



INSTALLATION GUIDE

SOLVENT WELDING

IPEX CEMENTS, PRIMERS & APPLICATORS

PVC, CPVC and ABS Pipe & Fittings



We build tough products for
tough environments®

IPEX
by aliaxis

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GUIDE TO SOLVENT WELDING PVC, CPVC AND ABS PLASTIC PIPE & FITTINGS

Each IPEX formulation has been developed for a specific application and is subject to the strictest quality control program in the industry. This program guarantees the most consistent and highest quality solvent cements commercially available.

Our products are intended for use by skilled individuals at their own risk. When you use IPEX products, rest assured you are using the highest quality products commercially available, so insist on IPEX!

The solvent welded 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 is given to other components of the system.

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 sizes of pipe and fittings.

This guide was developed to aid the installer in the proper techniques needed for the joining of plastic pipe and fittings.

The suggestions and data in this guide are based on information we believe to be reliable. Installers should verify for themselves that they can make satisfactory joints under varying conditions. Also, it is recommended that installers receive personal instruction from trained instructors or competent, experienced installers. Contact us or your supplier for additional information or instruction.

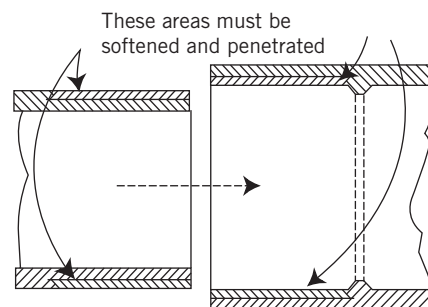
If you have any questions on the material in this guide or need further assistance, please give us a call.

Our toll free number is 1-866-473-9462.

BASIC PRINCIPLES OF SOLVENT WELDING

To make consistently good joints, the following points 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 fitting.
3. Assembly of pipe and fittings must be made while the surfaces are still wet and cement is still 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.

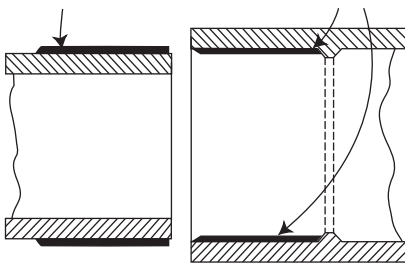


Penetration and softening can be achieved by the cement itself, by using a suitable primer, or by the use of both primer and cement. For certain materials and in certain situations, it is necessary to use a primer. A suitable primer will usually penetrate and soften the surfaces more quickly than cement 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 may be required.

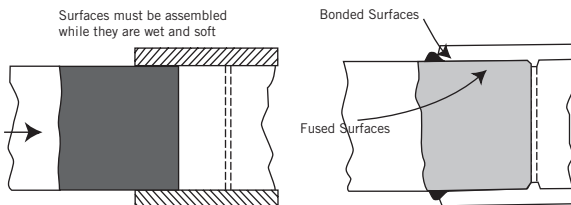
More than sufficient cement to fill the loose part of the joint must be applied. Besides filling the gap, adequate cement layers will penetrate the surfaces and also remain wet until the joint is assembled. Prove this for yourself. Apply on the top surface of a piece of pipe two separate layers of cement.

First apply a heavy layer of cement; then along side it, apply 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. A few minutes after applying these layers check for penetration. Scrape the surface of both with a knife. The thin layer will have achieved little or no penetration; the heavy one will have achieved much more penetration.






Cement Coatings of Sufficient Thickness



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 cement 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. 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 joint 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.



SOLVENT WELDING WITH PRIMER

1. Assemble proper materials for job (proper cement and applicator for the size of piping system to be assembled).
2. Pipe must be cut as square as possible. Use a hand saw and miter box or mechanical saw. A diagonal cut reduces bonding area in the most effective part of the joint.
 
3. 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.
 

4. Remove inside diameter burrs or raised beads with an internal deburring tool or knife. Remove the burrs or raised beads on the outside diameter of the pipe by using a file or external deburring tool that will produce a 3/32", 10-15° chamfer (bevel). Burrs can scrape channels into pre-softened surfaces or create hang-ups across the inside fitting diameter.
 

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

6. Check pipe and fittings for dry fit before welding. For proper interference fit, the pipe must go easily into the fitting 1/4 to 3/4 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, but without slop. All pipe and fittings must conform to ASTM or other recognized standards.



7. Use the right applicator for the size of pipe or fittings being joined. The applicator size should be equal to 1/2 the pipe diameter. It is important that a satisfactory size applicator be used to help ensure that sufficient layers of cement are applied.

8. Priming; the purpose of a primer is to penetrate and soften the surfaces so they can fuse together. The proper use of a primer and checking its softening effect provides assurance that the surfaces are prepared for fusion in a wide variety of conditions. 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 the primed surfaces away. Because weather conditions do affect priming and welding action, repeated applications to either or both surfaces may be necessary. In cold weather more time is required for proper penetration.



9. Using the correct applicator (as outlined in step #7), aggressively work the primer into 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. This is especially important for solvent bell-ended PVC Series Pipe where excessive primer may weaken these thinner sockets and cause premature failure.



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



11. A second application of primer in the socket is recommended.

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

13. Welding; stir the cement or shake can before using. Using the proper size applicator for the pipe size, 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.



14. Aggressively work a medium layer of cement into the fitting socket; avoid puddling 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 bell.

15. Apply a second full, even layer of cement on the pipe.
16. Without delay, while 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.
17. Hold the pipe and fitting together for approximately 30 seconds to avoid push out.
18. 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.
19. 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.
20. Handle newly assembled joints carefully until initial set has taken place. Follow IPEX set and cure times before handling or testing pipe system. (For set and cure times refer to pages 18 & 19).



SOLVENT WELDING WITHOUT PRIMER

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.

BEFORE WELDING

1. Assemble materials needed for the installation (the proper cement and applicator for the size of pipe and fittings to be assembled).
2. Pipe must be cut as square as possible. A diagonal cut reduces bonding area in the most effective part of the joint.
3. Remove inside diameter burrs or raised beads with an internal deburring tool or knife. Remove the burrs or raised beads on the outside diameter of the pipe by using a file or external deburring tool that will produce a 3/32", 10-15° chamfer (bevel). Burrs can scrape channels into pre-softened surfaces or create hang-ups across the inside fitting diameter.
4. Remove dirt, grease and moisture. A thorough wipe with a clean dry rag is usually sufficient. Moisture will retard cure and dirt or grease can prevent adhesion.
5. Check pipe and fittings for dry fit. For proper interference fit, the pipe must go easily into the fitting 1/4 to 3/4 of the way, but not bottom. (A good interference fit is desired for a one-step installation).
6. Check for penetration and softening of the pipe's surface. Take a scrap piece of the pipe you will be using and make a normal application of the cement. Then immediately, using a knife or other sharp object, try to scratch or scrape a few thousandths of the surface away. If you are able to do so, proceed with installation. If not, try making a more aggressive application of the cement on the scrap piece of pipe and check for penetration as noted above. If you are still unable to achieve penetration or softening of the pipe's surface, you may want to consider the use of a primer.

7. Using the correct size applicator (1/2 the pipe diameter), aggressively work solvent cement on the end of the pipe equal to the depth of the fitting socket.
8. Next, aggressively work cement into fitting socket being careful not to get cement into waterway.
9. Then apply a second layer of cement on to the end of the pipe equal to the depth of the fitting socket.
10. Immediately and while the surfaces are still wet, assemble the pipe and the fitting using sufficient force to ensure that the pipe bottoms into the fitting socket. If possible, twist the pipe a 1/4 turn as you insert it.
11. Hold the pipe and fitting together for approximately 30 seconds to eliminate push out.
12. After assembly, the 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. Using a rag, remove all the excess cement from the pipe and fitting, including the ring or bead.
13. Follow IPEX recommended set and cure times before handling or testing the piping system. (Refer to pages 18 & 19)

JOINING LARGE DIAMETER PIPE AND FITTINGS

As pipe diameter increases, so does the difficulty in installing it. The professional installer should be able to successfully assemble large diameter pipe and fittings by following the IPEX solvent welding instructions listed in the beginning of this guide along with the following additional recommendations.

1. Use of proper size applicators is even more necessary to ensure enough cement is applied to fill the larger gap that exists between the pipe and fittings.
2. Of equal importance is the use of the applicable cement for the size pipe and fittings being installed. We recommend the following:
 - up to 12" PVC Sch 40 or Sch 80 Xirtec 17 or 11
 - up to 30" PVC Sch 40 or Sch 80 Xirtec 19
 - up to 12" CPVC Xirtec 24
3. Remove all burrs from both inside and outside of the pipe with a knife, file or reamer. Burrs can scrape channels into pre-softened surfaces or create hang-ups inside surface walls.
4. Increase size of joining crew:
 - 6" – 8": 2-3 people per joint
 - 10" – 30": 3-4 people per joint

It is important in large diameter joining that the primer and cement be applied simultaneously to the pipe and fittings.

5. Make sure to apply a second full layer of cement to the pipe.
6. 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 we recommend for assembly of sizes above 6" diameter the use of a come-a-long.
7. Large diameter pipe and fittings require longer set and cure times. *(In cold weather, a heat blanket may be used to speed up the set and cure times.)
8. Prefabricate as many joints as possible.
9. If pipe is to be buried, make as many joints as possible above ground, then after joints have cured, carefully lower into trench.

* Contact IPEX for further information:
TOLL FREE 1-866-473-9462

CHEMICAL APPLICATIONS

Installations of plastic pipe and fittings for chemical applications requires a higher degree of skill than other installations; joint failures in these systems could be life threatening. It is for this reason we recommend the following tips for these applications.

Tips for Installation:

- Use Xirtec 24 CPVC cement for all joints in chemical applications regardless of pipe material (PVC or CPVC).
- Installers should attend an IPEX Installation Seminar.
- Allow at least twice the normal set and cure times.
- Flush system before putting into operation.
- Installers should use extra precautions during installation to insure proper installation of system.
- If there is any doubt about compatibility of materials (pipe, fittings or cement) with chemicals in system, manufacturers of materials should be contacted.
- Sodium Hypochlorite applications **ABSOLUTELY** require the use of Xirtec 24 CPVC cement regardless of piping material.

REPAIRS

For over forty years, IPEX has been supplying solvent cements and have had the opportunity to evaluate numerous joint failures, visit many job sites and witness numerous attempts at repairing leaking joints (most do not work).

Taking into consideration the cost of materials, time involved and labor costs, in most cases the installer is better off cutting out the defective joint, replacing it with new materials and taking greater care in the joining process.

JOINING PLASTIC PIPE IN HOT WEATHER

There are many occasions when solvent welding plastic pipe at 35°C (95°F) 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 from 10°C to 15°C (20°F to 30°F) higher than the ambient temperature. Solvents attack these hot surfaces faster and deeper, especially inside a joint. Therefore, it is very important to avoid puddling the cement inside the fitting socket and to wipe off any excess cement outside the joint.

By following our standard instructions and using a little extra care as outlined below, successful solvent welded joints can be made in even the most extreme hot weather conditions.

Tips to Follow when Solvent Welding in High Temperatures:

- 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.
- Cool surfaces to be joined by wiping with a damp rag. Make sure that the surface is dry prior to applying solvent cement.
- Try to do the solvent welding in cooler morning hours.
- 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.
- Be aware of possible expansion-contraction movement due to large changes in temperature.

By using IPEX products as recommended and by following these hot weather tips, making strong, leak proof joints even during very hot weather conditions can be achieved.

JOINING PLASTIC PIPE AND FITTINGS IN COLD WEATHER

Working in freezing temperatures is never easy. But sometimes the job is necessary. If that unavoidable job includes solvent welding plastic pipe, it can be done successfully with IPEX Solvent Cements.

By following our standard instructions and using a little extra care and patience, successful solvent welded joints can be made at temperatures even as low as -26°C (-15°F). In cold weather, solvents penetrate and soften the plastic pipe and fitting surfaces more slowly than in warm weather. Also the plastic is more resistant to solvent attack. Therefore it becomes even more important to pre-soften surfaces with an aggressive primer. And, because of slower evaporation, a longer cure time is necessary. Our cure schedules allow a margin for safety, but for colder weather more time should be allowed.

Tips to Follow when Solvent Welding during 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.
- 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. A heat blanket may be used to speed up the set and cure times.
- Read and follow all of our directions carefully before installation.

All IPEX cements are formulated to have well balanced drying characteristics and to have good stability in sub-freezing temperatures.

For all practical purposes, good solvent welded joints can be made in very cold conditions with proper care and a little common sense.

HELPFUL HINTS

A properly welded joint is a most critical part of the installation of plastic pipe and fittings. And no matter how many times we join pipe and fittings, it's very easy to overlook something. Here are a few helpful reminders.

1. Have you reviewed all of the instructions on the cement container label?
2. Are you using the proper cement for the job...for the type and size of pipe and correct fittings to be joined?
3. Do you need to take special precautions because of the unusual weather conditions?
4. Do you have sufficient manpower? Do you need more help to maintain proper alignment and to bottom pipe in fitting?
5. Do you have the proper tools and sufficient quantities of IPEX cements and primer, and is the cement in good condition?
6. Remember primer is NOT to be used on ABS pipe or fittings.
7. Be sure to use a large enough applicator to quickly spread cement generously on pipe and fittings. Then assemble immediately.
8. Avoid puddling excess primer or cement inside the socket, especially on thin wall, bell end PVC pipe and ABS in any schedule.
9. Be aware at all times of good safety practices. Solvent cements for pipe and fittings are flammable, so there should be no smoking or 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 us.
10. Finally, we remind you to INSIST ON IPEX!

SELECTION GUIDES

| General Purpose Solvent Cement Products | | |
|---|------------------------------------|--|
| Cement Product | IPEX Products / Material | Size Range |
| Xirtec 05 | Xirtec PVC Sch 40/80 Pressure | up to 6" (Sch 40) up to 4" (Sch 80) |
| Xirtec 11 | Xirtec PVC Sch 40/80 Pressure | up to 12" |
| Xirtec 17 | Xirtec PVC Sch 40/80 Pressure | up to 12" |
| Xirtec 19 | Xirtec PVC Sch 40/80 Pressure | 14" to 30" |
| Xirtec 24 | Corzan CPVC Sch 40/80 Pressure | up to 12" |
| Xirtec 7 | Primer for Xirtec PVC and Corzan | all sizes |
| IPEX 04 | PVC Building Drain Sewer, Septic | 3" to 6" |
| IPEX 25 | PVC Wet/Dry Rigid PVC or Flexible | up to 6" (Sch 40) up to 4" (Sch 80) |
| IPEX 47 | PVC Pool/Spa Rigid PVC or Flexible | up to 6" (Sch 40) up to 4" (Sch 80) |
| IPEX 95 | PVC Flexible | up to 6" (Sch 40) up to 3" (Sch 80) |
| IPEX 71 | ABS Drain, Waste and Vent | up to 6" |
| IPEX 90 | PVC-ABS Transition Low Pressure | up to 6" (Sch 40) up to 4" (Sch 80) |
| IPEX 96 | PVC-ABS Transition Non-Pressure | up to 6" (Sch 40) |

| Product Specific Cements | | |
|-------------------------------------|---------------------------------|--|
| Product | Application | Size Range |
| System 15 / XFR Cement | Drain, Waste and Vent | 1-1/2" to 6" (One-Step) 8" to 12" (Two-Step) |
| System 15 / XFR Primer | Drain, Waste and Vent | 1-1/2" to 6" (optional) 8" to 12" (mandatory) |
| System 636 PVC | Flue Gas Vent | up to 4" |
| System 636 CPVC | Flue Gas Vent | up to 8" |
| System 636 Primer | Flue Gas Vent | up to 4" (at 0°C or lower) 6" & 8" (mandatory) |
| System 636 Transition Cement | Flue Gas Vent (ABS Transitions) | 1-1/2" to 6" |
| AquaRise One-Step Cement | AquaRise Pressure | 1/2" to 2" (do not use primer) |
| AquaRise (Two-Step) Cement & Primer | AquaRise Pressure | 2-1/2", 3", 4" |
| IPEX 100 | Scepter PVC Conduit/ Duct | up to 6" |
| IPEX 100T Primer | Scepter PVC Conduit/ Duct | all sizes (cold weather) |
| BlazeMaster One-Step | BlazeMaster CPVC | 3/4" to 3" |
| Duraplus | Duraplus ABS Pressure | up to 12" |

SAFETY PRECAUTIONS

For over 40 years, millions of solvent welded joints have been made with only rare cases of mishap. However, since flammable and toxic solvents are a part of these products, appropriate safety precautions should be used.

All solvent cements and primers for plastic pipe are flammable and should not be used or stored near heat, spark, open flames and other sources of ignition. Vapors may ignite explosively. Keep containers closed when not in use and covered as much as possible when in use. Use in well ventilated area. If confined or partially enclosed, use forced ventilation or NIOSH-approved respirator. Avoid breathing vapors. Atmospheric levels should be maintained below established exposure limits contained in the product's Material Safety Data Sheet. If airborne concentrations exceed those limits, use of NIOSH-approved organic vapor cartridge with full face piece is recommended. The effectiveness of an air purifying respirator is limited. Use it only for a single, short term exposure. For emergency and other conditions where short-term exposure guidelines may be exceeded, use an approved positive pressure self-contained breathing apparatus. Do not smoke, eat or drink while using these products. Avoid contact with skin, eyes and clothing. Wash clothing if contaminated before re-use. May cause eye injury. Protective equipment such as gloves, goggles and an impervious apron should be used. Keep out of reach of children. Carefully read our Material Safety Data Sheets and follow all precautions.

FIRST AID

Inhalation: If ill effects from inhalation, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Eye Contact: Flush with plenty of water for 15 minutes and call a physician.

Skin Contact: Wash skin with plenty of soap and water for at least 15 minutes. If irritation develops, get medical attention.

Ingestion: If swallowed give 1 to 2 glasses of water or milk, DO NOT INDUCE VOMITING. Contact physician immediately.

SPECIAL PRECAUTIONS

IPEX SOLVENT CEMENTS MUST NEVER BE USED IN A SYSTEM USING OR BEING TESTED BY COMPRESSED AIR OR GASES.

Do not use a dry granular calcium hypochlorite as a disinfecting material for water purification in potable water piping systems. The introduction of granules or pellets of calcium hypochlorite with PVC and CPVC solvent cements and primers (including their vapors) may result in a violent chemical reaction 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 non-volatile. Furthermore, dry granular calcium hypochlorite should not be stored or used near solvent cements and primers. All systems should be flushed before start-up to remove excess fumes from piping system.

New or repaired potable water systems shall be purged of deleterious matter and disinfected prior to utilization. The method to be followed shall be that prescribed by the health authority having jurisdiction or, in the absence of a prescribed method, the procedure described in either AWWA C651 or AWWA C652.

POSSIBLE JOBSITE HAZARDS

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

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

- Well casing, elevator shafts and other confined areas.
- Installing pumps in irrigation water lines.
- Plastic pipe systems in industrial plant areas with little or no air circulation.

In all cases, solvent vapors must be removed by air circulation, purging, or other means prior to the use of welding torches, or other spark or flame generating equipment or procedures.

STORAGE AND HANDLING

Store in the shade between 4°C (40°F) and 43°C (110°F) or as specified on label. Keep away from heat, spark, open flame and other sources of ignition. Keep container closed when not in use. If the unopened container 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 gelatin has taken place because of actual solvent loss—for example, when the container was left open too long during use or not properly sealed after use. Cement in this condition should not be used and should be properly discarded.

IPEX solvent cements are formulated to be used “as received” in original containers. Adding thinners or primers to change viscosity is not recommended. If the cement is found to be jelly-like and not free flowing, it should not be used.

LISTING ORGANIZATIONS

IPEX products are certified to various industry standards such as those from ASTM, CSA and NSF. Third-party certifications are held with accredited testing agencies such as CSA, NSF and IAPMO.



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.

**AVERAGE INITIAL SET SCHEDULE
FOR IPEX PVC/CPVC SOLVENT CEMENTS****

| Temperature Range | Pipe Sizes 1/2" to 1-1/4" | Pipe Sizes 1-1/2" to 2" | | Pipe Sizes 2-1/2" to 8" | Pipe Sizes 10" to 15" | Pipe Sizes 15" + |
|-------------------|---------------------------|-------------------------|--|-------------------------|-----------------------|------------------|
| 60° - 100°F | 2 minutes | 5 minutes | | 30 minutes | 2 hours | 4 hours |
| 40° - 60°F | 5 minutes | 10 minutes | | 2 hours | 8 hours | 16 hours |
| 0° - 40°F | 10 minutes | 15 minutes | | 12 hours | 24 hours | 48 hours |

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

** These figures are estimates based on our laboratory tests using water; extended set times are required for chemical applications. Due to the many variables in the field, these figures should be used as a general guide only.

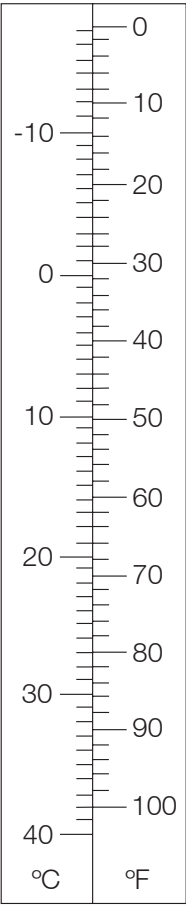
**AVERAGE JOINT CURE SCHEDULE
FOR IPEX PVC/CPVC SOLVENT CEMENTS****

| Relative Humidity 60% or Less | Cure Time Pipe Sizes 1/2" to 1-1/4" | | Cure Time Pipe Sizes 1-1/2" to 2" | | | Cure Time Pipe Sizes 2-1/2" to 8" | | Cure Time Pipe Sizes 10" to 15" | Cure Time Pipe Sizes 15" + |
|--|-------------------------------------|---------------------|-----------------------------------|---------------------|--|-----------------------------------|---------------------|---------------------------------|----------------------------|
| Temperature Range during assembly and cure periods | Up to 160psi | Above 160 to 370psi | Up to 160psi | Above 160 to 315psi | | Up to 160psi | Above 160 to 315psi | Up to 100psi | Up to 100psi |
| 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: Joint cure schedule is the necessary time to allow before pressurizing system. In damp or humid weather allow 50% more cure time.

** These figures are estimates based on our laboratory tests; extended cure times are required for chemical applications. Due to the many variables in the field, these figures should be used as a general guide only.

FAHRENHEIT TO CELSIUS
CONVERSION CHART



AVERAGE NUMBER OF JOINTS PER QUART
CONTAINER OF CEMENT*

| Pipe Diameter (inches) | Number of Joints Cement |
|---------------------------|----------------------------|
| 1/2 | 300 |
| 3/4 | 200 |
| 1 | 125 |
| 1-1/2 | 90 |
| 2 | 60 |
| 3 | 40 |
| 4 | 30 |
| 6 | 10 |
| 8 | 5 |
| 10 | 2-3 |
| 12 | 1-2 |
| 15 | 3/4 |
| 18 | 1/2 |

*These figures are estimates based on our laboratory tests. Due to the many variables in the field, these figures should be used as a general guide only.

Average number of joints per quart container of primer are estimated to be double of those for cement.

NOTES

[illegible]

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