

## Basic Principles of Solvent Cementing

The solvent cemented connection in thermoplastic pipe and fittings is the last vital link in a plastic pipe installation. It can mean the success or failure of the system as a whole. Accordingly, it requires the same professional care and attention that are given to other components of the system.

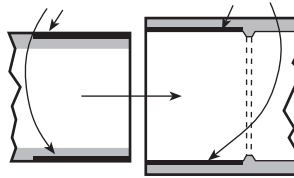
There are many solvent cementing techniques published covering step by step procedures on just how to make solvent cemented joints. However, we feel that if the basic principles involved are explained, known and understood, a better understanding would be gained, as to what techniques are necessary to suit particular applications, temperature conditions, and variations in size and fits of pipe and fittings.

Be aware at all times of good safety practices. Solvent cements for pipe and fittings are flammable, so there should be no smoking nor other sources of heat or flame in working or storage areas. Be sure to work only in a well ventilated space and avoid unnecessary skin contact with all solvents. More detailed safety information is available from Harvel or IPS (Weld-On) Corporation.

To consistently make good joints, the following should be carefully understood.

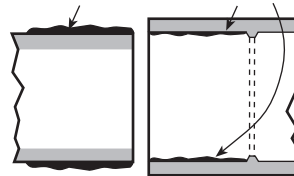
- 1 The joining surfaces must be softened and made semifluid.
- 2 Sufficient cement must be applied to fill the gap between pipe and fitting.
- 3 Assembly of pipe and fittings must be made while the surfaces are still wet and fluid.
- 4 Joint strength develops as the cement dries. In the tight part of the joint the surfaces will tend to fuse together, in the loose part the cement will bond to both surfaces.

These areas must be softened and penetrated



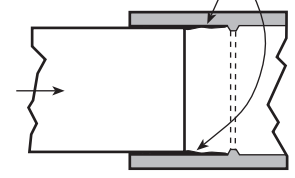
When using the ONE STEP cementing process, penetration and softening can be achieved by the cement itself (read ONE STEP cementing procedures carefully; refer to installation instructions). For certain sizes, under certain conditions, it may be desirable to use the TWO STEP process which utilizes a primer to ensure adequate softening. For example, when working in cold weather with large diameter pipe, more time and additional applications may be required.

Cement coatings of sufficient thickness



More than sufficient cement to fill the loose part of the joint must be applied. Besides filling the gap, adequate cement layers will penetrate the surfaces and also remain wet until the joint is assembled. Prove this yourself. Apply on the top surface of a piece of pipe two separate layers of cement. First flow on a heavy layer of cement, then alongside it a thin brushed out layer. Test the layers every 15 seconds or so by a gentle tap with your finger. You will note that the thin layer becomes tacky and then dries quickly (probably within 15 seconds) The heavy layer will remain wet much longer. Now check for penetration a few minutes after applying these layers. Scrape them with a knife. The thin layer will have achieved little or no penetration. The heavy one, much more penetration.

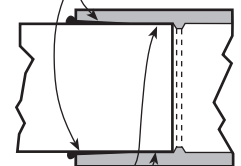
Surfaces must be assembled while they are wet and soft



If the cement coatings on the pipe and fittings are wet and fluid when assembly takes place, they will tend to flow together and become one layer. Also, if the cement is wet the surfaces beneath them will still be soft, and these softened surfaces in the tight part of the joint will tend to fuse together.

Surfaces

Bonded Surfaces



Fused Surfaces

As the solvent dissipates, the cement layer and the softened surfaces will harden with a corresponding increase in joint strength. A good joint will take the required working pressure long before the joint is fully dry and final strength is obtained. In the tight (fused) part of the joint, strength will develop more quickly than in the looser (bonded) part of the joint. Information about the development of bond strength of solvent cemented joints is available.

*The QUALITY Line*

# Solvent Cementing in Hot or Cold Weather

## Hot Weather

---

There are many occasions when solvent cementing Harvel piping products in 95°F temperatures and over cannot be avoided. If a few special precautions are taken, problems can be avoided. Solvent cements contain high-strength solvents which evaporate faster at elevated temperatures. This is especially true when there is a hot wind blowing. 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 and deeper, especially inside a joint. Thus, it is very important to avoid puddling inside sockets, and to wipe off excess cement outside.

### Tips to Follow when 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. 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.

By following Harvel's Installation Instructions, and using a little extra care, as outlined above, successful solvent cemented joints can be made in even the most extreme hot weather conditions.

## Cold Weather

---

Solvent Cement products 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 attack, therefore, it becomes more important to pre-soften surfaces. Because of slower evaporation, a longer cure time is necessary.

### Tips to Follow when 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.

## Solvent Cement and Primer Spills

Work areas should be protected by using drop cloths in the event of an accidental spill. Cement and/or primer spills can cause irreparable damage depending on the type of surface affected. Accidental spills should be wiped up immediately before the cement sets. A mild soap and water mixture may aid in removal of a stain; however, the use of solvents or harsh cleansers may do more damage than good. In the event of a spill, consult the manufacturer of the affected surface for possible suggestions.

Protecting the work area prior to starting is recommended.

# Storage and Handling

## General

Thermoplastic piping products have long established their value as a superior material resistant to attack from corrosives, chemicals, and electrolytic action. In many applications, service life is unlimited due to the characteristics of the material, in comparison to metal piping products.

It is important to understand that thermoplastic piping products do have a much lower impact strength when compared to metal piping products. Improper or careless handling is often the cause of damage to plastic piping products. Unfortunately, previously unnoticed or undetected damage is often discovered only after the system has been installed and put into service.

The following information provides the basic guidelines for the proper handling and storage of thermoplastic piping products. Losses due to damage and expensive replacements of thermoplastic piping components can be avoided through correct handling and storage practices.

## Storage

Thermoplastic pipe and fittings offer excellent resistance to weathering and may therefore be stored outside. Pipe and fittings stored outside must be covered with a light tarpaulin to prevent excessive temperature buildup and possible warpage or color fading. Exposure to sunlight (U.V. radiation) will cause a color fade of the pipe, but will not affect the physical properties of the CPVC material. However, piping which exhibits color fade is an indication that the product was not stored properly. Pipe in this condition should be examined carefully for signs of physical abuse due to improper storage and handling. When stored inside, they should be stored in a well ventilated area, away from steam lines or other types of heat sources.

Pipe should be stored on a clean, flat surface that provides an even support surface for the entire length of the pipe. Palletized pipe should be stacked no more than three pallets high, with the wooden pallet bracing in full contact with each other. Loose pipe should not be stacked to exceed a height of over three feet; bundled pipe may be stacked twice that. When storing pipe on racks, the racks should have continuous or close support arms to prevent the pipe from sagging.

Thermoplastic pipe fittings should be stored in their original cartons, on pallets. Pallets should be wrapped with thin plastic sheeting to prevent moisture from penetrating the cartons, causing them to collapse.

## Handling

Extra care is required when handling thermoplastic pipe and fittings, as they have a much lower impact strength and resistance to abuse than steel.

Pipe fittings, whether cartoned or loose, should not be tossed or thrown to the ground; pipe should not be dropped or dragged on the ground - i.e., when being unloaded from a truck. Impact cracks, splits or scratches can weaken or damage the pipe and fitting. Heavy or sharp objects should not be thrown onto or against thermoplastic pipe and fittings. Pipe fittings should never be mixed in storage bins with metal piping products.

When handling thermoplastic pipe with fork lift, only one pallet at a time should be carried. When using a hydraulic boom and cable for unloading, chain slings should not be used. Instead, wide canvas or fiberglass slings should be used, with adequate placements on the pallet load to prevent sagging.

Caution: Very cold weather will make thermoplastic pipe and fittings more susceptible to damage caused by impact. Extra care should be taken during handling to prevent damage.

The use of ratchet type cutters should be avoided, especially during cold weather. These types of cutters tend to compress the pipe prior to cutting which can result in hairline fracturing. Blades on this style of cutter tend to dull quickly. The use of dull blades can fracture the pipe prior to making a clean cut.

## Inspection Before Use

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

## Painting of Pipe

Harvel CPVC Fire Sprinkler Piping Products can be painted as necessary for aesthetic purposes. **ONLY WATER-BASED LATEX PAINTS ARE RECOMMENDED.** The use of oil-based paints are not recommended with CPVC piping and can result in damage. The piping can be cleaned with a mild soap and water mixture prior to painting.

# Safety Information on Primers and Solvents

Over a period of 30 years, millions of solvent cemented joints have been made with only rare cases of mishap. However, since these products are flammable and contain chemical solvents, appropriate safety precautions should be taken.

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. Cement should be stored in closed containers at temperatures between 40°F and 110°F. 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.

Respirators especially designed to minimize the inhalation of organic vapors can also be used. They are commercially available.

Containers should be kept tightly closed when not in use and covered as much as possible when in use. Use of an applicator can with applicator attached to a lid is especially recommended.

Avoid frequent contact with skin and eyes. May be absorbed through the skin. May cause eye injury. 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.

## Use Caution with Welding Torches

At construction sites where plastic pipe is being installed or has recently been solvent welded, special caution should be taken when using welding torches or other equipment where sparks might be involved. Flammable vapors from cemented joints sometimes linger within or around a piping system for some time.

Special care must be taken when using a welding torch in these applications:

- Well casing installations
- Installing pumps in irrigation water lines
- Installation of plastic pipe systems in industrial plants

In all cases, lines should be 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. The introductions of granules or pellets of calcium hypochlorite with solvent cements and primers (including their vapors) may result in violent chemical reactions if a water solution is not used. It is advisable to purify lines by pumping chlorinated water into the piping system - this solution will be nonvolatile.

Furthermore, 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. People have learned they must be careful with gasoline. Although solvent cements are not as flammable as gasoline - users must also learn to be careful. Again, accidents and injuries have seldom occurred in the use of our products. Help maintain and improve this excellent record by following the above recommendations.

# Plastic Piping Tools

## Tools used with Plastic Piping

The use of tools that have been specifically designed for use with thermoplastic pipe and fittings is strongly recommended to obtain optimum results when installing thermoplastic piping systems. 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:** Improper use of tools normally used with metal piping systems, i.e., hacksaws, water pump pliers, pipe wrenches, etc., can cause damage to plastic pipe and fittings. Visible and non-visible fractures, scoring or gouging of material, and over tightening of plastic threaded connections are some of the major problems associated with the use of incorrect tools and/or procedures.



### Pipe Cutters

Plastic pipe must have square-cut ends to allow for the proper interfacing of the pipe end and the fitting socket bottom. A wheel type pipe cutter, with special blades for plastic pipe, provides easy and clean cutting action. The raised bead left on the outside of the pipe after cutting must then be removed. A miter box saw may also be used to produce square-cut ends.



### 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.



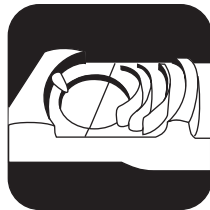
## Power Saws

Power saws especially for use with plastic pipe are available. These are particularly useful in prefabrication operations where a large quantity of pipe is being cut. Blades designed for thermoplastic pipe **MUST** be used. Follow manufacturer's instructions regarding speed, set, and proper use of tool.



## Pipe Bevelers

Pipe ends must be chamfered (or beveled) to allow easy insertion of the pipe into the fitting and to help prevent scraping the solvent 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 quickly achieved using a plastic pipe beveler.



## Deburring Tools

A smooth, beveled pipe end helps spread the solvent easily as the pipe is joined to the fitting. All burrs should be removed from the inside, as well as the outside, of the pipe ends. Special plastic pipe deburring tools deburr pipe ends quickly and efficiently.



## Strap Wrenches

Strap wrenches with special woven nylon straps are extra strong and are treated for slip resistance. These strap wrenches, designed for use with plastic pipe, provide gripping power for turning, without scratching or deforming the pipe.



## Chain Vises

Chain vises are made with jaws for holding plastic pipe. Jaws engineered for use with plastic pipe provide holding power, without damage to the pipe.

# Harvel® BlazeMaster® CPVC Fire Sprinkler Piping Products

Harvel Plastics, Inc. manufactures CPVC fire sprinkler pipe. It does not manufacture the other products, tools, or cements shown in this bulletin.

This information has been compiled solely as an aid and general guide for the users of plastic piping products. No warranty, expressed or implied, or endorsement of any kind is made by Harvel Plastics, Inc. for the products shown, or their manufacture. The procedures and information contained herein are based on the best available information and believed to be reliable. It is the users responsibility to determine the suitability of these products for each application, and to contact the product manufacturer for recommendations and instructions for use.

For detailed installation information, please refer to Harvel CPVC Fire Sprinkler Piping Products Installation Instructions (HFS-3).



Harvel Plastics, Inc.  
Quality Systems Certificate Nos. 270/455  
Assessed to ISO 9001



Member of:

**AFSA**

**NFPA**

**NFSA**

*The QUALITY Line*



300 Kuebler Rd., P.O. Box 757, Easton, PA 18044-0757  
Tel 610-252-7355 • Fax 610-253-4436  
www.HarvelSprinklerPipe.com • e-mail: harvel@harvel.com

Harvel® is a registered trademark of Harvel Plastics, Inc.  
BlazeMaster® is a registered trademark of Noveon, Inc.  
©Copyright 2004 Harvel Plastics, Inc.