Solvent Cementing Instructions for PVC & CPVC Pipe & Fittings

Solvent Cementing with Primer

Step 1 Preparation

Assemble proper materials for the job. This includes the appropriate cement, primer and applicator for the size of piping system to be assembled. See Tables 23 and 24 for guidelines to estimate the amount of cement required.

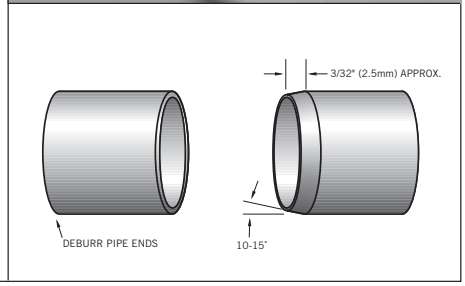
Step 2 Cut Pipe

Pipe must be cut as square as possible. (A diagonal cut reduces bonding area in the most effective part of the joint.) Use a handsaw and miter box or a mechanical saw.

Plastic tubing cutters may also be used for cutting plastic pipe; however, some produce a raised bead at the end of the pipe. This bead must be removed with a file or reamer, as it will wipe the cement away when pipe is inserted into the fitting.

Step 3 Deburr Pipe Ends

Use a knife, plastic pipe deburring tool, or file to remove burrs from the end of small diameter pipe. Be sure to remove all burrs from around the inside as well as the outside of the pipe. A slight chamfer (bevel) of about 15° should be added to the end to permit easier insertion of the pipe into the fitting. Failure to chamfer the edge of the pipe may remove cement from the fitting socket, causing the joint to leak. For pressure pipe systems of 2" and above, the pipe must be end-treated with a 15° chamfer cut to a depth of approximately 3/32" (2.5mm).



Step 4 Clean Pipe Ends

Remove all dirt, grease and moisture. A thorough wipe with a clean dry rag is usually sufficient. (Moisture will retard cure, dirt or grease can prevent adhesion).

Step 5 Check Fit

Check pipe and fittings for dry fit before cementing together. For proper interference fit, the pipe must go easily into the fitting one quarter to three quarters of the way. Too tight a fit is not desirable; you must be able to fully bottom the pipe in the socket during assembly. If the pipe and fittings are not out of round, a satisfactory joint can be made if there is a "net" fit, that is, the pipe bottoms in the fitting socket with no interference, without slop.

All pipe and fittings must conform to ASTM and other recognized standards.

Step 6 Select Applicator

Ensure that the right applicator is being used for the size of pipe or fittings being joined. The applicator size should be equal to half the pipe diameter. It is important that a proper size applicator be used to help ensure that sufficient layers of cement and primer are applied.

Step 7 Priming

The purpose of a primer is to penetrate and soften pipe surfaces so that they can fuse together. The proper use of a primer provides assurance that the surfaces are prepared for fusion.

Check the penetration or softening on a piece of scrap before you start the installation or if the weather changes during the day. Using a knife or other sharp object, drag the edge over the coated surface. Proper penetration has been made if you can scratch or scrape a few thousandths of an inch of the primed surfaces away.

Weather conditions can affect priming and cementing action, so be aware of the following:

- repeated applications to either or both surfaces may be necessary
- in cold weather, more time may be required for proper penetration
- in hot weather, penetration time may be shortened due to rapid evaporation

Step 8 Primer Application

Using the correct applicator, aggressively work the primer into the fitting socket, keeping the surface and applicator wet until the surface has been softened. More applications may be needed for hard surfaces and cold weather conditions. Re-dip the applicator in primer as required. When the surface is primed, remove any puddles of primer from the socket.

Step 9 Primer Application

Next, aggressively work the primer on to the end of the pipe to a point 1/2" beyond the depth of the fitting socket.

Immediately and while the surfaces are still wet, apply the appropriate IPEX cement.

Step 10 Cement Application

Stir the cement or shake can before using. Using the correct size applicator, aggressively work a full even layer of cement on to the pipe end equal to the depth of the fitting socket. Do not brush it out to a thin paint type layer, as this will dry within a few seconds.

Step 11 Cement Application

Aggressively work a medium layer of cement into the fitting socket.

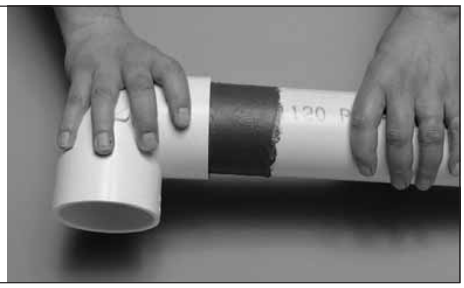
Avoid puddling the cement in the socket. On bell end pipe do not coat beyond the socket depth or allow cement to run down into the pipe beyond the spigot end.

Step 12 Cement Application

Apply a second full, even layer of cement on the pipe.

Step 13 Assembly

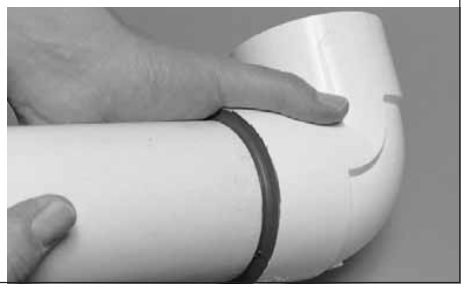
Without delay, while the cement is still wet, assemble the pipe and fittings. Use sufficient force to ensure that the pipe bottoms in the fitting socket. If possible, twist the pipe a quarter turn as you insert it.



Step 14 Assembly

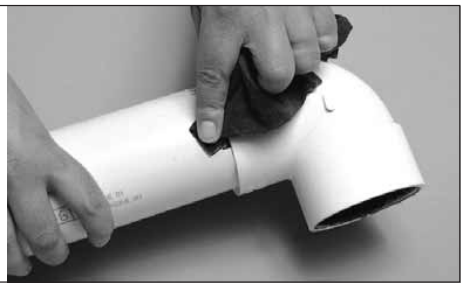
Hold the pipe and fitting together for approximately 30 seconds to avoid push out.

After assembly, a joint should have a ring or bead of cement completely around the juncture of the pipe and fitting. If voids in this ring are present, sufficient cement was not applied and the joint may be defective.



Step 15 Joint Cleaning

Using a rag, remove the excess cement from the pipe and fitting, including the ring or bead, as it will needlessly soften the pipe and fitting and does not add to joint strength. Avoid disturbing or moving the joint.



Step 16 Joint Setting & Curing

Handle newly assembled joints carefully until initial set has taken place. Allow curing to take place before pressurizing the system. (Note: in humid weather allow for 50% more curing time.)

For initial set and cure times for IPEX cements, refer to Tables 21 and 22.

Solvent Cementing without Primer / One Step Cements

If local codes permit, successful joints can be made without a primer using cement alone, but extra care must be given to the installation. It is important that a good interference fit exists between the pipe and fittings. It is for this reason we recommend that joints being made without a primer be limited to systems 2" and smaller for pressure applications or 6" and smaller for DWV or non-pressure applications. Extra care must also be given in applying cements to make sure proper penetration and softening of the pipe and fitting surfaces is achieved. Note that one step cements are not recommended at temperatures at or below 32°F (0°C).

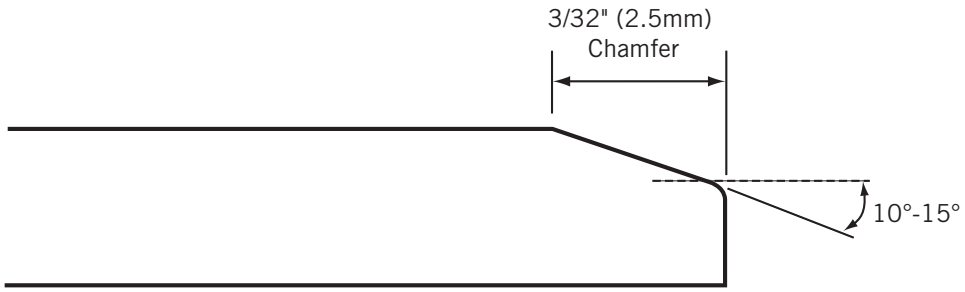
Joining Large Diameter Pipe and Fittings

As pipe diameter increases so does the difficulty in installing it. For large diameter pipe, the following recommendations apply.

- Select the proper size of applicator. The use of proper size applicators is even more important for large pipe to ensure that enough cement is applied to fill the larger gap that exists between the pipe and fittings.
- Ensure the proper selection of cement and primer (refer to Xirtec cement product catalog or your supplier of cements and primers).
- The size of the joining crew should be increased

  6" - 8" pipe: 2-3 people per joint

  10" - 24" pipe: 3-4 people per joint
- The end of the pipe must be chamfered as per the diagram below.
- The primer and cement should be applied simultaneously to the pipe and fittings.
- Make sure to apply a second full layer of cement to the pipe.
- Because of the short sockets in many large diameter fittings, it is very important to have pipe bottomed into the fitting. It is for this reason that above 6" diameter we recommend the use of a “come-a-long”.
- Large diameter pipe and fittings will require longer set and cure times. (In cold weather, a heat blanket may be used to speed up the set and cure times.)
- Prefabricate as many joints as possible.
- If pipe is to be buried, make as many joints as possible above ground, then after the joints have cured, carefully lower the piping system into the trench.



Cold Weather

Although normal installation temperatures are between 40°F (4°C) and 110°F (43°C), high strength joints have been made at temperatures as low as –15°F (–26°C).

In cold weather, solvents penetrate and soften the plastic pipe and fitting surfaces more slowly than in warm weather. In this situation, the plastic is more resistant to solvent attack and it becomes even more important to pre-soften surfaces with an aggressive primer. Be aware that because of slower evaporation, a longer cure time is necessary.

Tips for solvent cementing in cold weather

- Prefabricate as much of the system as is possible in a heated work area.
- Store cements and primers in a warmer area when not in use and make sure they remain fluid.
- Take special care to remove moisture including ice and snow from the surfaces to be joined.
- Ensure that the temperature of the materials to be joined (re: pipe and fittings) is similar.
- Use an IPEX Primer to soften the joining surfaces before applying cement. More than one application may be necessary.
- Allow a longer cure period before the system is used. Note: A heat blanket may be used to speed up the set and cure times.

Hot Weather

There are many occasions when solvent cementing plastic pipe at 95ºF (35ºC) temperatures and above cannot be avoided. If special precautions are taken, problems can be avoided.

Solvent cements for plastic pipe contain high-strength solvents which evaporate faster at elevated temperatures. This is especially true when there is a hot wind blowing. If the pipe is stored in direct sunlight, the pipe surface temperatures may be 20ºF to 30ºF (10ºC to 15ºC) higher than the ambient temperature. In this situation, the plastic is less resistant to attack and the solvents will attack faster and deeper, especially inside a joint. It is therefore very important to avoid puddling the cement inside the fitting socket and to ensure that any excess cement outside the joint is wiped off.

Tips for solvent cementing in hot weather:

- Store solvent cements and primers in a cool or shaded area prior to use.
- If possible, store fittings and pipe or at least the ends to be solvent welded, in a shady area before cementing.
- Try to do the solvent cementing in cooler morning hours.
- Cool surfaces to be joined by wiping with a damp rag.
- Make sure that the surface is dry prior to applying solvent cement.
- Make sure that both surfaces to be joined are still wet with cement when putting them together. With large size pipe, more people on the crew may be necessary.
- Using a primer and a heavier, high-viscosity cement will provide a little more working time.

Note: During hot weather the expansion-contraction factor may increase. Refer to the expansion-contraction design criteria in this manual.

Table 21 – Initial Set Schedule for IPEX and IPEX Recommended PVC/CPVC Solvent Cements *

Temperature Range (°F)	Temperature Range (°C)	Pipe Size (in)				
		½ to 1¼	1½ to 2	2½ to 8	10 to 14	≥ 16
60 to 100	16 to 38	2 minutes	5 minutes	30 minutes	2 hours	4 hours
40 to 60	4 to 16	5 minutes	10 minutes	2 hours	8 hours	16 hours
0 to 40	–18 to 4	10 minutes	15 minutes	12 hours	24 hours	48 hours

* The figures in the table are estimates based on laboratory tests for water applications (chemical applications may require different set times). In damp or humid weather allow 50% more set time.

Note 1: Due to the many variables in the field, these figures should be used as a general guideline only.

Note 2: Initial set schedule is the necessary time needed before the joint can be carefully handled.

Table 22 – Joint Cure Schedule for IPEX and IPEX Recommended PVC/CPVC Solvent Cements *

Temperature Range (°F)	Temperature Range (°C)	Pipe Size (in) & system operating pressure							
		½ to 1¼		1½ to 2		2½ to 8		10 to 14	> 16
		<160 psi	160 - 370 psi	<160 psi	160 - 315 psi	<160 psi	160 - 315 psi	<100 psi	<100 psi
60 to 100	16 to 38	15 min	6 hr	30 min	12 hr	1½hr	24 hr	48 hr	72 hr
40 to 60	4 to 16	20 min	12 hr	45 min	24 hr	4 hr	48 hr	96 hr	6 days
0 to 40	–18 to 4	30 min	48 hr	1 hr	96 hr	72 hr	8 days	8 days	14 days

* The figures in the table are estimates based on laboratory tests for water applications (chemical applications may require different set times). In damp or humid weather allow 50% more cure time (relative humidity over 60%).

Note 1: Due to the many variables in the field, these figures should be used as a general guideline only.

Note 2: Joint cure schedule is the necessary time needed before pressurizing the system.

Table 23 – Average Number of Joints per quart of IPEX and IPEX Recommended Cement *

Pipe Size (in)	No. of Joints / Qt.
½	300
¾	200
1	125
1½	90
2	60
3	40
4	30
6	10
8	5
10	2 - 3
12	1 - 2
14	1

* The figures in the table are estimates based on laboratory tests

Note: Due to the many variables in the field, these figures should be used as a general guideline only.

Table 24 – Average Number of Joints per US gallon of IPEX and IPEX Recommended Cement *

Pipe Size (in)	No. of Joints / Gal.
16	3
18	2
20	1 - 2
24	1

* The figures in the table are estimates based on laboratory tests

Note: Due to the many variables in the field, these figures should be used as a general guideline only.