HYDROSTATIC PRESSURE TESTING

Plastic pipe is not designed to provide structural strength beyond sustaining internal pressures up to its designed hydrostatic pressure rating and normal soil loads. Anchors, valves, and other connections must be independently supported to prevent added shearing and bending stresses on the pipe.

RISERS
The above piping design rule applies also where pipe is brought out of the ground. Above-ground valves or other connections must be supported independently. If pipe is exposed to external damage, it should be protected with a separate, rigidly supported metal pipe sleeve at the danger areas. Thermoplastic pipe should not be brought above ground where it is exposed to high temperatures. Elevated temperatures can lower the pipes pressure rating below design levels.

LOCATING BURIED PIPE
The location of plastic pipelines should be accurately recorded at the time of installation. Since pipe is a non-conductor, it does not respond to the electronic devices normally used to locate metal pipelines. However, a copper or galvanized wire can be spiraled around, taped to, or laid alongside or just above the pipe during installation to permit the use of a locating device, or use marker tape.

NOTE: For additional information see ASTM D-2774, "Underground Installation of Thermoplastic Pressure Piping."

TESTING THERMOPLASTIC PIPING SYSTEMS
We strongly recommend that all plastic piping systems be hydrostatically tested as described below before being put into service. Water is normally used as the test medium.
Note: Do not pressure test with compressed air or gas! Severe damage or bodily injury can result.
The water is introduced through a pipe of 1-inch diameter or smaller at the lowest point in the system. An air relief valve should be provided at the highest point in the system to bleed off any air that is present.

The piping system should gradually be brought up to the desired pressure rating using a pressure bypass valve to assure against over pressurization. The test pressure should in no event exceed the rated operating pressure of the lowest rated component in the system such as a 150-pound flange.

INITIAL LOW-PRESSURE TEST
The initial low-pressure hydrostatic test should be applied to the system after shallow back-filling which leaves joints exposed. Shallow back-filling eliminates expansion/ contraction problems. The test should last long enough to deter mine that there are no minute leaks anywhere in the system.

PRESSURE GAUGE METHOD
Where time is not a critical factor, the reading of a regular pressure gauge over a period of several hours will reveal any small leaks. If the gauge indicates leakage, that entire run of piping must then be visually inspected - paying special attention to the joints - to locate the source of the leak.

VISUAL INSPECTION METHOD
After the line is pressurized, it can be visually inspected for leaks without waiting for the pressure gauge to reveal the presence or absence of a pressure drop.

Even though no leaks are found during the initial inspection, however, it is recommended that the pressure be maintained for a reasonable length of time. Checking the gauge several times during this period will reveal any slow developing leaks.

LOCATE ALL LEAKS
Even though a leak has been found and the pipe or joint has been repaired, the low-pressure test should be continued until there is a reasonable certainty that no other leaks are present. Locating and repairing leaks is very much more difficult and expensive after the piping system has been buried. Joints should be exposed during testing.

HIGH-PRESSURE TESTING
Following the successful completion of the low-pressure test, the system should be high-pressure tested for at least 12 hours. The run of pipe should be more heavily backfilled to prevent movement of the line under pressure. Since any leaks that may develop probably will occur at the fitting joints, these should be left uncovered.

Solvent-cemented piping systems must be fully cured before pressure testing. For cure times, refer to the solvent cementing instruction tables on page 43.

TEST PRESSURE
The test pressure applied should not exceed: (a) the designed maximum operating pressure, (b) the designed pressure rating of the pipe, (c) the designed pressure rating of any system component, whichever is lowest.

SAFETY PRECAUTIONS
(1) Do not test with fluid velocities exceeding 5 ft./sec. since excessive water hammer could damage the system. (2) Do not allow any personnel not actually working on the high-pressure test in the area, in case of a pipe or joint rupture. (3) **Do not test with air or gas.**

TRANSITION FROM PLASTIC TO OTHER MATERIALS
Transitions from plastic piping to metal piping may be made with flanges, threaded fittings, or unions. Flanged connections are limited to 150 psi, and threaded connections are limited to 50% of the rated pressure of the pipe.

NOTE: When tying into a threaded metal piping system, it is recommended that a plastic male thread be joined to a metal female thread. Since the two materials have different coefficients of expansion, the male plastic fitting will actually become tighter within the female metal fitting when expansion occurs.

DO NOT TEST WITH AIR OR COMPRESSED GAS.

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INSTALLATION OF THERMOPLASTIC PIPING SYSTEMS

HANDLING & STORAGE OF PLASTIC PIPE

PVC and CPVC are strong, lightweight materials, about one fifth the weight of steel or cast iron. Piping made of this material is easily handled and, as a result, there is a tendency for them to be thrown about on the job site. Care should be taken in handling and storage to prevent damage to the pipe.

PVC and CPVC pipe should be given adequate support at all times. It should not be stacked in large piles, especially in warm temperature conditions, as bottom pipe may become distorted and joining will become difficult.

For long-term storage, pipe racks should be used, providing continuous support along the length. If this is not possible, timber supports of at least 3" bearing width, at spacings not greater than 3' centers, should be placed beneath the piping. If the stacks are rectangular, twice the spacing at the sides is required. Pipe should not be stored more than seven layers high in racks. If different classes of pipe are kept in the same rack, pipe with the thickest walls should always be at the bottom. Sharp corners on metal racks should be avoided.

For temporary storage in the field when racks are not provided, care should be taken that the ground is level and free of sharp objects (i.e. loose stones, etc.). Pipe should be stacked to reduce movement, but should not exceed three to four layers high.

The above recommendations are for a temperature of approximately 80°F. Stack heights should be reduced if higher temperatures are encountered, or if pipe is nested (i.e. pipe stored inside pipe of a larger diameter). Reduction in height should be proportional to the total weight of the nested pipe, compared with the weight of pipe normally contained in such racks.

Since the soundness of any joint depends on the condition of the pipe end, care should be taken in transit, handling and storage to avoid damage to these ends.

The impact resistance and flexibility of PVC and especially CPVC pipe are reduced by lower temperature conditions. The impact strength for both types of piping materials will decrease as temperatures approach 32°F (0°C) and below. Care should be taken when unloading and handling pipe in cold weather. Dropping pipe from a truck or forklift will cause damage. Methods and techniques normally used in warm weather may not be acceptable at the lower temperature range.

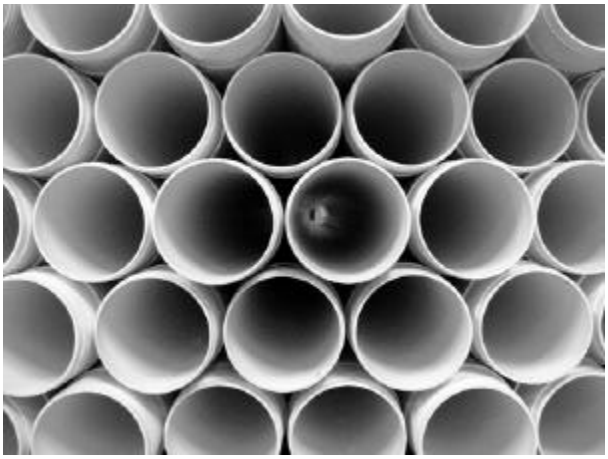
When loading pipe onto vehicles, care should be taken to avoid contact with any sharp corners (i.e. angle irons, nail heads, etc.), as the pipe may be damaged.

While in transit, pipe should be well secured and supported over the entire length and should never project unsecured from the back of a trailer.

Pipe may be off-loaded from vehicles by rolling them gently down timbers, ensuring that they do not fall onto one another or onto a hard, uneven surface.

INSPECTION

Before installation, all lengths of pipe and fittings should be thoroughly inspected for cuts, scratches, gouges, buckling, and any other imperfections which may have been imparted to the pipe during shipping, unloading, storing, and stringing.



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INSTALLATION OF THERMOPLASTIC PIPING SYSTEMS

JOINING TECHNIQUES

There are six recommended methods of joining thermoplastic pipe and fittings, each with its own advantages and limitations:

SOLVENT CEMENTING
The most widely used method in Schedule 40 PVC, Schedule 80 PVC and CPVC piping systems as described in ASTM D-2855- 93. The O.D. of the pipe and the I.D. of the fitting are primed, coated with special cement and joined together, as described in detail below. Knowledge of the principles of solvent cementing is essential to a good job. These are discussed in the Solvent Welding Instructions Section.
NOTE: The single most significant cause of improperly or failed solvent cement joints is lack of solvent penetration or inadequate primer application.

THREADING
Schedule 80 PVC, CPVC, PVDF, and PP can be threaded with special pipe dyes for mating with Schedule 80 fittings provided with threaded connections. Since this method makes the piping system easy to disassemble, repair, and test, it is often employed on temporary or take-down piping systems, as well as systems joining dissimilar materials. However, threaded pipe must be derated by 50 percent from solvent-cemented systems. **(Threaded joints are not recommended for PP pressure applications.)**

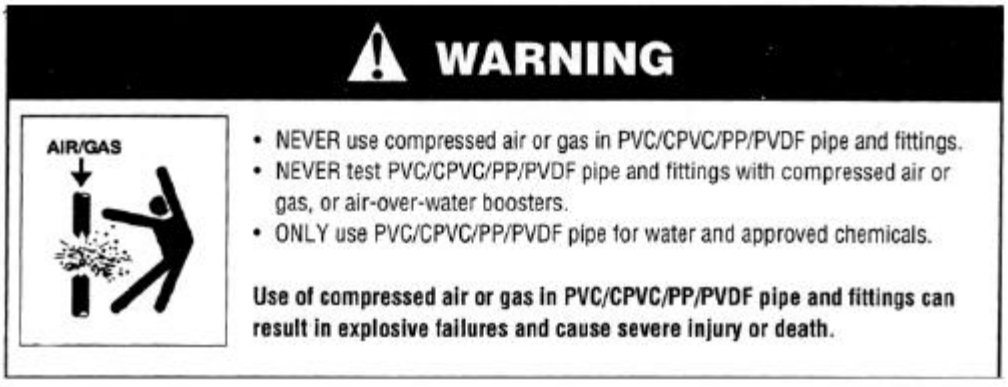
FLANGES
Flanges are available for joining all thermoplastic piping systems. They can be joined to the piping either with solvent-cemented or threaded connections. Flanging offers the same general advantages as threading and consequently is often employed in piping systems that must frequently be dismantled. The technique is limited to **150 psi working pressure.**

BUTT FUSION
This technique us used to connect all sizes of Poly-propylene (Proline), PVDF (Super Proline) and large diameter Fuseal. Butt fusion is an easy, efficient fusion method especially in larger diameters.

SOCKET FUSION
This technique is used to assemble PVDF and poly-propylene pipe and fittings for high-temperature, corrosive-service applications. (See each material Design Data section for recommended joining technique.)

FUSEAL HEAT FUSION
R & G Sloane's Fuseal is a patented method of elec-trically fusing pipe and fitting into a single homo-genous unit. This advanced technique is used for GF Fuseal polypropylene and PVDF corrosive waste-handling systems.

FUSEAL MECHANICAL JOINT
Mechanical Joint polypropylene drainage system is used extensively for accessible smaller sized piping areas. The system, as the name implies, is a mechanical sealed joint that consists of a seal-ring, grab-ring, and nut. It is quick and easy to install and can be disconnected just as easily. You will find it most suitable for under sink and under counter piping.



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INSTALLATION OF THERMOPLASTIC PIPING SYSTEMS

SOLVENT CEMENTING PVC AND CPVC PIPE AND FITTINGS

BASIC PRINCIPLES OF SOLVENT CEMENTING

To make consistently good joints the following should be clearly understood:

I. The joining surfaces 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. In the tight part of the joint the surfaces will tend to fuse together, in the loose part the cement will bond to both surfaces.

Penetrating and softening can be achieved by the use of both primer and cement. A suitable primer will usually penetrate and soften the surfaces more quickly than the cement alone. Additionally, the use of a primer can provide a safety factor for the installer, for he can know, under various temperature conditions, when he has achieved sufficient softening. For example, in cold weather more time and additional applications are required.

PRIMERS AND CEMENTS

Primer
It is recommended that a high quality primer be used to prepare the surfaces of pipe and fittings for solvent welding. Do not use water, rags, gasoline, or any other substitutes for cleaning PVC or CPVC surfaces. A chemical cleaner such as MEK may be used.

Cement
Make sure the solvent cement used is suitable for the type and size of the pipes being installed. PVC cement must be used with PVC pipe and fittings. CPVC cement must be used with CPVC pipe and fittings. Also, cement with the proper viscosity for the type and size of pipe, must be used. Contact the supplier of the cement if there are any questions of the suitability of the cement for the intended application.

Solvent cements are formulated to be used “as received” in original containers. Adding of thinners to change viscosity is not recommended. If the cement is found to be jelly-like and is not free-flowing, it should not be used. Containers should be kept covered when not in actual use.

Solvent cements should be stored at temperatures between 40° F and 110° F and away from heat or open flame. The cements should be used within one year of the date stamped on the container. Stocks should be constantly rotated to prevent buildup of old cement inventories, If new cement is subjected to freezing it may become extremely thick or gelled. This cement can be placed in a warm area where, after a period of time, it will return to its original, usable condition. But such is not the case when gellation has taken place because of actual solvent loss; for example, when container was left open too long during use or not sealed properly after use. Cement in this condition has lost its formulation and should be discarded,

Solvent cements and primers are extremely flammable and should not be used or stored near heat or open flame. They should be used only with adequate ventilation. In confined or partially enclosed areas, a ventilating device should be used to remove vapors and minimize their inhalation. Containers should be kept tightly closed when not in use and covered as much as possible when in use. Avoid frequent contact with the skin. In case of eye contact, flush repeatedly with water. Keep out of reach of children.

Applicators
To properly apply the primer and cement, the correct size and type of applicator must be used. There are three basic types of applicators:

Daubers — should only be used on pipe sizes 2" and below, and should have a width equal to 1/2 the diameter of the pipe.

Brushes — can be used on any diameter pipe, should always have natural bristles and should have a width equal to at least 1/2 the diameter of tile pipe.

Rollers — can be used on 4" and larger diameter pipe and should have a length equal to at least 1/2 the diameter of the pipe.

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INSTALLATION OF THERMOPLASTIC PIPING SYSTEMS

SOLVENT CEMENTING PVC AND CPVC PIPE AND FITTINGS

The table below shows the recommended applicator sizes

Table 1

Nominal Pipe Size (in.)	Applicator Type		
	Dauber	Brush Width (in.)	Roller Length (in.)
1/4	A	1/2	NR
3/8	A	1/2	NR
1/2	A	1/2	NR
3/4	A	1	NR
1	A	1	NR
1 1/4	A	1	NR
1 1/2	A	1 - 1 1/2	NR
2	A	1 - 1 1/2	NR
2 1/2	NR	1 1/2 - 2	NR
3	NR	1 1/2 - 2 1/2	NR
4	NR	2 - 3	3
5	NR	3 - 5	3
6	NR	3 - 5	3
8	NR	4 - 6	7
10	NR	6 - 8	7
12	NR	6 - 8	7
14	NR	7 - 8	7
16	NR	8+	8

A = Acceptable NR = Not Recommended

MAKING THE JOINTS

1. Preparation

Before starting to make any joints, the pipe and fittings should be visually inspected for any damage or defects. The fittings should be exposed to the same temperature conditions as the pipe, for at least one hour prior to installation, so that the pipe and fittings are basically at the same temperature when joined.

2. Cutting

Cut pipe square using a miter box or a plastic pipe cutting tool which DOES NOT flare up diameter at end of pipe.

3. Deburring and Chamfering

Remove all burrs from end of pipe with a knife, file, or plastic pipe deburring tool. Chamfer (bevel) the end of the pipe 10°-15° as shown to the right.

4. Cleaning

Remove any dirt, moisture, or grease from pipe end and fitting sockets with a clean dry rag. A chemical cleaner must be used if the wiping fails to clean the surfaces.

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INSTALLATION OF THERMOPLASTIC PIPING SYSTEMS

SOLVENT CEMENTING PVC AND CPVC PIPE AND FITTINGS

5. Dry Fitting

Check dry fit of pipe and fitting by inserting pipe into fitting. With light pressure, pipe should easily go at least 1/3 of the way in. If it bottoms, it should be snug.

6. Priming

Using the correct applicator (as shown in chart), apply primer freely to fitting socket, keeping the surface and applicator wet until the surface has been softened. This will usually require 5-15 seconds. More time is needed for hard surfaces and in cold weather conditions. Redip the applicator in primer as required. When the surface is primed, remove any puddles of primer from the socket.

A second application in the socket is recommended if it has unusually hard surfaces. These hard surfaces are often found in bellied-ends and in fittings made from pipe stock.

Apply the primer to the end of the pipe equal to the depth of the fitting socket. Application should be made in the same manner as was done on the fitting socket.

7. Cementing

While the surfaces of the pipe and fitting are still wet with primer, immediately apply a full even layer of cement to the pipe using the proper size applicator shown in chart) equal to the depth of the socket.

Apply a medium layer of cement to the fitting socket. Do not let the cement puddle. Also, when joining belled-end pipe, do not coat beyond the bell depth or allow the cement to run down the inside of the pipe.

Apply a second full even layer of cement to the pipe. Assemble parts QUICKLY! Parts must be assembled while cement is still fluid. If assembly is interrupted, recoat parts and assemble. Push pipe FULLY into fitting, using a turning motion, if possible, of 1/8 to 1/4 turn, until it bottoms. Hold them together for 15 - 30 seconds to offset tendency of pipe to move out of fittings. With a rag, wipe off excess bead of cement from juncture of pipe and fitting.

Note: For pipe sizes 6" and larger, two people will be required, a mechanical forcing device should be used, and the joint should be held together for up to 3 minutes.

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INSTALLATION OF THERMOPLASTIC PIPING SYSTEMS

SOLVENT CEMENTING PVC AND CPVC PIPE AND FITTINGS

JOINT CURING

The joint should not be disturbed until it has initially set. The table below shows the recommended initial set times.

Table 2

Recommended Initial Set Times

Temperature Range	Pipe Sizes ½" to 1¼"	Pipe Sizes 1½" to 3"	Pipe Sizes 4" to 8"	Pipe Sizes 10" to 16"
60° - 100° F	15 min	30 min	1 hr	2 hr
40° - 60° F	1 hr	2 hr	4 hr	8 hr
0° - 40° F	3 hr	6 hr	12 hr	24 hr

The joint should not be pressure tested until it has cured. The exact curing time varies with temperature, humidity, and pipe size. The following table shows suggested curing times.

Table 3

Recommended Curing Time Before Pressure Testing

RELATIVE HUMIDITY 60% or Less*	CURE TIME Pipe Sizes ½" to 1¼"		CURE TIME Pipe Sizes 1½" to 3"		CURE TIME Pipe Sizes 4" to 8"		CURE TIME Pipe Sizes 10" to 16"
Temperature Range During Assembly and Cure Periods	Up to 180 psi	Above 180 to 370 psi	Up to 180 psi	Above 180 to 315 psi	Up to 180 psi	Above 180 to 315 psi	Up to 100 psi
60° - 100° F	1 hr	6 hr	2 hr	12 hr	6 hr	24 hr	24 hr
40° - 60° F	2 hr	12 hr	4 hr	24 hr	12 hr	48 hr	48 hr
0° - 40° F	8 hr	48 hr	16 hr	96 hr	48 hr	8 days	8 days

*For relative humidity above 60%, allow 50% more cure time.

The above data are based on laboratory tests and are intended as guidelines.
For more specific information, contact should be made with the cement manufacturer.

Pressure Testing

1. Prior to testing, safety precautions should be instituted to protect personnel and property in case of test failure,
2. Conduct pressure testing with water. DO NOT USE AIR OR OTHER GASES for pressure testing.
3. The piping system should be adequately anchored to limit movement. The system may require thrust blocking at changes of direction.
4. The piping system should be slowly filled with water, taking care to prevent surge and air entrapment. The flow velocity should not exceed 1 foot per second (see charts on pages 24-29).
5. All trapped air must be slowly released. Vents must be provided at all high points of the piping system. All valves and air relief mechanisms should be opened so that the air can be vented while the system is being filled. Trapped air is extremely dangerous and it must be slowly and completely vented prior to testing.
6. The piping system can be pressurized to 125% of its designed working pressure. However, care must be taken to ensure the pressure does not exceed the working pressure of the lowest rated component in the system (valves, unions, flanges, threaded parts, etc.)
7. The pressure test should not exceed one hour. Any leaking joints or pipe must be cut out and replaced and the line recharged and retested using the same procedure.

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INSTALLATION OF THERMOPLASTIC PIPING SYSTEMS

SOLVENT CEMENTING PVC AND CPVC PIPE AND FITTINGS

TIPS TO FOLLOW IN SOLVENT CEMENTING DURING COLD WEATHER:

1. Prefabricate as much of the system as is possible in a heated working area.
2. Store cements and primers 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 extra primer to soften the joining surfaces before applying cement.
5. Allow a longer initial set and cure period before the joint is moved or the system is tested.
6. Read and follow all of our directions carefully before installation. Regular cements are formulated to have well-balanced drying characteristics and to have good stability in sub-freezing temperatures. Some manufacturers offer special cements for cold weather because their regular cements do not have that same stability.

For all practical purposes, good solvent cemented joints can be made in very cold conditions with our existing products, providing proper care and a little common sense are used.

PHYSICAL DATA
P-70 PRIMER FOR PVC AND CPVC

BOILING POINT (°F) Based on 1st boiling Comp. THF.	151°F	SPECIFIC GRAVITY (H_2O=1)	0.870 ±0.010
VAPOR PRESSURE (mm Hg.) THF @ 25	100	PERCENT, VOLATILE BY VOLUME (%)	100%
VAPOR DENSITY (AIR = 1) APPROX.	2.49	EVAPORATION RATE (BUAC = 1) APPROX.	5.5 - 8
SOLUBILITY IN WATER 100%			
APPEARANCE AND ODOR - Purple Color, - Ethereal Odor			

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) (T.C.C.) 6°F	FLAMMABLE LIMITS	Left 1.8 / Used 11.8
EXTINGUISHING MEDIA Dry chemical Carbondioxide - Foam - Ansul "Purple K" National Aero-O-Foam		
SPECIAL FIREFIGHTING PROCEDURES Close or confined quarters require self contained breathing apparatus. Positive pressure hose mask or airline masks.		
UNUSUAL FIRE AND EXPLOSION HAZARDS Fire hazard because of low flash point, high volatility and heavy vapor.		

PHYSICAL DATA
705 CLEAR OR GRAY CEMENT FOR PVC

BOILING POINT (°F) Based on 1st boiling Comp. THF.	151°F	SPECIFIC GRAVITY (H_2O=1)	0.920 ±0.02
VAPOR PRESSURE (mm Hg.) THF @ 25°C	100	PERCENT, VOLATILE BY VOLUME (%) APPROX.	85 to 90%
VAPOR DENSITY (AIR = 1) APPROX.	2.49	EVAPORATION RATE (BUAC = 1) APPROX.	5.5 to 8
SOLUBILITY IN WATER Solvent portion PVC resin & filler - Precipates			
APPEARANCE AND ODOR - Clear,Thin syrupy liquid, Ethereal odor			

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) (T.O.C.)10°F	FLAMMABLE LIMITS	Left 1.8 / Used 1.8
EXTINGUISHING MEDIA Dry chemical,Carbondioxide - Foam - Ansul "Purple K" National Aero-O-Foam		
SPECIAL FIREFIGHTING PROCEDURES Close or confined quarters require self contained breathing apparatus. Positive pressure hose mask or airline masks.		
UNUSUAL FIRE AND EXPLOSION HAZARDS Fire hazard because of low flash point, high volatility and heavy vapor.		

PHYSICAL DATA
711 GRAY CEMENT FOR PVC

BOILING POINT (°F) Based on 1st boiling Comp. THF.	151°F	SPECIFIC GRAVITY (H_2O=1)	0.958± 0.008
VAPOR PRESSURE (mm Hg.) THF @ 25°C	100	PERCENT, VOLATILE BY VOLUME (%)APPROX.	90%
VAPOR DENSITY (AIR = 1) APPROX.	2.49	EVAPORATION RATE (BUAC = 1) APPROX.	5.0 to 8
SOLUBILITY IN WATER Solvent portion PVC resin & filler - Precipates			
APPEARANCE AND ODOR - Gary color, medium syrupy liquid - Ethereal Odor			

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) (T.O.C.) 8°F	FLAMMABLE LIMITS % in Air	Left 2.0 / Used 11.8
EXTINGUISHING MEDIA Dry chemical, Carbondioxide - Foam - Ansul "Purple K" National Aero-O-Foam		
SPECIAL FIREFIGHTING PROCEDURES Close or confined quarters require self contained breathing apparatus. Positive pressure hose mask or airline masks.		
UNUSUAL FIRE AND EXPLOSION HAZARDS Fire hazard because of low flash point, high volatility and heavy vapor.		

PHYSICAL DATA
719 GRAY CEMENT FOR PVC

BOILING POINT (°F) Based on 1st boiling Comp. THF.	151°F	SPECIFIC GRAVITY (H_2O=1)	0.909 ±0.004
VAPOR PRESSURE (mm Hg.) THF @	100	PERCENT, VOLATILE BY VOLUME (%)	80%
VAPOR DENSITY (AIR = 1) APPROX.	2.49	EVAPORATION RATE (BUAC = 1) APPROX. Initial	5 - 8
SOLUBILITY IN WATER Solvent portion PVC resin & filler - Precipates			
APPEARANCE AND ODOR - Gray color, paste like, Ethereal Odor			

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) (T.C.C.)8°F	FLAMMABLE LIMITS	Left 2 / Used 11.8
EXTINGUISHING MEDIA Carbondioxide, Dry chemicals		
SPECIAL FIREFIGHTING PROCEDURES Close or confined quarters require self-contained breathing apparatus. Positive pressure hose mask or airline masks.		
UNUSUAL FIRE AND EXPLOSION HAZARDS Fire hazard because of low flash point, high volatility and heavy vapor.		

PHYSICAL DATA
714 GRAY CEMENT FOR CPVC

BOILING POINT (°F) The lowest boiling point	151°	SPECIFIC GRAVITY (H_2O=1)	
VAPOR PRESSURE (mm Hg.) THF @ 25	100	PERCENT, VOLATILE BY VOLUME (%)	85-90%
VAPOR DENSITY (AIR = 1) APPROX.	2.49	EVAPORATION RATE (BUAC = 1) Initially	8.0
SOLUBILITY IN WATER Resin precipates			
APPEARANCE AND ODOR -Gray color, Medium syrupy liquid - Ethereal Odor			

FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) (T.O.C.) 8°F	FLAMMABLE LIMITS	Left 1.8 % / Used 11.8%
EXTINGUISHING MEDIA Dry chemical, Carbondioxide - Foam - Ansul "Purple K" National Aero-O-Foam		
SPECIAL FIREFIGHTING PROCEDURES Close or confined quarters require self contained breathing apparatus. Positive pressure hose mask or airline masks		
UNUSUAL FIRE AND EXPLOSION HAZARDS Fire hazard because of low flash point, high volatility and heavy vapor.		

Low VOC 724 cement for hypochlorite service

weld-on 724 CPVC low VOC cement is a gray, medium bodied, fast-setting solvent cement used for joining CPVC industrial piping through 12" diameter and is specially formulated for services that include caustics and hypochlorites.

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THREADING INSTRUCTIONS

PVC AND CPVC PIPE

Only Schedule 80 Pvc and CPVC pipe can be safely threaded. Schedule 40 PVC and CPVC pipe and PVC SDR pipe should **not** be threaded.

Due to the reduction in wall thickness at the point of threading, the pressure rating of the pipe is reduced by 50%. Therefore, threaded connections are not recommended for high pressure applications.

THREADING PROCEDURE

1. Cutting
The pipe must be cut square using a power saw, a miter box, or a plastic pipe cutter. Burrs should be removed using a knife or deburring tool.

2. Threading
Threads can be cut using either hand held or power threading equipment. The cutting dies should be clean, sharp, and in good condition. Special dies for cutting plastic pipe are available and are recommended.

When using a hand threader, the dies should have a 5° to 10° negative front rake. When using a power threader, the dies should have a 5° negative front rake and the die heads should be self-opening. A slight chamfer to lead the dies will speed production. However, the dies should not be driven at high speeds or with heavy pressure.

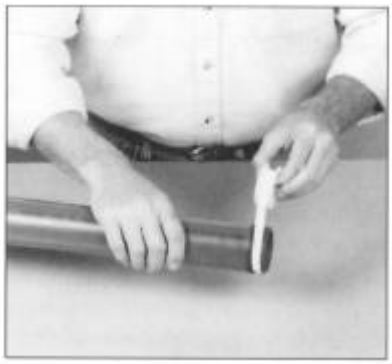
When using a hand held threader, the pipe should be held in a pipe vise. To prevent crushing or scoring of the pipe, a protective wrap such as emery paper, canvas, rubber, or a light metal sleeve should be used.

Insert a tapered plug into the end of the pipe to be threaded. This plug will provide additional support and prevent distortion of the pipe in the threading area.

It is recommended that a cutting lubricant, such as a soap and water solution or a water soluble machine oil, be used during the threading operation. Also, clearing the cuttings from the die is highly recommended.

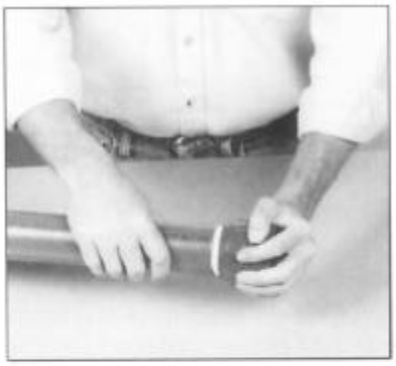
Do not over-thread the pipe. The diagram and table on the following page show the ASTM F 1498 dimensions for American Standard Taper Pipe Threads. Periodically check the threads with a ring gauge to ensure that the threads are accurate. The tolerance is ±11/2 turns.

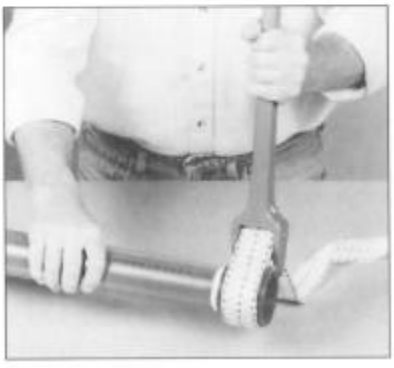
3. Installation
Brush the threads clean and wrap PTFE thread tape around the entire length of the threads.[1] Start with the second full thread and wrap in the direction of the threads to prevent unraveling when the fitting is tightened onto the pipe. Overlap each wrap by one half the width of the tape.



[1] Pipe joint compounds, pastes, or other thread lubricants are **not** recommended for use with PVC and CPVC pipe.

Thread the fitting onto the pipe and hand tighten. Further tighten the fitting (one to two turns past hand tight) by using a strap wrench only. Avoid over tightening as this may cause thread or fitting damage. When combining plastic and metallic threaded systems, it is recommended that plastic male threads be screwed into metallic female threads rather than metallic male threads into plastic female threads.





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THREADING INSTRUCTIONS

PVC - CPVC - PP - PVDF

SCOPE

The procedure presented herein covers threading of all IPS Schedule 80 or heavier thermoplastic pipe. The threads are National Pipe Threads (NPT) which are cut to the dimensions outlined in ANSI B2.1 and presented below:

DO NOT THREAD SCHEDULE 40 PIPE

Taper Pipe Thread Dimensions Diagram

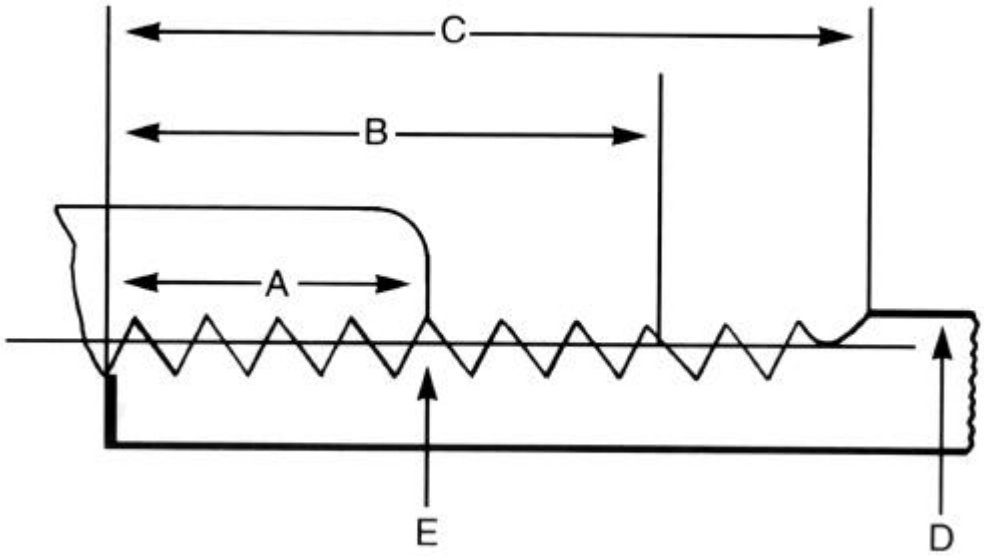

Table 4

PIPE		THREADS					
Nominal Size In Inches	Outside Diameter In Inches (D)	Number of Threads Per Inch	Normal Engagement By Hand In Inches (A)	Length of Effective Thread In Inches (B)	Total Length: End of Pipe to Vanish Point In Inches (C)	Pitch Diameter at end of Internal Thread In Inches (E)	Maximum Depth of Thread In Inches
1/4	.540	18	.228	.4018	.5946	.49163	.04444
3/8	.675	18	.240	.4078	.6006	.62701	.04444
1/2	.840	14	.320	.5337	.7815	.77843	.05714
3/4	1.050	14	.339	.5457	.7935	.98887	.05714
1	1.315	11 1/2	.400	.6828	.9845	1.23863	.06957
1 1/4	1.660	11 1/2	.420	.7068	1.0085	1.58338	.06957
1 1/2	1.900	11 1/2	.420	.7235	1.0252	1.82234	.06957
2	2.375	11 1/2	.436	.7565	1.0582	2.29627	.06957
2 1/2	2.875	8	.682	1.1375	1.5712	2.76216	.10000
3	3.500	8	.766	1.2000	1.6337	3.38850	.10000
4	4.500	8	.844	1.3000	1.7337	4.38713	.10000

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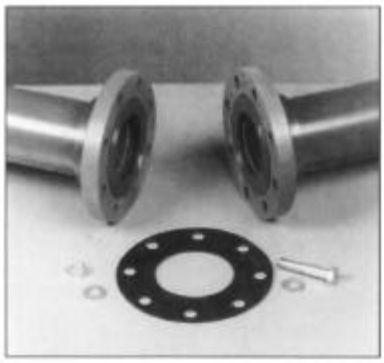
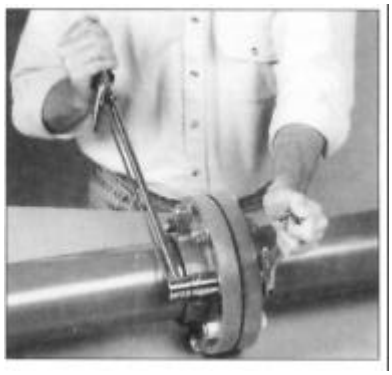
FLANGING
PVC AND CPVC PIPE

For systems where dismantling is required, flanging is a convenient joining method. It is also an easy way to join plastic and metallic systems.



5. Use a torque wrench to tighten the bolts to the torque values shown below.



INSTALLATION

1. Join the flange to the pipe using the procedures shown in the solvent cementing or threading sections (see pages 43-49).

2. Use a full faced elastomeric gasket which is resistant to the chemicals being conveyed in the piping system. A gasket 1/8" thick with a Durometer, scale "A", hardness of 55 -80 is normally satisfactory.

3. Align the flanges and gasket by inserting all of the bolts through the mating flange bolt holes. Be sure to use properly sized flat washers under all bolt heads and nuts.

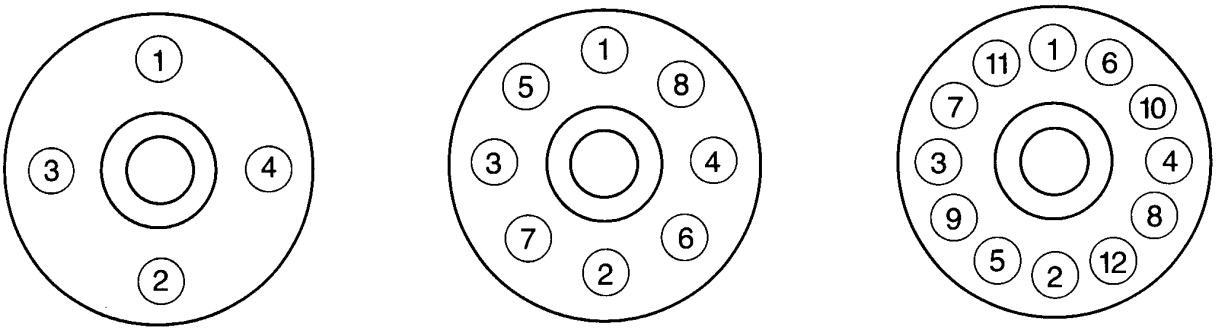
4. Sequentially tighten the bolts corresponding to the patterns shown below.

RECOMMENDED TORQUE

Table 5

Pipe Size In Inches	No. Bolt Holes	Bolt Diameter	Recommended Torque ft/lbs
1/2	4	1/2	10 - 15
3/4	4	1/2	10 - 15
1	4	1/2	10 - 15
1 1/4	4	1/2	10 - 15
1 1/2	4	1/2	10 - 15
2	4	5/8	20 - 30
2 1/2	4	5/8	20 - 30
3	4	5/8	20 - 30
4	8	5/8	20 - 30
6	8	3/4	33 - 50
8	8	3/4	33 - 50
10	12	7/8	53 - 75
12	12	7/8	53 - 75

FLANGE BOLT TIGHTENING PATTERNS



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FLANGED JOINTS

PRESSURE RATING

Maximum pressure for any flanged system is 150 psi. At elevated temperatures the pressure capability of a flanged system must be derated as follows:

Table 6

MAXIMUM OPERATING PRESSURE (PSI)

OPERATING TEMPERATURE				
(°F)	PVC*	CPVC*	PP**	PVDF
100	150	150	150	150
110	135	140	140	150
120	110	130	130	150
130	75	120	118	150
140	50	110	105	150
150	NR	100	93	140
160	NR	90	80	133
170	NR	80	70	125
180	NR	70	50	115
190	NR	60	NR	106
200	NR	50	NR	97
250	NR	NR	NR	50
280	NR	NR	NR	25

NR -Not Recommended

* PVC and CPVC flanges sizes 2-1/2, 3 and 4-inch threaded must be back welded for the above pressure capability to be applicable.

** Threaded PP flanges size 1/2 through 4" as well as the 6" back weld socket flange are not recommended for pressure applications (drainage only).

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