

IPEX PVC DWV

Handling & Installation

JOINING METHOD – SOLVENT WELDING

Installation

To make consistently tight joints, the following points of solvent cementing should be clearly understood:

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

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 for guidelines to estimate the amount of cement required.



Step 2 Cut Pipe

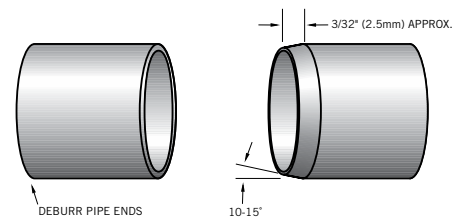
Pipe must be cut as square as possible. (A diagonal cut reduces bonding area in the most effective part of the joint.) Use a handsaw and miter box or a mechanical saw.

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 treated with a 15° chamfer cut to a depth of approximately 3/32".



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 welding 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 stop.

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



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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.



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 welding 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 CEMENT.



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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.



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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. (NOTE: IN HUMID WEATHER ALLOW FOR 50% MORE CURING TIME.)

For initial set and cure times, refer to Tables

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 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).

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 welding 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 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 welding plastic pipe at 95°F (35°C) 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 20°F to 30°F (10°C to 15°C) 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 welding 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 welding.
- Try to do the solvent welding 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.

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Initial Set Schedule for IPEX Recommended PVC Solvent Cements *

Temperature Range (°F)	Temperature Range (°C)	Pipe Size (in)				
		1/2 to 1-1/4	1-1/2 to 2	2-1/2 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. 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.

Initial Cure Schedule for IPEX Recommended PVC Solvent Cements *

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

* The figures in the table are estimates based on laboratory tests for water applications. 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.

Joining method—Threading

Threading of PVC schedule 40 pipe is not recommended.

Molded male (MPT x H) and female (H x FPT) threaded adapters should be used to make a threaded connection.

IPEX recommended thread lubricant such as Teflon® tape (PTFE) or IPEX Thread Sealant should be used onto the threaded portion of the fitting.

If tape is used, wrap the tape around the entire length of threads beginning with number two thread from the end. The tape should slightly overlap itself going in the same direction as the threads. This will prevent the tape from unraveling when the fitting is tightened on the pipe. Overlapping in the wrong direction and the use of too much tape can affect tolerances between threads. This can generate stress in the wall of female fittings resulting in failure during operations.

If IPEX Thread Sealant is to be used, brush on a generous amount of sealant, using the correctly sized applicator, onto the threads beginning with the number two thread from the end.

If desired, the joint may be tightened with a strap wrench. In NO INSTANCE should a pipe or chain wrench be used as the jaws of this type of wrench will scar and damage the pipe wall. Fittings should be threaded together until hand tight with an additional 1/2 to 1 turns more. Avoid stretching or distorting the pipe, fittings or threads by over tightening.

Transitions from PVC to cast iron can also be made using molded threaded cast iron adapters (H x NPT).

NOTE 1: Never apply solvent cement to threaded fittings. Do not allow cleaners, primers, or solvent cements to "run" or drip into the threaded portion of the fitting.

NOTE 2: Avoid screwing metallic male threads into plastic female threads, except those that have metal reinforcement. Consult the factory or your IPEX sales representative for the availability of these metal reinforced fittings.

NOTE 3: It is recommended that pipe tape/lubricant be used when connecting union ends to threaded pipe. However, pipe tape/lubricant is not needed on the union threaded interface assembly.





Handling and storage

PVC is strong, lightweight material. Piping made of this material is easily handled and, as a result, there is a tendency for them to be thrown about on the jobsite. Care should be taken in handling and storage to prevent damage to the pipe.

PVC 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.

Prolonged Outdoor Exposure

Prolonged exposure of PVC pipe to the direct rays of the sun will not damage the pipe. However, some mild discoloration may take place in the form of a milky film on the exposed surfaces. This change in color merely indicates that there has been a harmless chemical transformation at the surface of the pipe. A small reduction in impact strength could occur at the discolored surfaces but they are of a very small order and are not enough to cause problems in field installation.

Protection – Covering

Discoloration of the pipe can be avoided by shading it from the direct rays of the sun. This can be accomplished by covering the stockpile or the crated pipe with a light colored opaque material such as canvas. If the pipe is covered, always allow for the circulation of air through the pipe to avoid heat buildup in hot summer weather. Make sure that the pipe is not stored close to sources of heat such as boilers, steam lines, engine exhaust outlets, etc.

Protection – Painting

PVC pipe and fittings can be easily protected from ultraviolet oxidation by painting with a heavily pigmented, exterior water-based latex paint. The color of the paint is of no particular importance; the pigment merely acts as an ultraviolet screen and prevents sunlight change. White or some other light color is recommended as it helps reduce pipe temperature. The latex paint must be thickly applied as an opaque coating on pipe and fittings that have been well cleaned and very lightly sanded.



WARNING

- **NEVER** use compressed air or gas in PVC/CPVC/PP/PVDF pipe and fittings.
- **NEVER** test PVC/CPVC/PP/PVDF pipe and fittings with compressed air or gas, or air-over-water boosters.
- **ONLY** use PVC/CPVC/PP/PVDF pipe for water and approved chemicals.



Use of compressed air or gas in PVC/CPVC/PP/PVDF pipe and fittings can result in explosive failures and cause severe injury or death.



WARNING

During the curing of the solvent cement joints, vapors may accumulate inside the pipeline, especially should one end of the line be capped. Nearby sparks from welders or torches may inadvertently ignite these vapors and create a hazardous incident. Attention should be given to removing all vapors using air-blowers or water flushing prior to capping one end of an empty pipeline.

Schedule 40 Pipe & Fittings

Scope

This specification sheet covers the manufacturers' requirements for PVC Schedule 40 IPS pipe and DWV fittings as well as Schedule 40 Cellular Core pipe. The pipe and fittings meet or exceed all applicable ASTM, NSF and CSA standards.

PVC Materials

Rigid PVC (polyvinyl chloride) used in the extrusion of Schedule 40 pipe and fittings complies with the material requirements of ASTM D1784 (formerly Type 1, Grade 1) and has a cell classification of 12454. Raw material used in the extrusion shall contain the standard specified amounts of color pigment, stabilizers and other additives.

Dimensions

Physical dimensions and properties of PVC Schedule 40 pipe shall meet the requirements of ASTM D1785 and ASTM D2665 injection molded PVC DWV fittings shall conform to ASTM D2665.

PVC Cellular Core pipe conforms to (or meets the requirements of) ASTM F891.

Sample Specification

All PVC Schedule 40 pipe shall conform to ASTM D1785, ASTM D2665 and NSF 14. Molded DWV fittings shall conform to ASTM D2665. All molded fittings must be third party certified to NSF 14.

All PVC fittings shall be molded or fabricated from PVC compound compatible with the pipe material.

All PVC Cellular Core pipe shall conform to ASTM F891 and NSF 14.

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- Electrofusion systems for gas and water
- Industrial, plumbing and electrical cements
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