-1/4X1/2	7/16	1-7/8	1-11/16	2-7/32	2	1-3/8	.22

TorqueSafe™ 90° Sprinkler Head Elbow - Gasket Sealed Brass Thread Insert Style

Socket x Gasket Fipt With Elastomer Seal - Use NO Thread Sealant

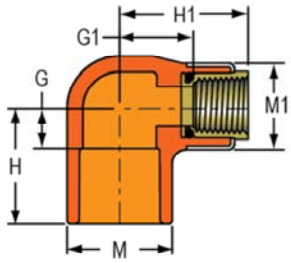


Part Number	Size	G	G1	H	H1	M	M1	Approx. Wt. (Lbs.)
4207-101 G	3/4X1/2	3/8	1- 7/32	1-13/32	1-9/16	1-3/8	1- 3/8	.19
4207-130 G	1X1/2	7/16	1-3/8	1- 9/16	1-11/16	1-11/16	1- 3/8	.23
4207-166 G	1-1/4X1/2	15/32	1-19/32	1-11/16	1-15/16	2- 3/32	1- 3/8	.29

Not intended to convey or dispense water for human consumption through drinking or cooking

Sprinkler Head 90° Ell - Brass Thread Insert Style

Socket x Fipt



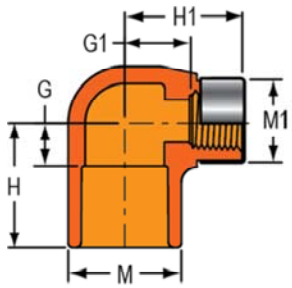
Part Number	Size	G	G1	H	H1	M	M1	Approx. Wt. (Lbs.)
4207-101	3/4X1/2	1/2	1- 3/32	1- 1/2	1- 5/8	1-13/32	1- 3/16	.17
4207-130	1X1/2	7/16	1-7/32	1-19/32	1-25/32	1-23/32	1- 3/16	.20
4207-131	1X3/4	17/32	1-1/4	1-21/32	1-31/32	1-23/32	1- 3/8	.25
4207-166	1-1/4X1/2	15/32	1-3/8	1-11/16	2-1/16	2- 3/32	1-3/16	.24

Not intended to convey or dispense water for human consumption through drinking or cooking

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Sprinkler Head 90° Ell - Special Reinforced Plastic Thread Style

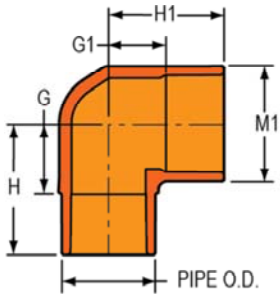
Socket x SR Fipt - Stainless Steel Collar
NSF® Certified Lead-Free



Part Number	Size	G	G1	H	H1	M	M1	Approx. Wt. (Lbs.)
4207-101SR	3/4X1/2	1/2	13/16	1-15/32	1- 1/2	1-13/32	1- 3/16	.13
4207-130SR	1X1/2	7/16	11/16	1- 9/16	1- 1/2	1-23/32	1- 3/16	.13
4207-131SR	1X3/4	1/2	7/8	1- 5/8	1- 9/16	1-23/32	1- 3/8	.16
4207-166SR	1-1/4X1/2	13/32	1- 1/32	1-21/32	1-23/32	2- 3/32	1- 7/32	.18

90° Street Ell

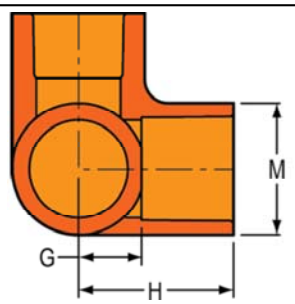
Spigot x Socket



Part Number	Size	G	G1	H	H1	M1	Approx. Wt. (Lbs.)
4209-007	3/4	29/32	11/16	1-15/16	1-11/16	1-13/32	.12
4209-010	1	1-3/32	27/32	2-7/32	2	1-23/32	.20
4209-012	1-1/4	1- 1/4	1	2-9/16	2- 1/4	2- 3/32	.32
4209-015	1-1/2	1-15/32	1-3/16	2-27/32	2- 9/16	2-3/8	.42
4209-020	2	1-23/32	1- 1/2	3- 7/32	3	2-27/32	.64

Side Outlet Ell

Socket x Socket x Socket

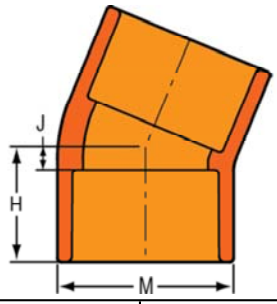


Part Number	Size	G	H	M	Approx. Wt. (Lbs.)
4213-007	3/4	5/8	1-9/16	1- 5/16	.09
4213-010	1	3/4	1- 7/8	1- 5/8	.17

FlameGuard® Product Weights & Dimensions

22-1/2° Ell

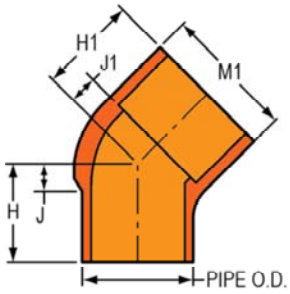
Socket x Socket



Part Number	Size	H	J	M	Approx. Wt. (Lbs.)
4216-007	3/4	1- 3/16	7/32	1-13/32	.08
4216-010	1	1- 3/8	9/32	1-23/32	.28
4216-012	1-1/4	1- 1/2	1/4	2- 3/32	.20
4216-015	1-1/2	1-21/32	9/32	2-11/16	.27
4216-020	2	1- 7/8	3/8	2-27/32	.43
4216-025	2-1/2	2-7/32	15/32	3-1/2	.72
4216-030	3	2- 3/8	1/2	4- 5/32	.76

22-1/2° Street Ell

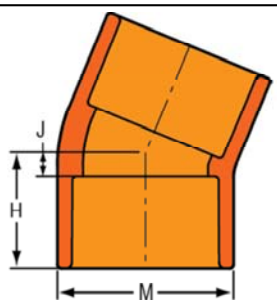
Spigot x Socket



Part Number	Size	H	H1	J	J1	M1	Approx. Wt. (Lbs.)
4242-007	3/4	1- 5/16	1- 1/8	5/16	1/8	1- 3/8	.08
4242-010	1	1- 1/2	1-11/32	3/8	7/32	1-23/32	.14
4242-012	1-1/4	1- 11/16	1-1/2	7/16	1/4	2- 1/16	.21
4242-015	1-1/2	1-13/16	1-23/32	7/16	11/32	2-11/32	.28
4242-020	2	2-1/16	1-7/8	17/32	3/8	2- 7/8	.41
4242-025	2-1/2	2- 7/32	2- 7/32	1/2	15/32	3- 1/2	.76
4242-030	3	2-13/32	2-13/32	17/32	17/32	4- 5/32	.98

45° Ell

Socket x Socket



Part Number	Size	H	J	M	Approx. Wt. (Lbs.)
4217-007	3/4	1-11/32	13/32	1- 5/16	.07
4217-010	1	1-13/32	3/8	1- 5/8	.11
4217-012	1-1/4	1- 5/8	3/8	2- 1/8	.23
4217-015	1-1/2	1-13/16	7/16	2-3/8	.32

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

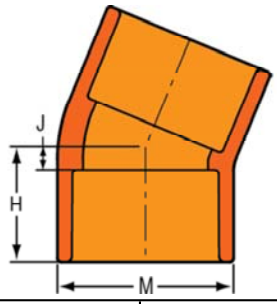
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® Product Weights & Dimensions

45° Ell

(Continued)

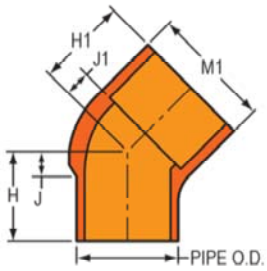
Socket x Socket



Part Number	Size	H	J	M	Approx. Wt. (Lbs.)
4217-020	2	2-1/8	5/8	2-7/8	.47
4217-025	2-1/2	2-7/16	11/16	3- 1/2	.83
4217-030	3	2-3/4	29/32	4- 5/32	1.21

45° Street Ell

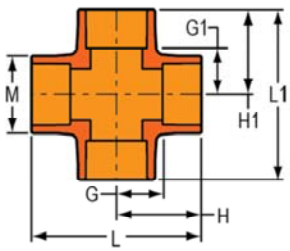
Spigot x Socket



Part Number	Size	H	H1	J	J1	M1	Approx. Wt. (Lbs.)
4227-010	1	1- 1/2	1- 3/8	1/2	1/4	1- 5/8	.09
4227-012	1-1/4	1-25/32	1- 9/16	9/16	11/32	1-31/32	.15
4227-015	1-1/2	2- 1/32	1-3/4	11/16	3/8	2-11/32	.28
4227-020	2	2- 5/16	1-15/16	7/8	13/32	2- 7/8	.43

Cross

Socket x Socket x Socket x Socket

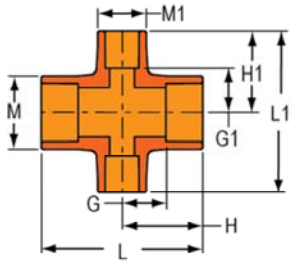


Part Number	Size	G	G1	H	H1	L	L1	M	Approx. Wt. (Lbs.)
4220-007	3/4	5/8	5/8	1-5/8	1-5/8	3- 1/4	3-1/4	1-13/32	.21
4220-010	1	3/4	3/4	1- 5/8	1- 5/8	3- 1/4	3- 1/4	1-23/32	.22
4220-012	1-1/4	1- 1/8	1- 1/8	2- 3/8	2- 3/8	4- 3/4	4- 3/4	2- 3/32	.63
4220-015	1-1/2	1-13/64	1- 7/32	2-39/64	2- 5/8	5-1/4	5-1/4	2- 3/8	.80
4220-020	2	1- 1/2	1- 1/2	3	3	6	6	3	1.40
4220-025	2-1/2	1-11/16	1-11/16	3- 7/16	3- 7/16	6- 7/8	6- 7/8	3-17/32	2.11
4220-030	3	2- 3/32	2- 3/32	3-31/32	3-31/32	7-15/16	7-15/16	4- 7/16	3.37

FlameGuard® Product Weights & Dimensions

Reducing Cross

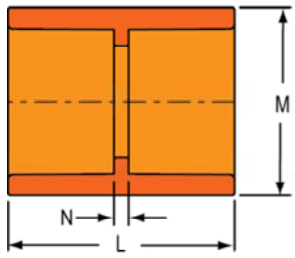
Socket x Socket x Socket x Socket



Part Number	Size	G	G1	H	H1	L	L1	M	M1	Approx. Wt. (Lbs.)
4220-131	1X3/4	23/32	5/8	1- 5/8	1- 5/8	3- 1/4	3- 1/4	1- 7/8	1- 1/2	.35
4220-167	1-1/4X3/4	3/4	1-1/32	2	2- 3/64	4	4- 3/32	2- 1/16	1-3/8	.35
4220-210	1-1/2X3/4	11/16	1- 5/32	2- 3/32	2-11/64	4- 3/16	4-11/32	2- 3/8	1-13/32	.41
4220-248	2X3/4	11/16	1-7/16	2-13/64	2-7/16	4-13/32	4-7/8	2-29/32	1-13/32	.55
4220-289	2-1/2X1	29/32	1- 3/4	2-43/64	2- 7/8	5-11/32	5- 3/4	3- 1/2	1- 3/4	.98

Coupling

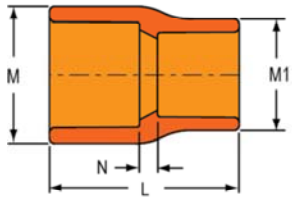
Socket x Socket



Part Number	Size	L	M	N	Approx. Wt. (Lbs.)
4229-007	3/4	1-31/32	1-5/16	3/32	.04
4229-010	1	2- 3/16	1- 5/8	3/32	.07
4229-012	1-1/4	2-19/32	2	3/32	.12
4229-015	1-1/2	2- 7/8	2-11/32	3/32	.22
4229-020	2	3- 1/8	2-27/32	3/32	.32
4229-025	2-1/2	3-11/16	3-15/32	3/16	.58
4229-030	3	4	4- 3/16	1/4	.89

Reducer Coupling

Socket x Socket



Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
4229-131	1X3/4	2- 3/8	1-23/32	1-13/32	7/32	.11
4229-167	1-1/4X3/4	2-19/32	2- 3/32	1- 5/8	11/32	.14
4229-168	1-1/4X1	2-11/16	2- 3/32	1-23/32	5/16	.17
4229-210	1-1/2X3/4	2-13/16	2-11/32	1-13/32	15/32	.18
4229-211	1-1/2X1	2- 7/8	2-13/32	1-15/16	3/8	.21
4229-212	1-1/2X1-1/4	2-13/16	2-13/32	2- 1/8	5/32	.22

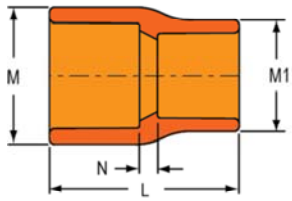
Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Reducer Coupling

(Continued)

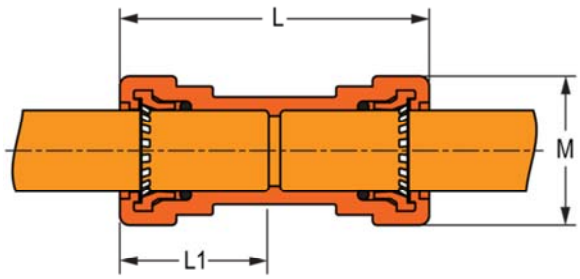
Socket x Socket



Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
4229-248	2X3/4	3- 3/16	2- 7/8	1- 7/16	23/32	.32
4229-249	2X1	3-1/2	3	1-23/32	27/32	.38
4229-250	2X1-1/4	3- 3/16	2- 7/8	2- 1/8	17/32	.33
4229-251	2X1-1/2	3- 3/16	2-27/32	2-11/32	1/4	.30
4229-291	2-1/2X1-1/2	3-23/32	3-15/32	2-11/32	9/16	.50
4229-292	2-1/2X2	3-21/32	3- 1/2	2- 7/8	13/32	.51
4229-337	3X1-1/2	3-1/2	4-3/16	2-3/8	7/32	.69
4229-339	3X2-1/2	3-27/32	4- 3/16	3- 1/2	1/4	.79

GripLoc™ Coupling

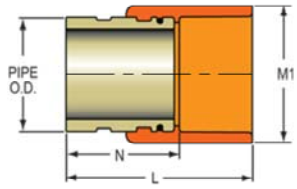
WARNING: DO NOT INSERT FINGERS
EPDM Gasket
Uses No Solvent Cement - NSF® Certified Lead Free



Part Number	Size	L	L1	M	Approx. Wt. (Lbs.)
GL4229-007	3/4	4-1/16	1-15/16	1-15/16	.27
GL4229-010	1	4-3/16	2	2-5/16	.37
GL4229-020	2	4-7/16	2-1/8	3-5/8	.90

Grooved Coupling Adapter

Groove x Socket

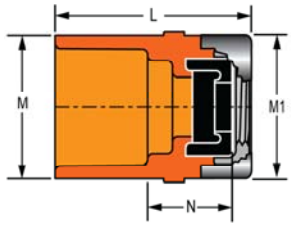


Part Number	Size	L	M1	N	Approx. Wt. (Lbs.)
4233-012	1-1/4	3- 5/8	2- 3/32	2-11/32	.71
4233-015	1-1/2	3- 3/4	2-11/32	2-11/32	.83
4233-020	2	3-27/32	2-27/32	2-11/32	1.29
4233-025	2-1/2	4- 3/16	3-15/32	2- 7/16	2.03
4233-030	3	4- 5/16	4- 5/32	2- 7/16	2.72

Not intended to convey or dispense water for human consumption through drinking or cooking

QuickTorque™ SR Female Sprinkler Head Adapter - Gasket Sealed Special Reinforced Metal Thread Style

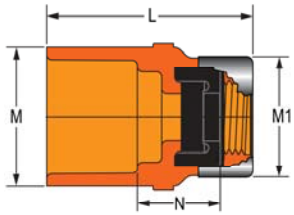
Socket x SR Fipt - Stainless Steel Collar
With Elastomer Seal - Use NO Thread Sealant
NSF® Certified Lead Free



Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
4235-101GMR	3/4X1/2	1-15/16	1-5/16	1-9/16	15/16	.16
4235-130GMR	1X1/2	2-1/4	1-5/8	1-9/16	15/16	.18

SofTorque™ SR Female Sprinkler Head Adapter - Gasket Sealed Special Reinforced Plastic Thread Style

Socket x SR Fipt - Stainless Steel Collar
With Elastomer Seal - Use NO Thread Sealant
NSF® Certified Lead-Free

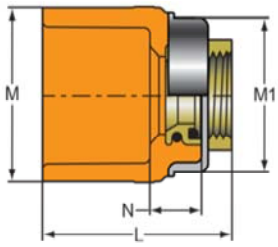


Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
4235-101GSR	3/4X1/2	2-1/8	1-23/32	1-3/8	31/32	.11
4235-130GSR	1X1/2	2- 3/8	1- 23/32	1- 3/8	1	.12

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

TorqueSafe™ Female Sprinkler Head Adapter - Gasket Sealed Brass Thread Insert Style

Socket x Gasket Fipt
With Elastomer Seal - Use NO Thread Sealant

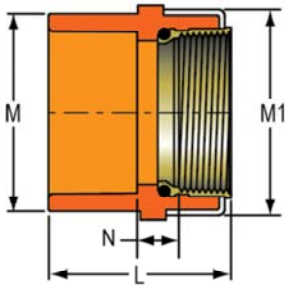


Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
4235-101 G	3/4X1/2	1- 7/8	1-13/32	1- 3/8	17/32	.15
4235-130GS	1X1/2	2-1/32	1-11/16	1- 3/8	17/32	.17
4235-131 G	1X3/4	2	1-11/16	1- 9/16	9/16	.25

Not intended to convey or dispense water for human consumption through drinking or cooking

Female Adapter - Brass Thread Insert Style

Socket x Fipt

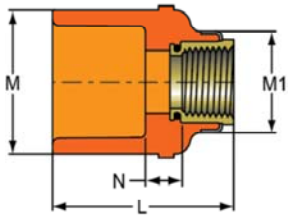


Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
4235-007	3/4	2- 1/8	1-13/32	1- 3/8	3/8	.16
4235-010	1	2- 3/16	1- 3/4	1-11/16	5/16	.24
4235-012	1-1/4	2- 3/8	2- 3/32	2- 1/16	1/4	.34
4235-015	1-1/2	2-17/32	2-11/32	2- 7/16	3/8	.48
4235-020	2	2-25/32	2-27/32	3- 3/16	3/8	1.00

Not intended to convey or dispense water for human consumption through drinking or cooking

Female Sprinkler Head Adapter - Brass Thread Insert Style

Socket x Fipt

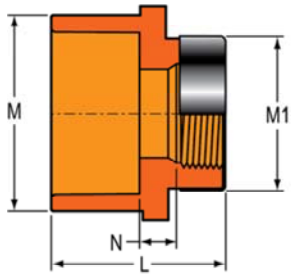


Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
4235-101	3/4X1/2	2-1/16	1-13/32	1-3/16	15/32	.13
4235-130	1X1/2	2-11/32	1-11/16	1- 3/16	5/8	.16
4235-131	1X3/4	2- 5/16	1-11/16	1- 3/8	17/32	.18

Not intended to convey or dispense water for human consumption through drinking or cooking

Female Sprinkler Head Adapter - Special Reinforced Plastic Thread Style

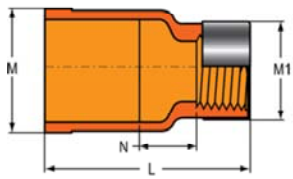
Socket x SR Fipt - Stainless Steel Collar
NSF® Certified Lead-Free



Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
4235-101SR	3/4X1/2	1-29/32	1-13/32	1- 3/16	1/8	.07
4235-130SR	1X1/2	2-7/32	1-23/32	1-3/16	11/32	.10
4235-131SR	1X3/4	2- 3/32	1- 3/4	1- 3/8	1/4	.12

Female Sprinkler Head Adapter - Special Reinforced Plastic Thread Style with Socket Body Wrench Flats

Socket x SR Fipt - Stainless Steel Collar
NSF® Certified Lead-Free

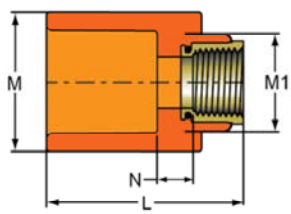


M = Flat to Flat Dimension

Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
W4235-101SR	3/4X1/2	2- 9/32	1-13/32	1- 3/16	17/32	.09
W4235-130SR	1X1/2	2- 9/32	1-3/8	1- 3/16	13/32	.11

Female Sprinkler Head Adapter - Brass Thread Insert Style with Long Body

Socket x Fipt



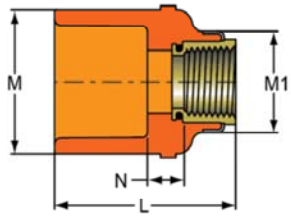
Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
L4235-130	1X1/2	2- 3/16	1-23/32	1- 7/32	1/2	.18

Not intended to convey or dispense water for human consumption through drinking or cooking

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Female Sprinkler Head Adapter - Brass Thread Insert Style with Positioning Ring

Socket x Fipt

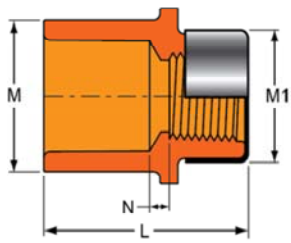


Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
R4235-101	3/4X1/2	2- 1/32	1- 7/16	1- 3/16	15/32	.14

Not intended to convey or dispense water for human consumption through drinking or cooking

Female Sprinkler Head Adapter - Special Reinforced Plastic Thread Style with Positioning Ring

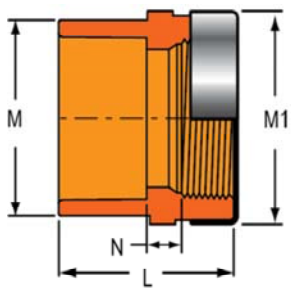
Socket x SR Fipt - Stainless Steel Collar



Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
R4235-101SR	3/4X1/2	1-15/16	1- 7/16	1- 7/32	7/32	.09

Female Adapter - Special Reinforced Plastic Thread Style

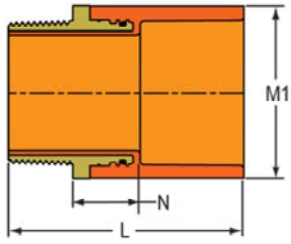
Socket x SR Fipt - Stainless Steel Collar
NSF® Certified Lead-Free



Part Number	Size	L	M	M1	N	Approx. Wt. (Lbs.)
4235-007SR	3/4	1- 7/8	1-13/32	1- 3/8	3/32	.08
4235-010SR	1	2- 5/32	1-23/32	1- 11/16	3/32	.12
4235-012SR	1-1/4	2- 5/16	2- 1/8	2- 1/16	3/16	.20

Transition Male Adapter with Brass Thread

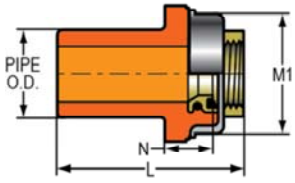
Mipt x Socket
NSF® Certified Lead-Free



Part Number	Size	L	M1	N	Approx. Wt. (Lbs.)
4236-007	3/4	2-17/32	1-13/32	13/16	.28
4236-010	1	2-15/16	1-23/32	29/32	.44
4236-012	1-1/4	3- 1/8	2- 3/32	31/32	.68
4236-015	1-1/2	3- 9/32	2-11/32	31/32	.81
4236-020	2	3- 7/16	2-27/32	1	1.09

TorqueSafe™ Female Spigot Sprinkler Head Adapters - Gasket Sealed Brass Thread Insert Style

Spigot x Gasket Fipt
With Elastomer Seal - Use NO Thread Sealant

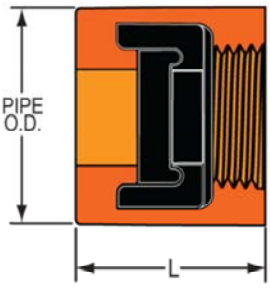


Part Number	Size	L	M	N	Approx. Wt. (Lbs.)
4238-101 G	3/4X1/2	1-15/16	1- 3/8	1-17/32	.14
4238-130 G	1X1/2	2- 1/16	1- 3/8	1-21/32	.20

Not intended to convey or dispense water for human consumption through drinking or cooking

SofTorque™ Reducer Bushing - Gasket Sealed Plastic Thread Style

Spigot x Fipt - With Elastomer Seal - Use NO Thread Sealant

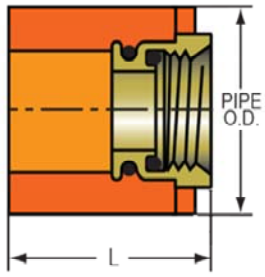


Part Number	Size	L	Approx. Wt. (Lbs.)
4238-130GSR	1X1/2	1-5/32	.05

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

TorqueSafe™ Bushing - Gasket Sealed Brass Thread Insert Style

Spigot x Gasket Fipt
With Elastomer Seal - Use NO Thread Sealant

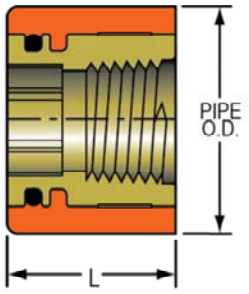


Part Number	Size	L	Approx. Wt. (Lbs.)
4238-130BR G	1X1/2	1-1/4	.10

Not intended to convey or dispense water for human consumption through drinking or cooking

Bushing - with Brass Thread Insert

Spigot x Fipt

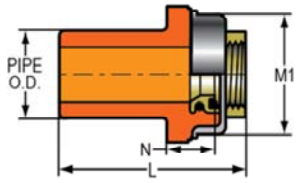


Part Number	Size	L	Approx. Wt. (Lbs.)
4238-130BR	1X1/2	1	.21

Not intended to convey or dispense water for human consumption through drinking or cooking

Spigot Female Sprinkler Head Adapters - Brass Thread Insert Style

Spigot x Fipt

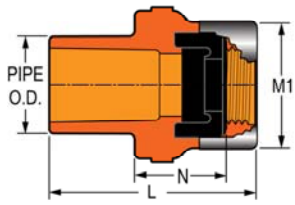


Part Number	Size	L	M1	N	Approx. Wt. (Lbs.)
4238-101	3/4X1/2	2- 5/32	1- 7/32	19/32	.12
4238-130	1X1/2	2- 1/4	1- 3/16	9/16	.13

Not intended to convey or dispense water for human consumption through drinking or cooking

SofTorque™ Spigot Female Adapter - Gasket Sealed Special Reinforced Plastic Thread Style

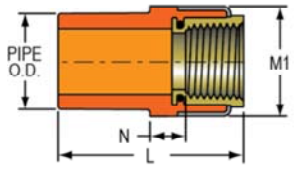
Spigot x SR Fipt - Stainless Steel Collar
With Elastomer Seal - Use NO Thread Sealant
NSF® Certified Lead Free



Part Number	Size	L	M1	N	Approx. Wt. (Lbs.)
4278-101GSR	3/4X1/2	2-1/4	1-3/8	1	.11
4278-130GSR	1X1/2	2-3/8	1-3/8	11/16	.12

Spigot Female Adapter - Brass Thread Insert Style

Spigot x Fipt

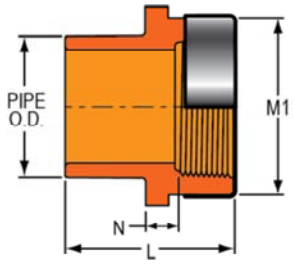


Part Number	Size	L	M1	N	Approx. Wt. (Lbs.)
4278-007	3/4	2- 5/32	1- 3/8	1/2	.17
4278-010	1	2- 9/32	1-11/16	7/16	.22

Not intended to convey or dispense water for human consumption through drinking or cooking

Spigot Female Adapter - Special Reinforced Plastic Thread Style

Spigot x SR Fipt - Stainless Steel Collar
NSF® Certified Lead-Free

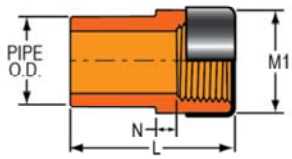


Part Number	Size	L	M1	N	Approx. Wt. (Lbs.)
4278-007SR	3/4	1-15/16	1- 3/8	5/16	.07
4278-010SR	1	2- 1/4	1-23/32	5/16	.13

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Spigot Female Sprinkler Head Adapters - Special Reinforced Plastic Thread Style

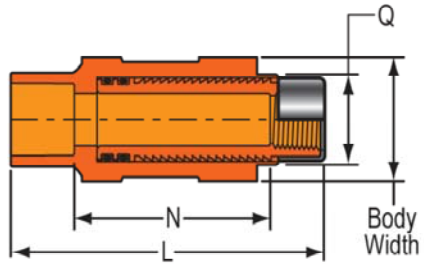
Spigot x SR Fipt - Stainless Steel Collar
NSF® Certified Lead-Free



Part Number	Size	L	M1	N	Approx. Wt. (Lbs.)
4238-101SR	3/4X1/2	1-29/32	1- 7/32	1/8	.06
4238-130SR	1X1/2	2- 1/32	1- 7/32	7/32	.08

Adjustable Sprinkler Head Adapters - Special Reinforced Plastic Thread Style

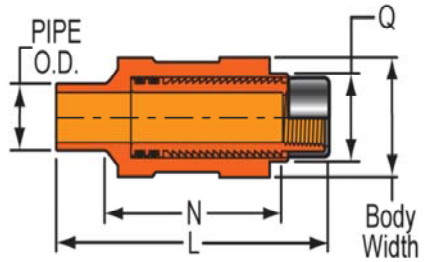
Socket x SR Fipt - Stainless Steel Collar
TRAVEL = 1-9/16"
NSF® Certified Lead-Free



Part Number	Size	L-Max	L-Min	N-Max	N-Min	Q	Body Width	Approx. Wt. (Lbs.)
42001SR	3/4X1/2	8-1/4	6-5/8	6-9/16	4-7/8	1- 1/4	2-3/16	.65
42011SR	1X1/2	8-3/8	6-3/4	6-9/16	4-7/8	1- 1/4	2-3/16	.67

Adjustable Sprinkler Head Adapters - Special Reinforced Plastic Thread Style

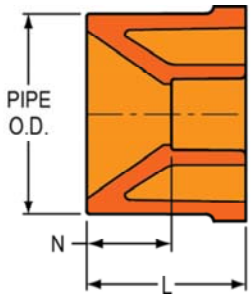
Spigot x SR Fipt - Stainless Steel Collar
TRAVEL = 1-5/8"
NSF® Certified Lead-Free



Part Number	Size	L-Max	L-Min	N-Max	N-Min	Q	Body Width	Approx. Wt. (Lbs.)
42004SR	3/4X1/2	8-1/4	6-3/4	7-1/2	6	1- 1/4	2-3/16	.64
42014SR	1X1/2	8-1/4	6-3/4	7-1/2	6	1- 1/4	2-3/16	.65

Reducer Bushing - Flush Style

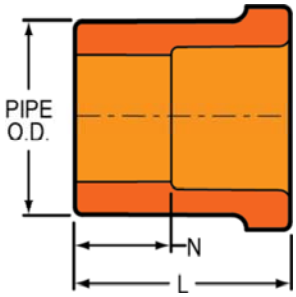
Spigot x Socket



Part Number	Size	L	N	Approx. Wt. (Lbs.)
4237-131	1X3/4	1- 1/4	1/4	.03
4237-167	1-1/4X3/4	1- 7/16	7/16	.09
4237-168	1-1/4X1	1-13/32	9/32	.06
4237-210	1-1/2X3/4	1- 5/8	5/8	.16
4237-211	1-1/2X1	1-17/32	13/32	.12
4237-212	1-1/2X1-1/4	1- 9/16	5/16	.06
4237-248	2X3/4	1-29/32	29/32	.27
4237-249	2X1	1-23/32	9/16	.24
4237-250	2X1-1/4	1-11/16	7/16	.20
4237-251	2X1-1/2	1-11/16	5/16	.15
4237-290	2-1/2X1-1/4	2- 5/32	7/8	.43
4237-291	2-1/2X1-1/2	2- 5/32	3/4	.39
4237-292	2-1/2X2	2-1/4	3/4	.29
4237-338	3X2	2- 7/32	11/16	.62
4237-339	3X2-1/2	2- 5/16	1/4	.39

Transition Bushing

IPS Spigot x CTS Socket



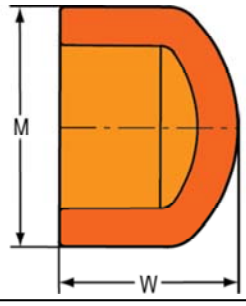
Part Number	Size	L	N	Approx. Wt. (Lbs.)
4240-101	3/4X1/2	1- 1/8	5/8	.03
4240-130	1X1/2	1- 1/4	3/4	.05

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Cap

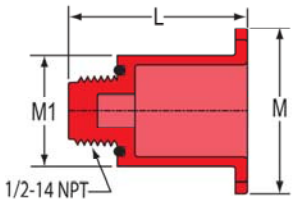
Socket



Part Number	Size	M	W	Approx. Wt. (Lbs.)
4247-007	3/4	1-5/16	1-5/16	.03
4247-010	1	1- 5/8	1- 9/16	.06
4247-012	1-1/4	2- 3/32	1-27/32	.12
4247-015	1-1/2	2-11/32	2	.16
4247-020	2	2-27/32	2- 9/32	.26
4247-025	2-1/2	3-17/32	2- 5/8	.47
4247-030	3	4- 3/8	3	.91

Test Plug - O-ring Sealed

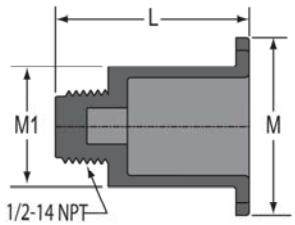
Mipt – For Pressure Testing Only.
NOT for use with TorqueSafe™ or Z4235 Series Adapters



Part Number	Size	L	M	M1	Approx. Wt. (Lbs.)
FTP-005	1/2	1-27/32	1-15/16	1- 1/4	.03
DO NOT use with tape or paste thread sealants					

Test Plug for TorqueSafe™ & SofTorque™ Gasket Sealed Head Adapters

Mipt – For Pressure Testing Only.
Use ONLY with Gasket Sealed Adapters

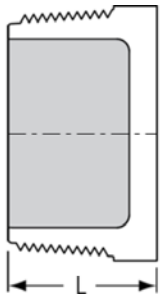


Part Number	Size	L	M	M1	Approx. Wt. (Lbs.)
FTP-005GS	1/2	1-25/32	2- 1/32	1- 1/4	.05

FlameGuard® Product Weights & Dimensions

Test Plug - White PVC

Mipt - For Pressure Testing Only

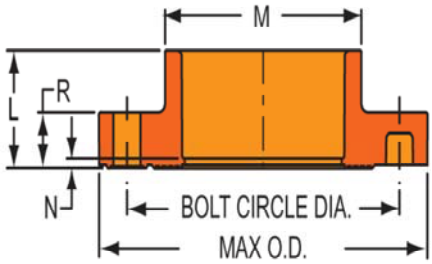


Part Number	Size	L	Approx. Wt. (Lbs.)
4250-005	1/2	27/32	.01

Requires use of a thread sealant

Flange

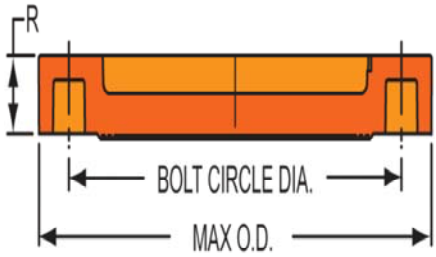
Socket - 4 Bolt Holes - 175 psi (1.21 Mpa) @ 150°F (66°C)



Part Number	Size	L	M	N	R	Bolt Circle Dia.	Bolt Size	Max. O.D.	Min. Bolt Length	No of Bolts	Approx. Wt. (Lbs.)
4251-007	3/4	1- 5/32	1- 1/2	1/8	5/8	2- 3/4	1/2	3-29/32	2	4	.31
4251-010	1	1- 9/32	1-13/16	3/32	21/32	3- 1/8	1/2	4-9/32	2-1/4	4	.35
4251-012	1-1/4	1-13/32	2- 7/32	5/32	11/16	3- 1/2	1/2	4-5/8	2-1/4	4	.44
4251-015	1-1/2	1-5/8	2- 1/2	3/16	23/32	3-7/8	1/2	5-1/16	2-1/2	4	.51
4251-020	2	1-27/32	3	5/16	27/32	4- 3/4	5/8	5-31/32	3	4	.94
4251-025	2-1/2	2- 7/32	3- 1/2	7/16	1- 1/32	5- 1/2	5/8	7	3-1/4	4	1.57

Blind Flange

4 Bolt Holes - 175 psi (1.21 Mpa) @ 150°F (66°C)



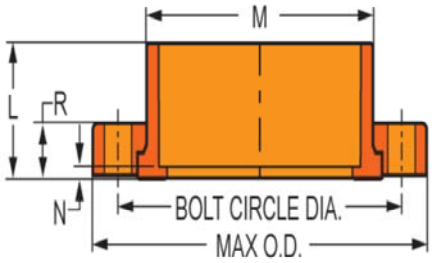
Part Number	Size	R	Bolt Circle Dia.	Bolt Size	Max. O.D.	Min. Bolt Length	No of Bolts	Approx. Wt. (Lbs.)
4253-007	3/4	5/8	2- 3/4	1/2	3-27/32	2	4	.29
4253-010	1	23/32	3- 1/8	1/2	4-1/4	2-1/4	4	.34
4253-012	1-1/4	21/32	3- 1/2	1/2	4-5/8	2-1/4	4	.39
4253-015	1-1/2	23/32	3-7/8	1/2	5-1/16	2-1/2	4	.65
4253-020	2	27/32	4- 3/4	5/8	5-31/32	3	4	.88
4253-025	2-1/2	1- 1/32	5- 1/2	5/8	6-15/16	3-1/4	4	1.70
4253-030	3	1-1/16	6	5/8	7-5/8	3-1/4	4	1.78

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Flange - Van Stone Style

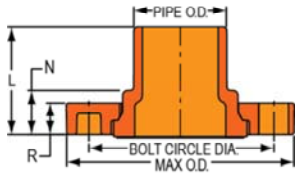
Socket - 4 Bolt Holes - 175 psi (1.21 Mpa) @ 150°F (66°C)



Part Number	Size	L	M	N	R	Bolt Circle Dia.	Bolt Size	Max. O.D.	Min. Bolt Length	No of Bolts	Approx. Wt. (Lbs.)
4254-030	3	2-1/16	4- 1/4	3/16	1-1/16	6	5/8	7-17/32	3-1/4	4	1.76

Flange - Van Stone Style

Spigot - 4 Bolt Holes - 175 psi (1.21 Mpa) @ 150°F (66°C)

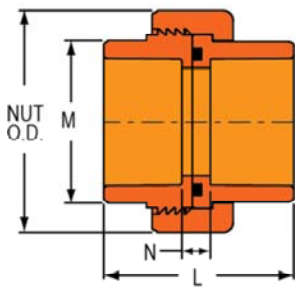


Part Number	Size	L	N	R	Bolt Circle Dia.	Bolt Size	Max. O.D.	Min. Bolt Length	No of Bolts	Approx. Wt. (Lbs.)
4256-007	3/4	1-15/16	13/16	9/16	2- 3/4	1/2	3-27/32	2	4	.29
4256-010	1	2-1/8	15/16	5/8	3- 1/8	1/2	4-1/4	2-1/4	4	.40
4256-012	1-1/4	2-1/4	1	5/8	3- 1/2	1/2	4-5/8	2-1/4	4	.50
4256-015	1-1/2	2- 7/16	1	23/32	3- 7/8	1/2	4-31/32	2-1/2	4	.64
4256-020	2	2-3/4	1-1/4	13/16	4- 3/4	5/8	5-31/32	3	4	1.00
4256-025	2-1/2	3- 1/16	1- 1/4	1	5- 1/2	5/8	6-15/16	3-1/4	4	1.65
4256-030	3	3-5/16	1-9/32	1- 1/32	6	5/8	7-9/16	3-1/4	4	1.93

Union

Socket x Socket

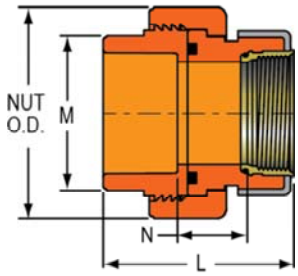
175 psi (1.21 Mpa) @ 150°F (66°C)



Part Number	Size	L	M	N	NUT O.D.	Approx. Wt. (Lbs.)
4257-007	3/4	2- 3/8	1-1/2	3/8	2- 1/2	.27
4257-010	1	2- 9/16	1-7/8	5/16	2- 7/8	.38
4257-012	1-1/4	2-7/8	2- 7/32	11/32	3- 5/16	.50
4257-015	1-1/2	3-5/32	2- 1/2	1/2	3-17/32	.64
4257-020	2	3- 5/8	3	9/16	4- 3/16	1.01

Transition Union - Metal Thread Insert Style

Socket x Fipt
175 psi (1.21 Mpa) @ 150°F (66°C)

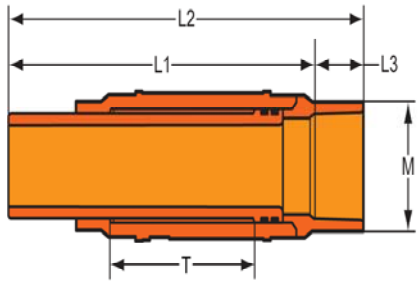


Part Number	Size	L	M	N	NUT O.D.	Approx. Wt. (Lbs.)
4259-010BR	1	2-13/16	1- 7/8	1	2- 7/8	.52
4259-012BR	1-1/4	3-5/16	2-7/32	1-9/32	3-5/16	.98
4259-015BR	1-1/2	3- 1/2	2-9/16	1-11/32	3-17/32	1.20
4259-020BR	2	3- 5/8	2- 7/8	1- 1/4	4- 5/16	1.61

Not intended to convey or dispense water for human consumption through drinking or cooking

Short Repair Couplings

Spigot x Socket
175 psi (1.21 Mpa) @ 150°F (66°C)

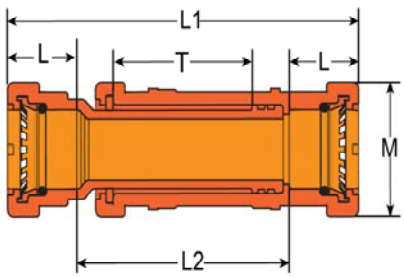


Part Number	Size	L1	L2	L3	M	T	Approx. Wt. (Lbs.)
SH118-07CO	3/4	4-3/4	5-1/2	3/4	1-1/2	2	.30
SH118-10CO	1	4-3/4	5-5/8	15/16	1-7/8	2-1/8	.41

Unit Must Be Thrust Blocked

GripLoc™ Repair Coupling

WARNING: DO NOT INSERT FINGERS
EPDM Gasket
Uses No Solvent Cement - NSF® Certifed Lead Free
175 psi (1.21 Mpa) @ 150°F (66°C)



Part Number	Size	L	L1	L2	M	T	Approx. Wt. (Lbs.)
SG118-07CO	3/4	1-1/2	7-3/8	4-3/8	1-29/32	2-15/16	.62
SG118-10CO	1	1-1/2	7-1/2	4-1/2	2-1/4	2-15/16	.75

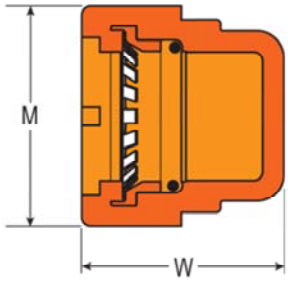
Unit Must Be Thrust Blocked

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® Product Weights & Dimensions

GripLoc™ Cap

WARNING: DO NOT INSERT FINGERS
EPDM Gasket
Uses No Solvent Cement - NSF® Certifed Lead Free
175 psi (1.21 Mpa) @ 150°F (66°C)



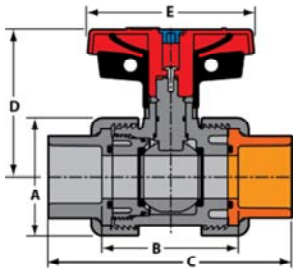
Part Number	Size	M	W	Approx. Wt. (Lbs.)
GL4247-007	3/4	1-15/16	1-11/16	.14
GL4247-010	1	2-5/16	2	.20

FlameGuard® CPVC Drain & Swing Check Valves for NFPA 13D Application Only

Application: FlameGuard® CPVC Orange Swing Check Valves and PVC/CPVC True Union Drain Valves are for use in Configuring CPVC Fire Sprinkler System connection to water supply (riser/drain assembly) in NFPA 13D installations only. These valves are not UL listed and NOT for use in any other locations within the fire sprinkler system.

True Union Industrial Drain Valve With Locking Handle

Socket x Socket
CPVC Gray Valve with CPVC Orange End Connector

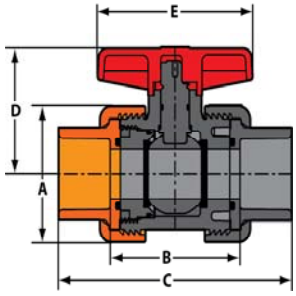


Not UL Listed

Part Number	Size	A	B	C	D	E	Approx. Wt. (Lbs.)
1822-007CFG	3/4	2-3/8	2-13/16	4-13/16	2-7/8	3-3/8	.62
1822-010CFG	1	2-5/8	2-15/16	5-3/16	3-1/8	3-7/16	.83
1822-012CFG	1-1/4	3-3/16	3-1/4	5-13/16	3-5/8	3-7/8	1.24
1822-015CFG	1-1/2	3-9/16	3-9/16	6-5/16	4	4-3/16	1.62
1822-020CFG	2	4-1/4	4-3/4	7-13/16	4-7/16	5-1/8	2.86

True Union Standard Drain Valves

Socket x Socket
PVC Gray Valve with CPVC Orange End Connector

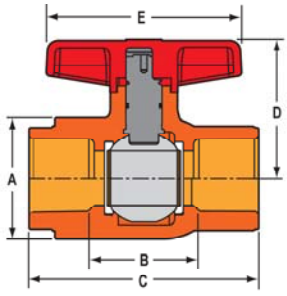


Not UL Listed

Part Number	Size	A	B	C	D	E	Approx. Wt. (Lbs.)
3622-007FG	3/4	2-3/8	2-13/16	4-13/16	2	3	.57
3622-010FG	1	2-5/8	2-15/16	5-3/16	2-5/16	3-5/16	.74

Compact 2000 Drain Valve

Socket x Socket



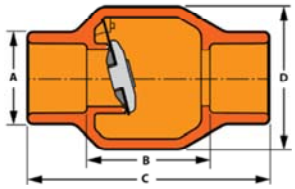
Not UL Listed

Part Number	Size	A	B	C	D	E	Approx. Wt. (Lbs.)
6622-007CO	3/4	1-3/4	1-1/2	3-1/2	2	3	.31
6622-010CO	1	2-1/16	1-3/4	4	2-5/16	3-3/8	.46

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

CPVC Swing Check Valves

Socket x Socket

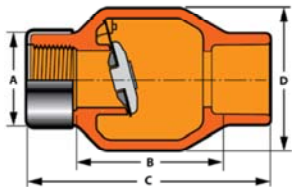


Not UL Listed

Part Number	Size	A	B	C	D	Approx. Wt. (Lbs.)
S1520-10CO	1	1-11/16	2-7/16	4-11/16	2-5/8	.40
S1520-12CO	1-1/4	2-1/16	3	5-1/2	3-3/8	.59
S1520-15CO	1-1/2	2-7/16	3	5-5/8	3-3/8	.79

CPVC Special Reinforced Thread Inlet Swing Check Valves

SR Fipt x Socket



Not UL Listed

Part Number	Size	A	B	C	D	Approx. Wt. (Lbs.)
S1520-10FSRSCO	1	1-11/16	2-15/16	4-23/32	2-5/8	.43
S1520-12FSRSCO	1-1/4	2-1/16	3-3/8	5-1/2	3-3/8	.69
S1520-15FSRSCO	1-1/2	2-7/16	3-3/8	5-5/8	3-3/8	.87

TorqueSafe™

- **Eliminates Radial Stress**
- **Requires NO Thread Sealants**
- **Eliminates Sealant Incompatibility**
- **Prevents Over-Tightening**
- **Provides Easy Frame Alignment**
- **UL® Listed for U.S. and Canada**
- **FM® Approved**

Spears® **TorqueSafe**™ revolutionary design features a special molded-in-place Brass Thread Insert fitted with an elastomer gasket seal at the base of the threads. The gasket seal allows a modified thread design that eliminates radial stress and associated problems typical with tapered thread joint make up. The insert is designed to rotate during head installation for easy sprinkler frame alignment without over tightening.

No Sealant = No Problem

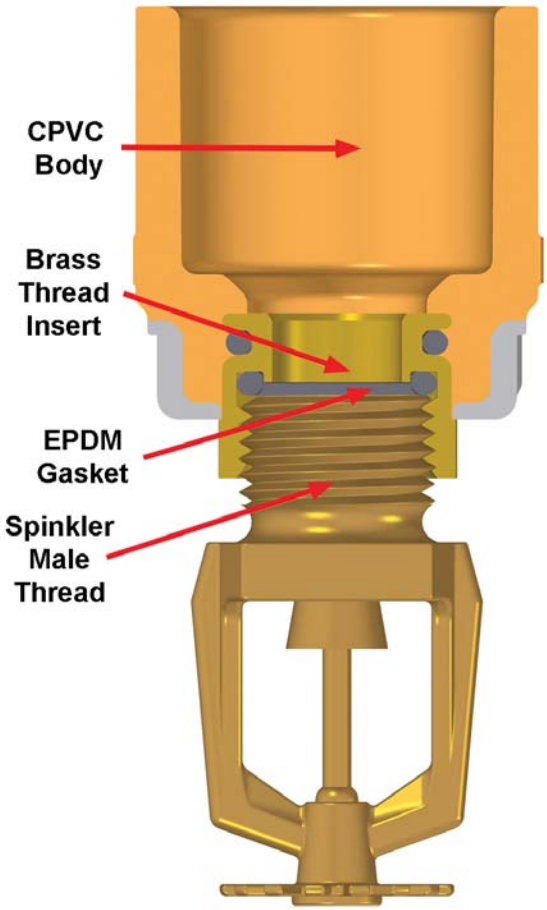
Using incompatible thread pastes and pipe dopes is the major cause of environmental stress cracking in plastics. Tape sealants are far too frequently improperly or excessively applied. These problems are fully eliminated.

NO-Stress Thread Design

The modified straight thread design is engineered to provide a tight joint at full engagement without radial stress from tapered thread expansion. An internal gasket retaining lip serves as a positive stop against over-tightening. No stress assures years of long, trouble free service.

Gasket Sealing

An EPDM gasket has been engineered for sealing against the sprinkler head. The NPT male thread starts on all sprinkler heads provide a uniform surface for positive, reliable seal. Hundreds of tests have been performed using virtually all brands of heads and even rough, galvanized pipe nipples without any damage or loss of sealing.



Patent No. 7,458,613

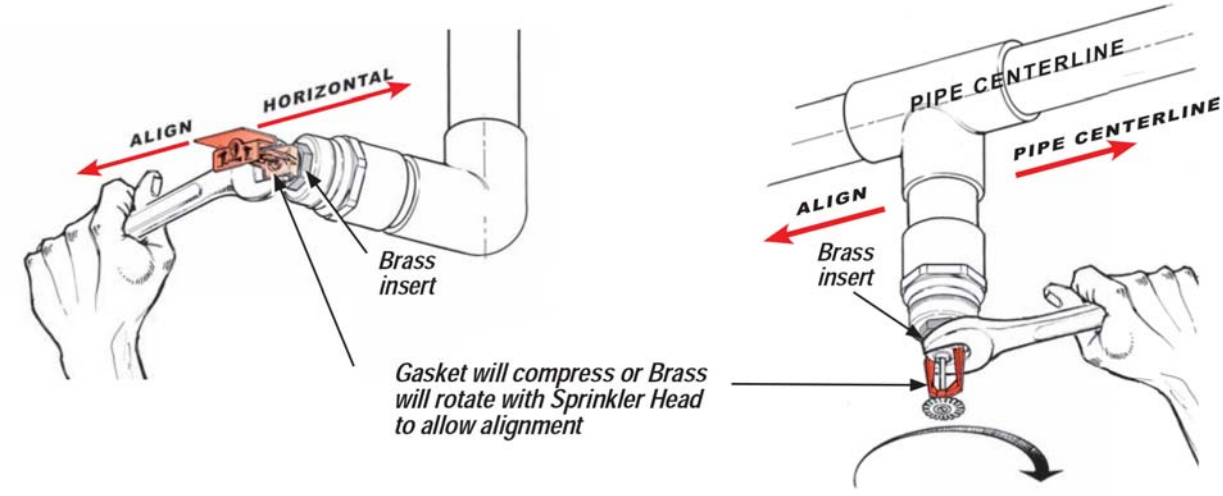
Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

Simply Hand Install Head & Align

Wrench Alignment

If necessary for alignment, rotate sprinkler head clockwise until frame is properly aligned. Gasket will compress or brass will rotate with sprinkler head until aligned. **Caution: DO NOT use back-up wrench on brass insert hex.**



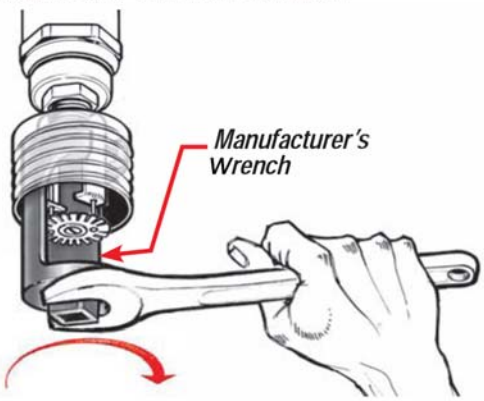
DO NOT Reverse or Back up Threaded Assembly. If over-adjusted, continue to rotate clockwise until properly aligned.

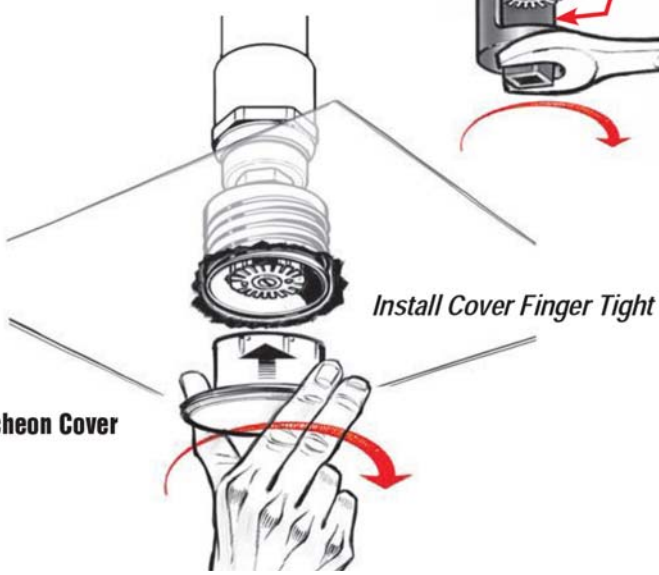
Installing Concealed Sprinkler Escutcheons

Follow these steps to assure extra firm seating of Head

1. Install Sprinkler Head/Escutcheon.

2. Tighten Sprinkler Head/Escutcheon with manufacturer's wrench until snug.





3. Install Escutcheon Cover

SofTorque™ SR

Patented

Spears® Combines Patented Special Reinforced (SR) Plastic Thread & Gasket Sealed Technology. . .

- Unitized One-Piece Design
- NO Lead - NSF® Certified
- NO Radial Stress
- NO Paste or Tape Sealants
- NO Leaks
- NO Over-Tightening
- Provides Easy Frame Alignment
- Suitable For Multipurpose Systems
- FM® Approved
- Easiest Installation, Finger Tight Plus 1-Turn Then Align Sprinkler Head!

Spears® **SofTorque™ SR** design features a special formed-in-place elastomer gasket seal at the base of Special Reinforced (SR) plastic threads. The thread design and gasket seal eliminate radial stress typical in tapered thread joint make up, plus gasket compresses to allow sprinkler frame alignment without over-tightening. Special SR design provides additional strength and thread reinforcement. **Available in size 1" Socket x 1/2" SR FIPT, Spears® Part Number 4235-130GSR. For additional sizes and configurations, contact Spears®.**

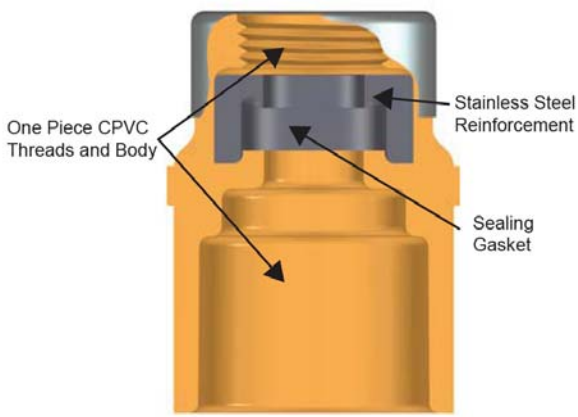
Unitized Construction
One-Piece all CPVC construction eliminates potential for problems from conventional 2-piece construction designs. No metal water contact eliminates corrosion.

NO Lead - NSF® Certified
All plastic construction is NSF® Standard 61 Annex G, Certified Lead Free in compliance with US Safe Drinking Water Act (SDWA)

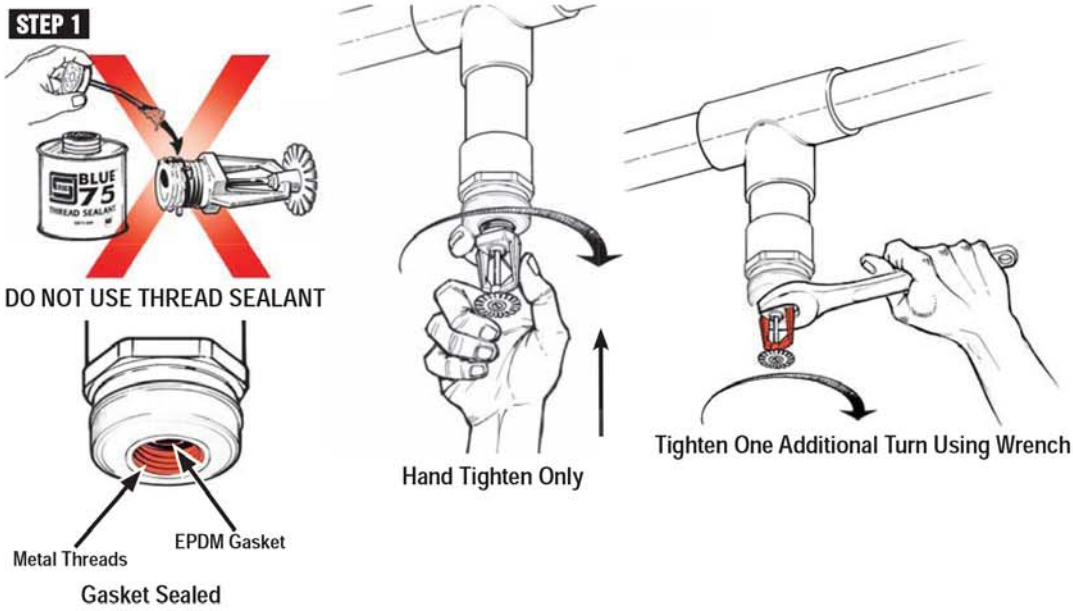
Special Gasket Sealing & Alignment Feature
EPDM gasket has been engineered not only for proper sealing, but provides proportional compression as threads are tightened for sprinkler head frame or sidewall deflector alignment.

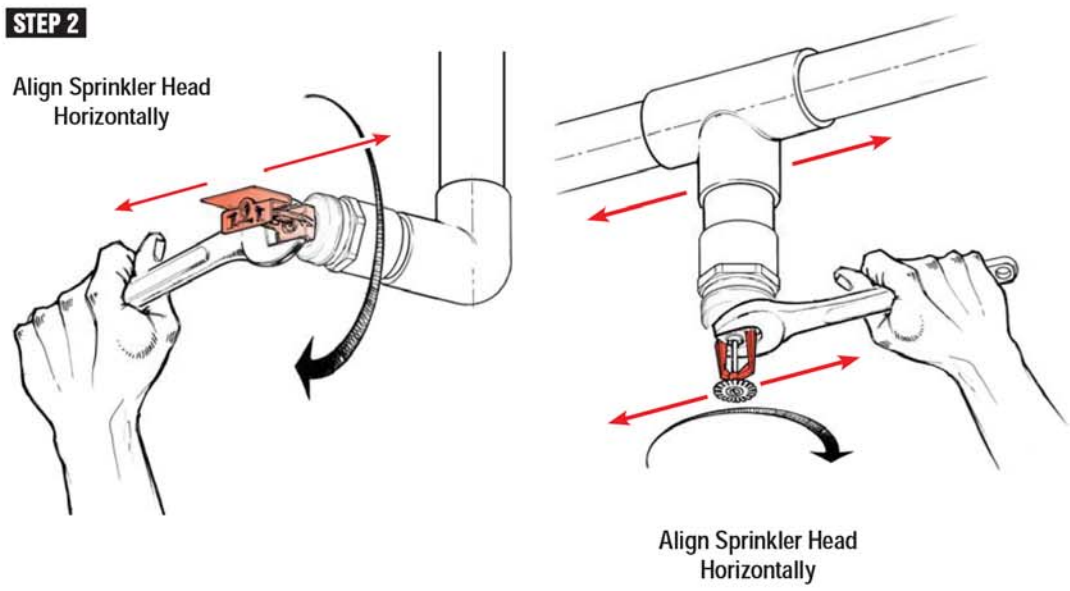
No Sealant = No More Problems!
Eliminates problems from incompatible thread pastes and pipe dopes or improperly applied thread tape.

Reinforced No Stress Thread Design
Spears® patented Special Reinforced (SR) thread design eliminates radial stress and reinforces against splitting plastic threads. No stress assures years of long, trouble free service.



Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing


STEP 1
BLUE 75
THREAD SEALANT
DO NOT USE THREAD SEALANT
Metal Threads
EPDM Gasket
Gasket Sealed
Hand Tighten Only
Tighten One Additional Turn Using Wrench


STEP 2
Align Sprinkler Head
Horizontally
Align Sprinkler Head
Horizontally

QuickTorque™

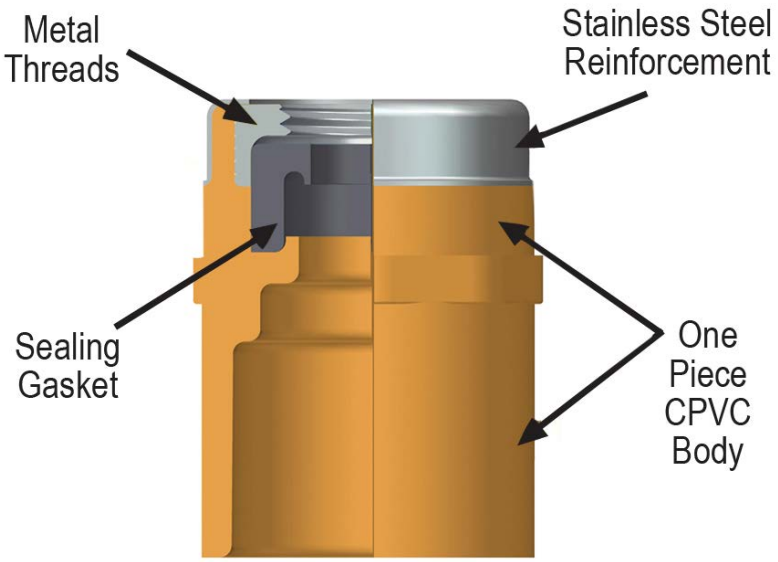
Spears® FlameGuard® QuickTorque™ CPVC Sprinkler Head Adapter uses a combination of high-strength materials to provide the most reliable, worry-free adapter in the industry:

CPVC Body for Unsurpassed Corrosion Resistance
High grade EPDM Gasket for Reliable Sealing
Metal Thread & Exterior Reinforcement for Superior Strength

The thread design and gasket seal eliminate radial stress found in tapered thread joint make up, the gasket compresses to allow sprinkler frame alignment without over-tightening.

4235-101GMR 3/4"x1/2"
4235-130GMR 1"x1/2"

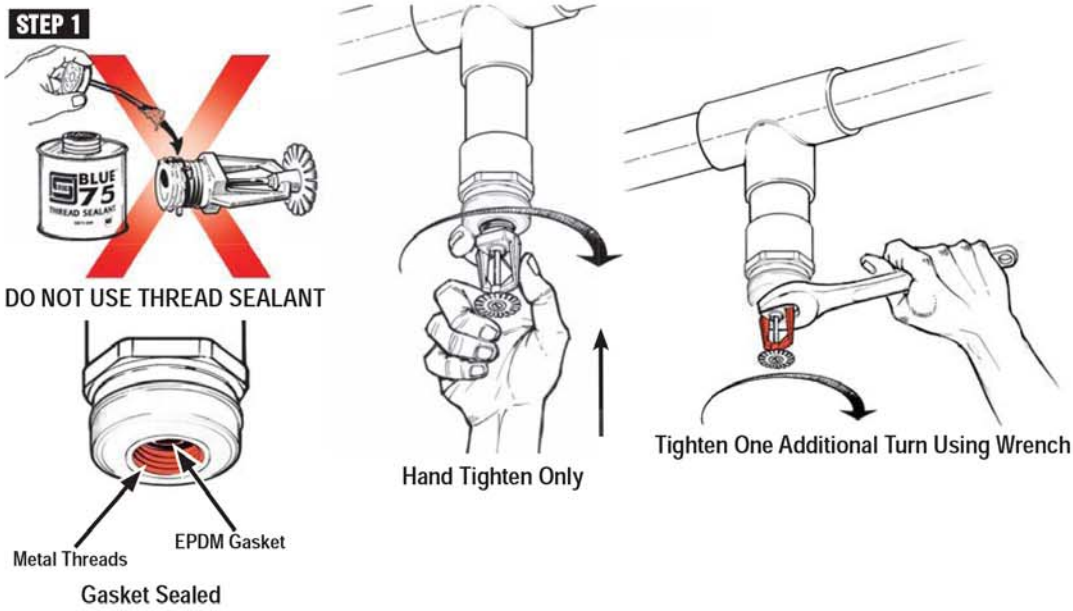
- ✔ **Metal Thread Eliminates Cross Threading**
- ✔ **Requires NO Thread Sealant**
- ✔ **High Grade EPDM Compression Gasket Allows Quick, Easy Head Alignment**
- ✔ **Easiest Installation, Finger Tight Plus 1-Turn Then Align Sprinkler Head**
- ✔ **NSF® Certified Lead-Free for Use in Potable Water Systems - Suitable for Use in Multi-purpose Systems**

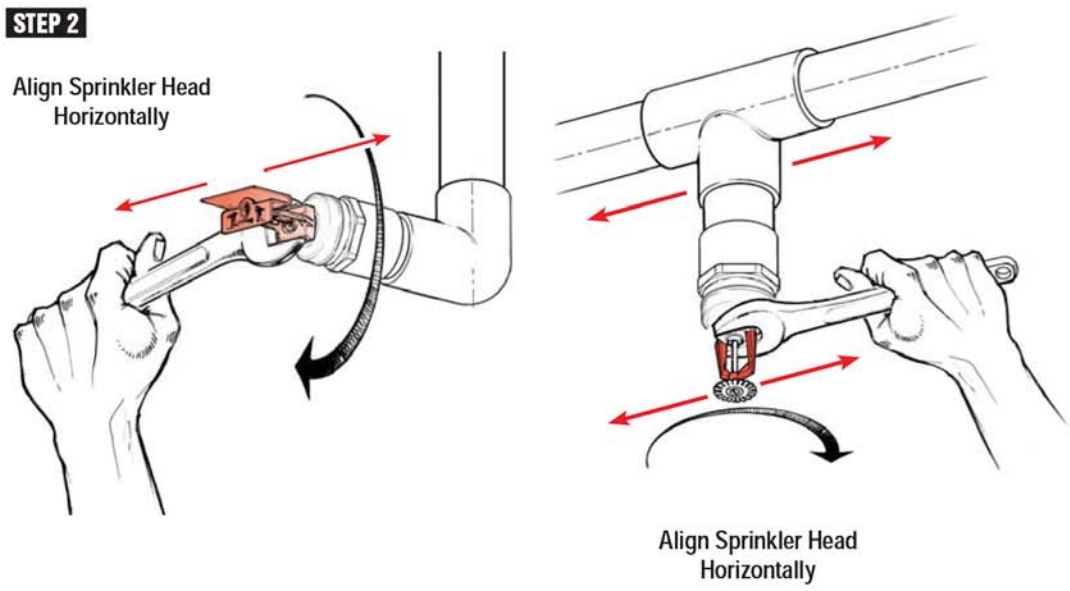


Progressive Products From Spears®
Innovation & Technology

QuickTorque™ Female Sprinkler Head Adapter - Gasket Sealed Metal Thread Style.

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas
See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing


STEP 1
BLUE 75
THREAD SEALANT
DO NOT USE THREAD SEALANT
Metal Threads
EPDM Gasket
Gasket Sealed
Hand Tighten Only
Tighten One Additional Turn Using Wrench


STEP 2
Align Sprinkler Head Horizontally
Align Sprinkler Head Horizontally

Spears ® FlameGuard® Installer Protection Plan

In order to provide continued protection to trained installing contractors following installation, testing and sign off of a Spears® FlameGuard® system; Spears® has instituted this plan to go above and beyond standard product warranties and will indemnify and defend the installing contractor against verified claims. If the Spears® FlameGuard® system experiences a failure due to conditions outside the control of the installing contractor; The Installing Contractor will be covered 100% by the Spears® Installer Protection Plan.

Typical Post Installation Conditions Covered Under this Plan (Partial List Only)

Use of cutting oils

Solder flux

Cat5 and other cable installations

Spray foam (pending testing)

Use of pipe dope

Anti-Free solution (Follow NFPA - No Glycol)

Anti-MIC coatings (see FM approvals)

Termiticides / Pesticides

Responsibility of the Installing Contractor

- Follow Spears® installation instructions (FG-3).
- All components must be 100% Spears® FlameGuard® products. This includes pipe, fittings and cement. **NO EXCEPTIONS**.
- Installation must be by trained individuals with current certification. Spears® will accept certification by other certification entities up to the renewal date. At that time, subsequent training and certification must be done by Spears® authorized personnel.
- The installing contractor must contact Spears® immediately after they become aware of any issue. Contact information is located at the end of Exhibit A.
- The installing contractor will be responsible for initial labor charges on any repairs.
- The contractor shall promptly report in writing all claims within seven (7) days of any knowledge and fully cooperate with Spears® in the defense and resolution of all such claims, including providing any alleged parts.
- Exhibit A must be filled out in its entirety and submitted to Spears® for approval.

Responsibility of Spears® Under the Plan

- Spears® will cover the cost of any property damage as a result of an adverse condition that is outside the control of the Installing Contractor as outlined above.
- Spears® will reimburse the contractor for labor at a rate agreed upon by both parties.
- Any replacement products will be supplied by Spears®.
- Spears®will provide or approve of an attorney, if required.

This Protection Plan covers the contiguous United States and Canada

General Terms and Notations of the Plan

Items Not Covered Under the Plan

- Product that has been allowed to freeze by the property owner or contractor.
- Vandalism, acts of God, i.e., tornados, earthquakes, and landslides, etc.
- Improper storage.
- Installation of system not in accordance with established professional standards.
- Systems with the use of cutting oils not properly flushed/cleaned.

Antimicrobial Internally Coated Steel Pipe on Hybrid Systems

FM Approvals is one of several nationally recognized testing laboratories in the United States and offers information on the compatibility of antimicrobial internally coated steel pipe. FMs approval relates only to the acceptability of manufacturers applied anti-mic coatings to steel pipe.

- All ancillary products must have been tested and found compatible by Spears®.
- No aftermarket antimicrobial coating is allowed with a hybrid system.

Training

Spears® offers training classes in proper solvent cement handling and installation techniques for installing contractors and their employees. These sessions are complimentary and available with advanced notification and must be scheduled. Contact your local Spears® Representative for details and to schedule a session.

Partial Listing of Compatible Products

- Pipe thread paste: Spears® Blue 75™
- PTFE tape (3.5 mil) or the use of Spears® SofTorque™, QuickTorque™ and TorqueSafe™ head adaptors that require **no tape or paste**
- Metal pipe connected to Spears® Fire Sprinkler Systems (See FM Approvals)
- Fire Stop: (See List)
- Anti-Freeze: Follow NFPA guidelines
- For a full list of compatible products, go to **www.spearsmfg.com**

Please complete Exhibit A, located on our website, and submit to Spears® Manufacturing Company within 30 calendar days following AHJ sign-off. Failure to do so will result in rejection of your submission.

Fax - 818-364-6945

Email: IPP@spearsmfg.net

This Protection Plan covers the contiguous United States and Canada

Terms & Conditions

Revised: June 1, 2018

TERMS AND CONDITIONS. Unless accepted in writing by the corporate home office of the Company, no term or condition (including but not limited to all terms and conditions set forth in any offer, purchase order, confirmation or other document) other than the terms and conditions set forth in this Invoice shall be binding upon Company. All other terms and conditions are hereby explicitly rejected and acceptance is limited to the terms and conditions herein stated. All conflicts with the terms and conditions herein shall be resolved in favor of this Invoice. Upon acceptance of the subject goods and services, Customer thereby acknowledges and agrees that the prices and charges set forth in this Invoice for the goods and services are the reasonable value for such goods and services and the other terms and conditions herein set forth are consistent with the parties' prior course of dealing, prior course of performance and/or usage of trade. If any term or condition herein is not acceptable, Customer shall give Company written notice thereof within ten (10) business days after receipt of the respective goods and services and if not, Customer shall be deemed to have unconditionally accepted the respective goods and services upon and subject to the terms and conditions hereof.

PRICING POLICY. Spears® maintains a policy to try and provide stable pricing for its products which can reasonably be relied upon by customers and end users. Irrespective of such policy, unforeseen events could occur which may necessitate immediate price increases without notice and/or cause interruption of Spears® ability to furnish products on a timely basis. Unforeseen events may be destructive acts of nature, labor disruptions, raw material or power shortages. In the event of the situations described, Spears® cannot be held liable for effecting immediate price increases or for costs incurred due to delays in delivery of products.

SPECIAL ORDERS. Orders for non-current products or exceptional runs of current products are custom orders, and as such, cannot be canceled or returned by Customer except upon Company's prior written approval. Company reserves the right to charge back Customer all costs incurred in the cancellation or return of such custom orders, including without limitations the charges applicable to returned goods.

Not all of the Fabricated Fittings listed in this catalog are carried in Spears® Distribution Center inventories. When ordering Fabricated Fittings, please check your servicing Distribution Center for availability. ALL ORDERS FOR NON-STOCKED Fabricated Fittings are NON-CANCELABLE and NON-RETURNABLE.

CUSTOM PRODUCTS. Orders for custom-made products are accepted only under the following conditions:

A. Determination of the custom products' suitability for the user's intended application is the sole responsibility of the purchaser or end user.

B. Spears® warranty for custom products is strictly limited to workmanship. Buyout components, devices, raw materials, etc. are covered by the warranties of those manufacturers.

C. Custom products are non-cancelable, non-returnable once production has commenced. Customers will be charged for all expenses incurred up to the time of notification to Spears® to cancel a custom product order.

D. Prior to production of custom products, the following documents must be submitted to Spears®:

- Customer's signed acceptance of Spears® part drawing submittal;
- Customer's purchase order acknowledging acceptance of Spears® custom product conditions and any other conditions as may be set forth in the Spears® custom product quotation.

PACKAGING. Spears® standard method of packaging will apply for all orders shipping via normal surface means at no additional charge.

SPECIAL PACKAGING. Packaging charges will be invoiced on orders for

- Custom Products;
- Any packaging requirement specifications submitted to Spears® that exceed Spears® standard methods of packaging.

MINIMUM INVOICE. $50.00 Net

SALES TAX. Spears® is required to charge applicable national, state, and local tax on all purchased items for which a U.S. sales tax exemption certificate for the Purchaser is not on file. When ordering, please indicate clearly which items are tax exempt and provide the required valid resale certificate and/or number.

TERMS OF PAYMENT. Terms of payment are 2% 35 days, net 45 days from date of invoice, past due at 46 days on open accounts unless otherwise agreed in writing. Company's monthly cut-off is the 25th, and as such, all invoices dated after the 25th will be considered the next month's business.

Freight charges are net and not subject to any volume adjustment. THERE IS NO 2% CASH REBATE ON C.O.D. OR C.I.A. ORDERS. Company reserves the right to levy a late charge on any past due balances equal to the lower of one point five percent (1.5%) per month or the highest rate permitted by law. Customer agrees to pay all costs of collection incurred by Company, including all reasonable attorney's fees and costs but in no event less than Seven Hundred Fifty Dollars ($750) and costs, regardless of whether formal legal action is instituted. Customer agrees to honor and to pay this Invoice according to the terms of payment contained herein. All payments must be made in U.S. legal currency and by readily available funds. In the event shipment is made hereunder in multiple lots, payment for each lot received shall be made in accordance therewith. Furthermore, Customer agrees not to debit or offset against any amount due Customer from Company on account of any claim or defense that Customer now has or may have in the future against Company. In the event Customer's account is assigned to a collection agency or commercial lender, Customer also agrees not to assert any such claims or defenses against its account with such collection agency or commercial lender.

FREIGHT AND DELIVERY. All orders are FOB point of shipment. Title of goods and risk of loss passes to Customer when order is picked up by freight carrier. Company shall determine the type of container and arrange for suitable packing of the goods for transport and delivery. Company will attempt to expedite all back-ordered items. All back-ordered items will be subject to product availability and Company does not assume any liability for any damage or additional cost resulting from non-delivery or late delivery.

FREIGHT TERMS:
Prepaid and Allowed: Pipe Excluded. (Freight Charges Borne by Spears®). Freight charges will be prepaid and allowed on customer orders for Spears® products when the following conditions are met (see exclusions):

A. Shipment is to a single destination from the designated Spears® servicing Regional Distribution Center.
B. Shipment is by surface means via a freight carrier selected by Spears®
C. $2,000.00 USD net order value is met for shipments within the Continental USA and to nearest port for Alaskan shipments. Customer is responsible for freight from the port to the Alaskan destination.
D. $2,500.00 USD net order value is required for exclusive orders of PVC-DWV Molded Fittings (Mixed orders of PVC-DWV and other Spears® products qualify for $2,000.00 prepaid and freight-allowed). Alaska orders ship to nearest port. Customer is responsible for freight from the port to the Alaskan destination.
E. $3,000.00 USD net order value is met for shipments to Hawaii.
F. $3,000.00 USD net order value is required for exclusive orders of PVC-DWV Molded Fittings to Canada. (Mixed orders of PVC-DWV and other Spears® products qualify for $2,500.00 net order value for freight prepaid and allowed.)

Exclusions. All carrier accessorial charges, not included in the carrier's standard freight charges, will be invoiced back to the customer. Typical accessorial charges include, but are not limited to; by appointment deliveries, residential and government facility deliveries, inside deliveries and those requiring special / additional handling (lift gate, ETC).

Prepaid and Allowed — Pipe Included (SEE ADDITIONAL CONDITIONS BELOW*):

A. Pipe Only, $8,000.00 Continental USA and nearest port for Alaska; $9,000.00 Canada.
B. Pipe, with qualified Spears® product, $7,000.00 Continental USA and nearest port of Alaska; $8,000.00 Canada.
C. Hawaii — No Prepaid and Allowed Shipments.

***Pipe Shipments.** In order to contain shipping costs, the following conditions have been implemented:

A. Pipe orders for 10,000 pounds or more will generally be shipped on flatbed trailers at Spears®' discretion and expense.
B. Orders for smaller quantities of pipe, which qualify for Full Freight Allowed shipment, will generally be shipped in closed containers.
C. Customers may request flatbed delivery of any shipment of pipe. However, despite an order qualifying for FFA under our normal terms, any increase in shipping cost over the cost of a closed truck will be invoiced to the customer. If requested, customer will be advised of this cost prior to shipment. It should also be noted that, due to limited availability of flatbed trailers in some areas, delays in shipping and delivery may occur.
D. Company does not accept returned pipe of any material or type. (See Returned Goods Policy).

Exclusions. The following products do not qualify for freight allowance regardless of net order value amount or if included in an order with other Spears® products. Actual freight charges will be billed on orders for these products. Upon request, a freight charge estimate will be provided on inquiries or orders for these products.

- Fabricated Duct Fittings and Duct Pipe
- Custom Fabricated Manifolds
- Custom Molded & Fabricated Fittings
- Custom Manual & Actuated Valves
- Large Quantities Fabricated Fittings
- Neutralization Tanks

Prepaid and Charged Back (Charges Borne by Customer). All orders not meeting the requirements for freight charges being allowed will be invoiced with the carrier's actual freight / accessorial charges. These include, but are not limited to; excessive length, by appointment deliveries, residential and government facility deliveries, inside deliveries and those requiring special / additional handling (lift gate, ETC)

Exceptions to this policy are noted below and will be invoiced the actual freight charges incurred:

A. All orders shipping to Alaska or Hawaii with a net value less than $2,500.00. ($3,000.00 for PVC-DVW exclusive orders.)
B. All orders shipped to Hawaii via customer's requested carrier.
C. Customer-requested special freight regardless of order's net value (Air Freight, Bus, etc.).
D. Original orders and backorders regardless of net value that are shipped at the customer's request from a Spears® warehouse other than the designated servicing warehouse.
E. All C.O.D. shipments not meeting minimum for full freight allowance.

Freight Collect:

A. All orders shipping to CANADA with a net value of less than $2,500.00 USD. ($3,000.00 for PVC-DWV exclusive orders.)
B. As requested by the customer.
C. Customer-requested routings for shipment of goods via a non-contracted freight carrier (not normally used by Spears® Manufacturing Company) regardless of value.

Freight carrier fees and small package carrier fees on all C.O.D. shipments must be paid by the customer upon delivery of the order. FREIGHT TERMS FOR ORDERS SHIPPPED OUTSIDE THE CONTINENTAL USA, OTHER THAN THOSE LOCATIONS NOTED ABOVE, WILL BE QUOTED ON A "PER ORDER BASIS".

INSPECTION AND REJECTION. Customer shall inspect all goods promptly upon delivery. If Customer does not object in writing, stating all its reasons, to the goods as delivered and/or the services provided within ten (10) days of delivery, Customer shall be deemed to have irrevocably accepted the goods and services as satisfactory and in full compliance with its requirements, and to have waived all objections thereto which may be patently observable by a thorough and reasonable inspection. In the event Customer timely rejects any of the goods or is otherwise entitled to reject any of the goods, Customer agrees to and shall hold such rejected goods, free of charge, at Customer's place of business until Company has been notified in writing of the rejection and has had a reasonable opportunity to arrange for suitable transportation. Customer shall, under no circumstance, be entitled to resell, destroy, or discard any rejected goods without the prior written consent of Company.

CARRIER CLAIMS. Company will not be liable for any damage, loss or delay caused by any freight carrier. Claims for damaged goods, suspected damages, container shortages or pilferage within the container on delivery must be so noted on the carrier's delivery receipt and the carrier's claims representative should be notified immediately. Upon receipt of this Invoice, Customer shall make timely payment to Company notwithstanding any claims due to any carrier's responsibility. Claims proven to be the responsibility of Company shall be resolved as expeditiously as possible through replacement or credit of goods involved.

RETURNED GOODS. No goods shall be returned to Company for credit without the prior written consent of Company. Company reserves the right to levy a minimum handling and re-stocking charge of thirty percent (30%) on all returns (due to Customer's option). There may be additional charges or deductions from the credit for cleaning and reboxing costs. **Company does not accept returned Pipe, Cements or Primers of any material or type.**

Terms & Conditions

All returned goods shall be sent prepaid unless Company otherwise agrees in writing. Except for large quantities of slow-moving goods, for returns of goods, on a cumulative basis, in excess of Two Thousand Five Hundred Dollars ($2,500) and as herein otherwise provided. Customer's requests to return goods are normally granted provided the proposed return is in compliance with Company's Current Return Goods Policy. Said policy requires returned goods to be limited to only goods manufactured or currently sold by Company, all returned goods must be clean, in resalable condition and of current design and color. Except for defective or damaged goods due to the sole fault of Company, Customer shall be entitled only to a credit against further sales for returned goods. The credit shall apply only to returned goods actually received by Company with credit to be issued based on the lowest price in effect within the prior twelve (12) month period, unless the original Invoice numbers and verification is provided by Customer. For further information on this policy, please consult with Company's servicing Regional Distribution Center.

FORCE MAJEURE. Spears® shall not be liable for any delay in or impairment of performance resulting in whole or in part from Acts of God, severe weather conditions, labor disruptions, governmental decrees or controls, insurrections, war risks, shortages, inability to procure or ship product or obtain permits and licenses, supplies or raw materials, or any other circumstances or causes beyond the control of Spears® in the conduct of its business.

RECOMMENDATIONS FOR INSTALLERS AND USERS. PLASTIC PIPING SYSTEMS SHOULD BE ENGINEERED, INSTALLED, AND OPERATED IN ACCORDANCE WITH INDUSTRY ESTABLISHED DESIGN AND ENGINEERING STANDARDS AND PROCEDURES. SUITABILITY FOR THE INTENDED SERVICE APPLICATION SHOULD BE DETERMINED PRIOR TO INSTALLATION. WITH RESPECT TO SOLVENT WELD CONNECTIONS, THE USE OF SPEARS® QUALITY PRIMER AND SOLVENT CEMENT FORMULATED FOR THE TYPE OF CONNECTION IS RECOMMENDED, WITH THE CORRECT SIZE APPLICATOR. READ AND FOLLOW ALL OF THE SOLVENT CEMENT APPLICATION INSTRUCTIONS. WITH RESPECT TO THREADED CONNECTIONS, COMPANY RECOMMENDS THE USE OF SPEARS® BLUE 75™ THREAD SEALANT. CHOICE OF OTHER PRIMERS, SOLVENT CEMENTS, OR THREAD SEALANT IS AT THE DISCRETION OF THE INSTALLER. THE MANUFACTURER'S LITERATURE FOR THESE PRODUCTS SHOULD BE REVIEWED FOR PROPER SELECTION AND APPLICATION PROCEDURES. WARNING: SOME PIPE JOINT COMPOUNDS OR PTFE PASTES MAY CONTAIN SUBSTANCES, WHICH COULD CAUSE STRESS CRACKING TO PLASTIC. ONE (1) OR TWO (2) TURNS BEYOND FINGER TIGHT IS GENERALLY ALL THAT IS REQUIRED TO MAKE A SOUND PLASTIC THREADED CONNECTION. UNNECESSARY OVER TIGHTENING WILL CAUSE DAMAGE TO BOTH PIPE AND FITTING. **CUSTOMER SHALL BE SOLELY RESPONSIBLE FOR INFORMING ALL INSTALLERS AND OTHER END USERS OF THE FOREGOING AND ALL OTHER PRECAUTIONARY INSTRUCTIONS AND DISCLOSURES.**

LIMITED LIFETIME WARRANTY. Except as otherwise mandated by law or herein provided, Spears® Manufacturing Company (“Company”) warrants Standard Catalog Products (“Products”) which have been directly manufactured by them to be free from defects in material and workmanship for as long as the end user of the Products (“End User”) retains ownership and possession of the Products in accordance with this Warranty (“Warranty Period). Products installed with pipe, fittings, valves, solvent cements, thread sealants or other related products, not manufactured by this company, are subject to review and may be exempt at the sole discretion of the Company. Each other person or entity acquiring or employing the Products, including buyers, contractors and installers (“Buyer”) and End Users (“Buyer/End User”) agrees that this Warranty shall be effective only during the Warranty Period so long as the Products are used solely for the normal purposes for which they are intended and in conformance with industry established standards, engineering, installation, operating, and maintenance specifications, recommendations and instructions including explicit instructions by the Company; the Products are properly installed, operated and used, and have not been modified; and all the other terms of this Warranty are complied with. Any violation thereof shall void this Warranty and relieve Company from all obligations arising from this Warranty and the Products.

Upon receipt or discovery of any Products that appear questionable or defective each Buyer/End User shall promptly inspect and return any such Product to the Company at 15853 Olden Street, Sylmar, California 91342, accompanied by a letter stating the nature of any problems. If the Products are determined by Company to be defective in materials or workmanship directly provided by Company, Company, at its sole option, may either repair or replace the defective Products, or reimburse applicable Buyer/End User for the cost of such Products. The applicable Buyer/End User shall bear all applicable shipping costs. THIS SHALL BE BUYERS/END USERS’ SOLE REMEDY. EACH BUYER/END USER AGREES THAT COMPANY WILL NOT BE RESPONSIBLE FOR ANY OTHER OBLIGATIONS RELATING TO THE PRODUCTS, INCLUDING ANY OTHER MATERIALS OR LABOR COSTS, LOSS OF USE OR ANY OTHER ITEM OR FOR ANY DELAYS IN COMPLYING WITH THIS WARRANTY BEYOND COMPANY’S REASONABLE CONTROL.

COMPANY SHALL NOT BE LIABLE FOR, DOES NOT ASSUME, AND EXPRESSLY DISCLAIMS, ANY LIABILITY, RESPONSIBILITY AND DAMAGES: DUE TO ANY BUYER/END USER’S FAILURE TO COMPLY WITH THIS WARRANTY, INCLUDING IMPROPER INSTALLATION, USE OR OPERATION; USE WITH PRODUCTS FROM OTHER MANUFACTURERS THAT DO NOT MEET ASTM OR OTHER APPLICABLE PRODUCT STANDARDS; IMPROPER CONTROL OF SYSTEM HYDRAULICS, IMPROPER WINTERIZATION PROCEDURES, IMPROPER VOLTAGE SUPPLY, CONTACT WITH INCOMPATIBLE MATERIALS, CHEMICALS OR CABLES, EXCAVATION/DIGGING, EXCESSIVE WEIGHT, AND VANDALISM; DUE TO REASONABLE WEAR AND TEAR AND DUE TO ANY ACTS OF NATURE, INCLUDING LIGHTNING, EARTHQUAKES, GROUND MOVEMENT, FROST HEAVE, OR FLOODS.

COMPANY EXTENDS ONLY THIS WARRANTY AND EXPLICITLY DISCLAIMS ALL OTHER WARRANTIES, WHETHER IMPLIED OR OTHERWISE EXPRESSED, WHETHER ORAL, STATUTORY OR OTHERWISE, INCLUDING ANY IMPLIED WARRANTIES OR AFFIRMATIONS FOR SUITABILITY, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. NO AFFIRMATION BY COMPANY OR ANY OF ITS REPRESENTATIVES, BY WORDS, CONDUCT OR OTHERWISE, SHALL CONSTITUTE A WARRANTY. THIS WARRANTY MAY NOT BE TRANSFERRED, EXTENDED, ALTERED OR OTHERWISE MODIFIED IN ANY MANNER, EXCEPT BY WRITTEN AGREEMENT SIGNED BY COMPANY.

BY ITS ACCEPTANCE OF THE PRODUCTS, EACH BUYER/END USER EXPRESSLY WAIVES ALL OTHER LIABILITY OR OBLIGATION OF ANY KIND OR CHARACTER OF COMPANY, INCLUDING LIABILITY PREDICATED UPON CONTRACT, TORT, STRICT LIABILITY OR OTHER LEGAL OR EQUITABLE GROUNDS, AND ALL, IF ANY, DAMAGES AND LOSSES AS A RESULT THEREOF, INCLUDING ALL, IF ANY, COMPENSATORY, GENERAL, SPECIAL, CONSEQUENTIAL, INCIDENTAL, OR PUNITIVE DAMAGES. WITH RESPECT TO SUCH WAIVERS, EACH BUYER/END USER EXPLICITLY WAIVES ANY AND ALL PROVISIONS, RIGHTS AND BENEFITS CONFERRED BY ANY LAW OF ANY FEDERAL, STATE OR TERRITORY OF THE UNITED STATES, OR PRINCIPLE OF COMMON LAW, WHICH IS SIMILAR, COMPARABLE OR EQUIVALENT TO CALIFORNIA CIVIL CODE §1542 WHICH STATES "A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS THAT THE CREDITOR OR RELEASING PARTY DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE AND THAT IF KNOWN BY HIM OR HER MUST HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH DEBTOR OR RELEASED PARTY." AND ALL OTHER SIMILAR STATUTORY, COMMON AND CASE LAW RIGHTS, DEFENSES AND LIMITATIONS.

Having previously independently inspected the Products, or a sample, as fully as desired, or having the opportunity to and having not done so, upon acceptance of delivery of the Products, and except as otherwise herein explicitly provided, each Buyer/End User by acceptance or use of the Products accepts them in their "AS IS" and "WITH ALL FAULTS" condition without any other warranty, expressed, implied or otherwise, and accepts and assumes the entire risk and cost of all servicing, remediation and consequences thereof. This Warranty shall be governed by Nevada law and any unenforceable provisions severed without affecting the remaining provisions. As used herein, "including" includes "without limitation."

MATERIALS OF TRADE. Purchaser represents that it is purchasing goods as its "materials of trade" as defined in the Hazardous Materials Regulations in Title 49 of the Code of Federal Regulations. It further represents that the goods shall be used in direct support of its business, which is not transportation, and that such goods shall not be resold or transported in a vehicle other than the one owned by itself unless it has properly packaged, documented and declared such shipment to the carrier.

INTERPRETATION. Except as otherwise explicitly provided herein, this Invoice shall constitute the entire and final understanding of the parties, and shall supersede all prior understanding, as to the subject matter herein stated. Each party hereby acknowledges that there is no other, and that it is not relying on any other, statement, representation or agreement with respect to this Invoice not herein stated or referred to. This Invoice may be modified or amended only in writing signed by the party against whom enforcement of the amendment or modification is sought. This Invoice shall be interpreted under and governed by the laws of California, except as preempted or otherwise controlled by applicable Federal law in which case such Federal law shall apply. Time is of the essence to this Invoice, and unless stated otherwise, the reasonable time required during which to perform any act shall be thirty (30) days after demand. Except as herein explicitly otherwise provided, this Invoice shall not be varied, supplemented, qualified or interpreted by any prior or subsequent oral understanding, course of dealing or performance between the parties, or by any usage of trade. No party shall be entitled to any advantage due to another party's legal representation or preparation of this Invoice. As used herein, certain capitalized words shall have the meaning as herein provided. Any conflict between said capitalized words and any other meaning shall be resolved as herein provided. To the extent that any provision of this Invoice is declared unenforceable, ambiguous, severable or contradictory, and to the extent it is commercially reasonable, said provision and this Invoice shall be deemed amended with such terms and conditions as to effect and enforce the intention, terms and conditions of this Invoice.

REMEDIES. Except as herein otherwise provided, all remedies provided for herein or by law or equity shall be cumulative and nonexclusive and the exercise of one shall not be deemed a waiver of any other remedy. Notwithstanding anything to the contrary, before any default or breach can be declared hereunder against any party and to the extent written demand has not been so made, at least a ten (10) business day prior notice and opportunity to cure demand shall be made of such a party.

Further, provided that in the case of a non-monetary default or where such cure reasonably requires additional time to cure, if such a party promptly commences within the notice period and thereafter diligently pursues the same, such party shall be entitled to complete such cure. Except for any monetary obligations, neither Buyer nor Company shall be considered in default in the performance of its obligations herein to the extent that performance of such is delayed or prevented due to causes beyond the control of said party, including but not limited to acts of God, war, revolution, civil commotion, blockade or embargo, any law, order, regulation or ordinance of any government, fires, floods, unavoidable casualties, strikes, and labor disputes; provided that within ten (10) business days of such cause, party required to perform hereunder provides the other party with written notice of such cause and the estimated time of the delay or in the case performance is prevented, the termination of this Invoice or the respective part thereof. **THE PARTIES AGREE AND ACKNOWLEDGE THAT ANY PROVISION OF THIS INVOICE WHICH SHALL SEEK TO LIMIT ANY PARTY'S RIGHT TO ANY REMEDY OR RECOVERY SHALL BE INTERPRETED TO THE EXTENT NECESSARY AND MADE ENFORCEABLE AS EITHER A LIMITATION OF REMEDIES OR LIQUIDATED DAMAGES. EACH PARTY ACKNOWLEDGES THAT, AS APPLICABLE, IT WOULD BE IMPRACTICAL OR EXTREMELY DIFFICULT TO FIX THE ACTUAL DAMAGES IN THE EVENT OF LIQUIDATED DAMAGES AND THAT SUCH LIMITATIONS OR LIQUIDATED DAMAGES PROVISIONS HAVE BEEN REASONABLY DETERMINED AND UNDER THE CIRCUMSTANCES ARE FAIR AND EQUITABLE TO EACH PARTY.**

WAIVER. The failure of either party to assert a right hereunder or to insist upon compliance with any term or condition will not constitute a waiver of that right or excuse any subsequent nonperformance of any such term or condition by the other party.

JURISDICTION AND LITIGATION. The parties agree that any disputes concerning this Invoice and all goods and services covered by this Invoice shall be litigated only within the County of Los Angeles, California which the parties agree for jurisdictional purposes is the place where this Invoice has been entered into and where it will be substantially performed. All causes of action related to this Invoice and the covered goods and services shall be commenced within two (2) years of the date of the respective shipment or providing to Customer or are all hereby waived.

NOTICES. All notices, demands, acknowledgments, approvals, waivers, responses and any other instruments of any kind (collectively "Notices"), which any party may be required, or desires, to be provided, or served on any party shall be written, dated, state its purpose and the time during which to respond, and served on the respective parties at the addresses set forth in this Invoice, or as may otherwise be subsequently directed in writing. Service shall be deemed made if personally at the time of such service; if by certified or registered mail within seventy-two (72) hours after deposit in the United States mail, postage prepaid and properly addressed, and if by telegraph, telefacsimile, telex or other carrier service (such as Federal Express, DHL, etc.) at the time the machine or agency confirms delivery, provided that within three (3) business days thereafter the original thereof shall have been sent by certified mail (as herein provided) to the party to whom such Notice was directed.

For additional information, contact Spears® Manufacturing Company Regional Distribution Center.
Possession of these Terms & Conditions shall not be construed as an offer to sell Spears® products.

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® Product

FlameGuard® Technical

Suitable for Oil-Free air handling to 25 psi, not for distribution of compressed air or gas

See MSRP-1 Sheet or Check Spears® On-line Catalog @ www.spearsmfg.com for Pricing

FlameGuard® Technical (continued)

Your NSF Certified Single Source Manufacturer of PVC & CPVC Plastic Pipe, Valves Fittings, Solvent Cements & Specialty Systems Featuring...

EverTUFF®
CPVC CTS Plumbing System

Lead-Free CPVC Systems Proven Superior to PEX

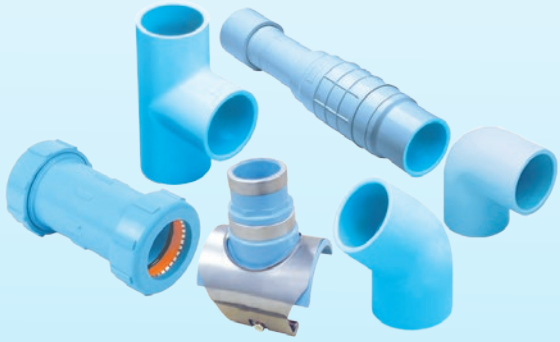
SPEARS® FlameGuard®
CPVC FIRE SPRINKLER PRODUCTS

Broadest Line of CPVC Fire Sprinkler Products

LabWaste®
CPVC Corrosive Waste Drainage System

Patented CPVC System of Pipe, Fittings & Solvent Cement

SPEARS® EverTUFF® TURF™
Fittings Engineered for Golf Course & Turf Applications



Engineered for Commercial Irrigation Sports Fields, Parks & Golf Courses

Complete Selection of Solvent Cements, Primers & Accessories

NSF Certified For Your Health & Safety

Progressive Products From Spears® Innovation & Technology

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