PLUMBING

Solvent Cements and Primers

PRODUCT GUIDE

Westlake
Pipe & Fittings

Solvent Cements and Primers

Westlake Pipe & Fittings is the preferred choice for contractors who prioritize excellence. The commitment is straightforward – the products instill the confidence needed for successful project execution. Our solvent cement and primers are formulated to facilitate smooth installations while prioritizing installer safety and comfort. This makes the products ideal for use in residential, industrial, and commercial buildings.

Table of Contents

Solvent Cements and Primers Product Selection Guide

	SOLVENT CEMENTS						PRIMERS			
	1-Step PVC Solvent Cement		PVC Solvent Cement		PVC Solvent Cement		PVC and CPVC Primer		PVC and CPVC Primer	
										
Body	Medium		Medium		Heavy					
Color	Clear		Clear		Gray		Purple		Clear	
Application	Medium-bodied PVC 1-Step solvent cement used for welding non-pressure PVC DWV pipe and fittings up to 6" in diameter.		Medium-bodied solvent cement used for welding pressure PVC SCH40 pipe and fittings up to 4" in diameter, and non-pressure PVC DWV pipe and fittings 4" to 12".		Heavy-bodied solvent cement used for welding non-pressure PVC DWV pipe and fittings up to 24" in diameter, and PVC SCH40 and SCH80 pressure pipe and fittings up to 12" nominal size.		PVC and CPVC primer is used for priming pressure and non-pressure PVC and CPVC pipe and fittings prior to solvent welding.		PVC and CPVC primer is used for priming pressure and non-pressure PVC and CPVC pipe and fittings prior to solvent welding.	
Standard	ASTM D2564		ASTM D2564		ASTM D2564		ASTM F656		ASTM F656	
Certifications	NSF		NSF		NSF		NSF		NSF	
For Use With	PVC DWV up to 6"		PVC SCH40 up to 4" PVC DWV up to 12"		PVC SCH40 up to 12" PVC SCH80 up to 12" PVC DWV up to 24"		CPVC SCH40 up to 2" PVC SCH40 up to 12" PVC SCH80 up to 12" PVC DWV up to 24"		CPVC SCH40 up to 2" PVC SCH40 up to 12" PVC SCH80 up to 12" PVC DWV up to 24"	
VOC Level	486 grams/liter		409 grams/liter		508 grams/liter					
Sizes Available	16 oz.	32 oz.	16 oz.	32 oz.	16 oz.	32 oz.	16 oz.	32 oz.	16 oz.	32 oz.
Item Number	SOLV-50US016C	SOLV-50US032C	SOLV-01US016C	SOLV-01US032C	SOLV-02US016C	SOLV-02US032C	PRIM-01US016P	PRIM-01US032P	PRIM-01US016C	PRIM-01US032C

Standards References

- **ASTM D2564:** Standard Specification for Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Piping Systems
- **ASTM F656:** Standard Specification for Primers for Use in Solvent Cement Joints of Poly Vinyl Chloride (PVC) Plastic Pipe & Fittings

How to Make Solvent Cement Joints

This section describes the procedure for making joints with PVC plastic pipe using plain ends, bell ends and fittings, by means of solvent cements. These procedures are general ones for PVC piping. In non-pressure applications, simplified procedures may be used. The techniques covered are applicable only to PVC pipe of the same classes as described. Pipe and fittings are manufactured within certain tolerances to provide for the small variations in the extrusion, however, bell-end and molding processes and are not always to the exact size.

To consistently make good joints, the following should be clearly understood and adhered to:

Pipe and Fittings
The pipe and fittings should meet the requirements of current NSF, CSA and/or ASTM piping standards.

Solvent Cements
Westlake Pipe & Fittings' solvent cements do meet and exceed both the NSF, CSA and ASTM standards for solvent cements. Check with local, state, and federal codes concerning any product requirements.

Selection of Solvent Cements
Solvent cements are available in different viscosities and wet film thickness, to cover the range of pipe sizes from 1/8 to 12 inch. The cement viscosity plays an important role for interference fit joints, as well as non-interference joints, as found is some schedule 80 (Heavy Bodied) pipe and fittings. One of the general principles of solvent cementing that should be strictly adhered to is: sufficient cement must be applied to fill the gap between the pipe and fitting. The ability of a solvent cement to fill a gap in a pipe joint can be determined by considering its viscosity and wet-film thickness.

Storage of Cements, Cleaners, And Primers
PVC solvent cements should be stored in a cool place except when in use at the job site. These cements have a limited shelf life when not stored in hermetically sealed containers. Screw top containers are not considered to be hermetically sealed. Consult our technical department for specific storage recommendations on storage conditions and shelf life. The cement is unsuitable for use on the job site if it exhibits an appreciable change from the original viscosity, or if a sign of gelation is apparent.

STOP *If the cement is "jelly-like", do not use it and do not attempt to bring it back to the original viscosity by adding solvents or thinners.*

Cleaners
There are two types of cleaners used in a solvent welding process, chemical cleaners and mechanical.

- Chemical cleaners are a blend of solvents formulated to remove surface impurities (oil, dirt, etc.) and surface gloss from pipe and fittings.
- Mechanical cleaners are fine abrasive paper or cloth (180 grit or finer) or clean oil free steel wool. Both types are used to remove oil and dirt from the pipe and fittings surfaces.

Primers
CPVC and PVC Primer exceed the ASTM Standard Specification F656. Most city, state and federal codes require these and other code approvals. Always check with governing authority before using a product.

STOP *There exists a common misunderstanding that if a cleaner is used, a primer is not required, and vice versa. It is important to note that cleaners and primers are intended for different functions and should not be considered interchangeable.*

Cutting Pipe
Cut pipe square with the axis, using a fine-tooth handsaw and a miter box, or a fine tooth power saw with suitable guides. Wood working blades may also be used. A rotary cutter may be used if the cutting blades are specifically designed for cutting plastic pipe in such a way not to raise a burr or ridge at the cut end of the pipe. If other tools are not available, a standard rotary metal pipe cutter may be used, provided great care is taken to remove all the ridge raised at the pipe end by the wedging action of the cutting wheels. Failure to remove the ridge will result in the cement in the fitting socket being scraped from the socket surface, producing a dry joint with a high probability of joint failure. Remove all burrs with a knife, file, or abrasive paper.

Joint Preparation
Failing to chamfer or deburr the edge of the pipe may remove the cement and softened material from the fitting socket, which may result in a leaking joint.

Dry Fit Testing

The solvent cement joint is designed so that there will generally be interference of pipe wall with the fitting socket before the pipe is fully inserted. Insert the pipe into the fitting and check that the interference occurs about 1/3 to no more that 2/3 of the socket depth. When pipe and fittings are at their tolerance extremes or when Schedule 80 pipe is used, it may be possible to fully insert the dry pipe into the fitting socket until it bottoms. If this occurs, the fit between the pipe and fitting must be snug. If the fit is loose or wobbly, other pipe or fittings should be selected which gives a proper fit.

Cleaning

Surfaces to be joined must be cleaned and be free of dirt, moisture, oil, and other foreign materials. If this cannot be accomplished by wiping with a clean dry cloth, a chemical or mechanical cleaner must be used.

Applicator Size

Apply the cement with a natural bristle, nylon brush or suitable applicator. The brush size should be half the diameter of the pipe. Example use a 2-inch brush for a 4-inch pipe, except that for pipe sizes 6 inches and larger, a 3 inch brush or applicator is adequate. Other applicators may be used provided their use, results in an equivalent amount of cement being applied to the joining surfaces. Remember, both surfaces must be wet before assembling the pipe and fitting. Failure to apply adequate cement to both the pipe and fitting surfaces may cause joint failures.

Application of Primer and Cements

PVC solvent cement is fast drying, and therefore the cement must be applied as quickly as possible, consistent with good workmanship. It may be necessary for two workers to perform this operation for larger sizes of pipe and fittings. Under conditions of high atmospheric humidity, quick application is very important to minimize condensation of moisture from the air on the cement surface. The surface temperature of the mating surfaces should not exceed 45°C (110°F) at the time of assembly. In direct sunlight or in ambient temperatures above 45°C (110°F), the pipe temperature may be reduced by swabbing the surface to be cemented with clean wet rags provided the pipe is <u>thoroughly dried</u> before primer and cement are applied.

First apply primer to inside socket surface using a scrubbing motion to ensure penetration. Next soften surface of male end of pipe, to be inserted into socket, to depth of fitting socket by uniformly applying a liberal coat of primer. Be sure <u>entire surface is well softened</u>. Without delay, apply cement to pipe while the surfaces are still wet with primer. Apply cement lightly but uniformly to inside of socket, taking care to keep excess cement out of socket. In extreme conditions, it may become necessary to apply a second application of solvent cement to the pipe end only. Contact our technical department for information on solvent welding in temperatures below 5°C.

STOP *Special Instructions for Bell-End Pipe - The above procedures may be followed in the case of bell-end pipe EXCEPT that great care should be taken not to apply an excess of cement in the bell socket. This precaution is particularly important for installation of bell-end pipe with a wall thickness of less than 1/8 inch (3 mm).*

Joint Assembly

Immediately after applying the last coat of cement to the pipe, and while both the inside socket surface and the outside surface of the male end of the pipe are SOFT AND WET with solvent cement, forcefully bottom the male end of the pipe in the socket. Turn the pipe and fitting 1/4 of a turn during assembly to distribute the cement evenly. NOTE: The 1/4 turn should be completed before the pipe reaches full socket depth of the fitting. Assembly should be completed in 20 seconds or less after the last application of cement. The pipe should be inserted with a steady even motion. Hammer blows should not be used. If there is any sign of drying of the cement surfaces, due to delay in assembly, the surfaces should be recoated, taking care again not to apply a surplus of cements to the inside of the socket, particularly in bell-end pipe. As large axial forces are necessary for the assembly of interference fit joints in large size pipe, two or more workers are needed for such joints. Mechanical forcing equipment, such as come-along or levers and braces may also be necessary. Until the cement is set in the joint, the pipe may back out of the fitting socket not held in place for approximately 1 minute after assembly. Care should be taken during assembly not to disturb or apply any force to joints previously made. Early rough handling can destroy fresh joints.

After assembly, wipe excess cement from the pipe at the end of the fitting socket. A properly made joint will show a bead around its entire perimeter. Any gaps at this point may indicate a defective assembly job, due to insufficient cement or the use of light-died cements on large diameter where standard or heavy bodied should have been applied.

Installation

After the set period, the pipe can be carefully placed in a prepared ditch and snaked from side to side. Prior to backfilling, the pipe shall be brought to approximate operating temperature either by shading backfilling, or by filling with water, or by allowing to stand overnight. The pipe system should be allowed to stand vented to the atmosphere prior to pressure testing. The set period before the system is pressure tested will depend on the specific cement, the size of the pipe, the ambient temperature, and the dry joint tightness. Necessary cure time can vary from minutes to days depending on conditions and the solvent cement used. A general rule, relatively short cure periods are satisfactory for high ambient temperatures with low humidity, small pipe sizes, quick drying cements, and tight-fitting joints. Longer cure periods are required for low temperatures, large pipe sizes, slow drying cements, loose joints, and relatively high humidity. Shade backfill, leaving all joints exposed so that they can be examined during pressure tests. On long runs pressure tests should be performed on sections no longer than 5000 feet. Test pressure should be 150% of system design pressure and held at this pressure until the system is checked for leaks, or follow the requirements of the applicable codes, whichever is higher.

Tips on Solvent Welding

1.0 PIPE AND FITTING RELATED

a. Loose Fitting Components

Failure of the pipe and or fittings to conform to the dimensional tolerances required by the respective specifications, resulting in a fit that when tested dry is loose enough to provide less than adequate surface contact with the fitting.

b. Tight Fitting Components

If the pipe and/or fittings fail to meet the dimensional tolerances specified, it can lead to a fit that, when tested without any solvent, is excessively tight. This tightness not only hinders proper assembly but also causes the expulsion of cement from inside the joint during assembly.

c. Out of Round Egg-Shaped Components

If the pipe and/or fittings do not meet the specified out-of-round requirements, it leads to gaps that cannot be filled by cement meeting the resin content requirements. Due to the inherent characteristics of solvent cements, where a significant portion is prone to evaporation leading to substantial shrinkage of the cement layer, even a PVC cement with twice the minimum specified resin content will not exhibit meaningful gap-filling properties.

d. Extrusion Aids on Mating Surfaces (Release Agents & Lubricants)

Occasionally, some pipe compounds contain an excessive amount of extrusion aids, such as metallic stearates and waxes, which result in finished pipe where these components are integrated at high levels into the entire matrix of the pipe wall. Similarly, the presence of moulding release agents used to facilitate removal of moulded fittings during manufacture, such as silicone, while not integrated into the plastic matrix of that component, are sometimes found at high concentrations on the fitting surface.

In any event, the result is the presence of materials on the mating surface that are either difficult to remove by conventional cleaners or primers. These slick, waxy chemicals can provide a very effective barrier to the flow together mechanism so essential to the solvent welding process. From time to time, one may encounter pipe and or fitting surfaces that are exceptionally hard and consequently very resistant to penetration by the solvents used in cements to soften the mating surfaces. While this phenomenon can be found on any surface, it is most often encountered on the interior surface of the bell section of bell end pipe due to the post heating process by which the bell is formed. This situation may be aggravated when attempting to make welds involving such surfaces in cold temperatures, which inhibit solvent action even on normal surfaces.

Quality cements that fully meet or exceed testing requirements may fail to adequately soften such surfaces; therefore, the industry has recommended the use of primers to aid in the elimination of this problem.

2.0 WORKMANSHIP RELATED

a. Failure to Test Pipe with Fitting for Proper Fit

The proper snugness of the pipe and fitting selected is essential to a successful joint. Even using components that are individually within the dimensional tolerances prescribed by respective specifications, it is possible to mismatch an almost oversize socket with a piece of undersize pipe, the result being a very loose match. Conversely, the opposite over tight condition, which causes squeezing out of the cement when assembled, may present itself by selection of an almost oversized pipe section to be used with an undersized fitting.

Even worse, pipes and fittings that are oversized or undersized may, from time to time, be found on the job site. Failure to test for dry fit will eventually result in the use of such mismatched components and consequently cause joint failures.

b. Failure to Cut Pipe Square

An un-square cut results in a portion of the socket area not being in physical contact with the pipe surface. This substantially reduces the actual area of joined components in much the same way as failure to insert the pipe fully to the socket depth. A compounding factor in this cause of failure is that the area not in contact is the most critically needed area of the joint.

c. Failure to Remove Burrs or Raised Edges

The burrs created from the sawing of plastic pipe if not removed, can as the pipe is inserted, plough small grooves in the interface of the joining area. Such grooves can be the source of leaks. Alternately, the raised leading edge created by cutting plastic pipe with conventional pipe cutters, if not removed will have the effect of forcing the cement out in front of it as the pipe is inserted into the fitting. This results in a less than adequate amount of cement left inside the joint to melt and join the surfaces.

d. Failure to Clean Surfaces and Remove Foreign Materials

In manufacture, handling, storage, and transportation of the pipe, and to a lesser degree, the fittings, a concentration of foreign material that may inhibit the solvent action and or the flow together action of the joined surfaces may accumulate on the area to be solvent welded. This may vary in character from diesel exhaust residue on the pipe acquired during transportation, to atmospheric residues acquired during outside storage, or simply grease and oil from the hands of the assembler or his helpers. Also, there are often some residual extrusion aids waxy in character, and in the case of fittings some residual moulds release agents slippery in character, not removed by the manufacturer. If not removed, these surface contaminants provide a serious jeopardy to the making of a successful joint.

e. **Failure to Use Primer**
The function of primer is to pre-soften the mating surfaces of the pipe and fitting. Thus, allowing the surfaces to be easily softened by the solvents in the cements. While in most cases the nature of the mating surfaces is such that the cement will provide an adequate weld by itself, conditions may exist that would require the use of a primer for adequate penetration. These include, but are not limited to, randomly encountering very hard pipe and fittings surfaces, along with cold weather cementing. Because these conditions are randomly encountered and are neither easily detected nor predicted, and because a primer will always help and won't hurt, the use of a primer, especially on pressure systems is recommended. Remember, most codes call for the use of an approved primer during pressure installation. Always check with code authorities prior to eliminating the use of primer or other recommended procedures.

f. **Failure to Assemble Joint While Cement is Wet**
The active ingredients of cements evaporate into the air very quickly. It is essential that these solvents be trapped within the assembled joint where they can actively soften the surfaces as a prerequisite to the desired flow together mating of the surfaces. Failure to work quickly enough, especially in the time frame between application of the cement and assembly of the joint, may result in the cement partially drying prior to assembly. This is one of the more common causes of joint failure, especially when working with larger diameter pipe and fittings in hot climates.

g. **Failure to Apply an Adequate Layer of Cement**
A layer of cement of adequate proportions to fill any gaps or spaces that may exist between the pipe and fitting is essential to a leak free joint. Failure to apply the cement in a manner consistent with this requirement will result in leaks due to voids or inadequate fusion of the mating surfaces because all components were not in direct physical contact at all joining areas. A study of joint failures suggests this is perhaps the most common cause of joint failures.

h. **Failure to Apply Cement Uniformly**
Lack of uniformity in the cement layer will result in missed spots or areas that have less than the desired amount of cement or primers applied.

i. **Failure to Insert Pipe to Full Socket Depth**
To benefit the entire socket area provided and to maximize the bond strength of the joint, the pipe must be inserted to the full depth of the socket. Failure to do so will result in a reduction of the total bonded area. More importantly, due to the taper design of the socket, which causes it to be smaller in diameter at the shoulder than at the entrance, the reduction is in the most critical area of the joint.

j. **Failure to Insert Pipe with a Twisting Action**
The purpose of the twisting motion or the giving of a 1/4 turn while inserting the pipe into the socket ensures the even distribution of the cement should any light or missed spots exist. Additionally, should there be any air bubbles present in the cement layer this will aid in their elimination. While failure to use a twisting motion may not be a direct cause of joint failures per se, use of the technique is helpful in eliminating other causes.

k. **Failure to Hold Pipe in Place After Assembly**
The taper design of the socket operating in conjunction with the pressures formed inside the joint by the swelling action of the cement creates a strong tendency for the pipe to back out of the socket or fitting after assembly. This can and must be prevented by holding the assembly firmly until the cement has the opportunity to set. Failure to do so will result not only in a loss of total bonded area, but also a reduction in the most critical area of bonding surface.
In addition, and just as important, backing out takes place as the cement is beginning to set, and movement at this stage can destroy any bonding and could cause joint failure.

l. **Rough Handling of Freshly Cemented Joints**
Rough handling of an assembly that contains freshly cemented joints may result in enough movement at the interface of the mating surfaces to destroy the bond permanently. Rotation of only a few degrees of the socket on the pipe or any rough handling that results in a disruption of the cement resulting in a poor bond. A loose-fitting socket, and especially one that is assembled during cold weather, is slower to set and consequently more subject to the harmful effects of rough handling.

m. **Using Cement From a Can Left Open For a Prolonged Period**
The active ingredients of any cement are very volatile and are subject to rapid evaporation into the atmosphere. A cement container left open when not in use, especially during hot weather, can lose enough of these key ingredients to cause a complete imbalance of the formulated solvent blends. This would result in a cement that lacks the power to soften the pipe or fittings. A performance test should be applied to any questionable cement prior to application.

n. **Pressure Testing Before Cement Has Adequately Cured**
The application of pressure to an uncured joint may have the same effects as rough handling of a joint during the early stages of bond strength development. The stresses involved in even low-pressure applications may be significant enough to cause the slight movement required to disrupt the welding process.

o. **Selecting the Wrong Cement**
Cements are produced in a variety of grades in an effort to tailor them for specific applications. Some contain a higher level of plastic than others and or slow evaporating solvents in the blends. These types of cements are designed for use on larger diameter pipe due to the requirement in situations for better gap filling properties and longer working time while the cement is being applied. Because of these differences, the use of cement not designed for a particular

Tips on Solvent Welding

application can result in a failure caused by the cement drying prior to assembly, or less than required gap filling properties. Be safe; follow manufacturer's guidelines for selecting solvent cements.

p. Excess Solvent Cement
Excess cement will be forced out of the assembled joint as the pipe is inserted. Due to the tapered design of the socket any excess that has been applied to the pipe end will be forced to the outside of the assembly where it can and should be wiped off. Any excess applied to the socket will be forced forward by the leading edge of the pipe to the inside of the assembly where it is inaccessible and will lie in a puddle or run down the inside of the pipe. The solvent penetration of the cement may in certain instances eat a hole in the wall of the pipe. This is commonly known as solvent weld pipe burn. This is especially a problem with thin wall pipe class 160 and below and bell end pipe where there is no shoulder provided as in the case of a moulded fitting. In addition, the curve of the pipe where the base of the socket begins on a bell end consists of ordinary wall thickness pipe that has been stretched to form the bell. Stretching results in both a reduced thickness as well as a matrix that has less solvent resistance.

q. Use of Hot Pipe or Fittings
When exposed to the sunlight in a hot climate, the pipe surface temperature may reach 48°C to 50°C. Even in cooler temperatures the radiant energy of the sun will raise the exposed surface twenty or more degrees above the ambient conditions. Because application of cement to a hot surface may cause rapid flash off of the active ingredients resulting in partially dried cement at the time of assembly, this practice should be avoided. The pipe should be tested for surface temperature and if necessary, cooled down by a suitable method. One method is to wipe the surface with a wet cloth using caution to assure that the water is removed before cementing.

r. Stress on Joints
The practice of trying to bend the pipe around a slight curve in order to make it fit some pre-determined configuration rather than the use of a fitting that would provide the necessary offset, will result in an application of stress to fresh joints. This stress will of course result in a possible failure.

s. Failure to Snake Long Runs of Pipe in a Ditch
Because of the expansion and contraction characteristics of most plastics, including PVC, long runs of pipe must be placed in a trench in a manner that will allow for contraction without placing undue stress on a freshly bonded joint. The method endorsed by the Plastic Pipe Industry is to snake the pipe in the ditch. Failure to do so may result in complete pullouts or enough disruption of the joint to result in leaks and joint failure.

t. INEFFECTIVE SOLVENT CEMENTS, CLEANERS, & PRIMERS
Solvent cements are designed, formulated, and manufactured to soften PVC pipe and fittings for solvent welding. If solvent cements adequately soften the PVC surface it will make a successful solvent welded joint. Characteristically solvent cements soften or it will not soften the pipe and fitting surfaces. In other words, if everything is equal during assembly application, and you make ten solvent welded joints, and you have only three that leak, it is most likely not the solvent cement. Some other variables have created joint failures. That is not to say, solvent cement cannot and will not lose its strength. Evaporation and age are two common causes of strength loss in solvent cements. Solvent cements are formulated with resins, fillers, and aggressive solvents that evaporate very quickly. Each time the container is opened, solvents escape into the atmosphere, as the aggressive solvent evaporates the ratio of solvents to solids becomes unbalanced. This procedure alters the product viscosity causing it to become stringy, thick, and show signs of gelling. Solvent cements should not be applied when they show any of the altered descriptions above. Scrap test should be performed on any questionable solvent cement, cleaner, and primers before use in any application. These procedures are mentioned and outlined in ASTM D-2855 Standard Specifications for Making Solvent Cemented Joints. Like the standards for PVC pipe and fittings, solvent cements and approved primers must meet or exceed ASTM, NSF, and CSA testing standards.

Solvent cement formulations are tested, approved, and listed by several governing bodies. Products must be within these guidelines each and every time they are sampled and tested. Manufacturers in violation or deviating from the original approved formulations could lose their product certification and listing. The test standards and approval specifications for solvent cements and primers are listed below:

PVC Solvent Cements	ASTM D2564	Standard Specification for Solvent Cements for Poly Vinyl Chloride (PVC) Plastic Piping Systems
CPVC Solvent Cements	ASTM F493	Standard Specification for Solvent Cements for Chlorinated Poly Vinyl Chloride (CPVC) Plastic Pipe and Fittings
ABS to PVC Transition Cements	ASTM D3138	
Primers	ASTM F656	Standard Specification for Primers for Use in Solvent Cement Joints of Poly Vinyl Chloride (PVC) Plastic Pipe & Fittings

Set Times – Joint Cure Schedule – Product Yield

SET TIMES

AVERAGE INITIAL SET TIMES FOR PVC/CPVC SOLVENT CEMENTS				
Temperature Range	Pipe Sizes ½" to 1¼"	Pipe Sizes 1½" to 2"	Pipe Sizes 2½" to 8"	Pipe Sizes 10" to 15"
15° to 40°C (59° to 104°F)	2 min	5 min	30 min	2 hours
5° to 15°C (41° to 59°F)	5 min	10 min	2 hours	8 hours
-16° to 5°C (3° to 41°F)	10 min	15 min	12 hours	24 hours

- In damp or humid weather allow 50% more set time; extended set times are required for chemical applications.
- Important – The initial set schedule is the necessary time needed before the joint can be carefully handled.

JOINT CURE SCHEDULE

During the initial setting of the cement, approximately 2 minutes after applying the cement the joint must not be moved or disturbed.

The cure schedules listed below are suggested guidelines based on past field experience and laboratory testing and should not be taken as absolutes. Numerous factors, such as application conditions and the specific cement used may result in faster or slower cure rates than listed below.

AVERAGE JOINT CURE SCHEDULE							
Relative Humidity 60% or Less	Cure Time Pipe Sizes ½" to 1¼"		Cure Time Pipe Sizes 1½" to 2"		Cure Time Pipe Sizes 2½" to 8"		Cure Time Pipe Sizes 10" to 15"
Temperature Range During Assembly & Cure Periods	up to 160 psi	160-370 psi	up to 160 psi	160-315 psi	up to 160 psi	160-315 psi	up to 100 psi
15° to 40°C (59° to 104°F)	15 min	6 hrs	30 min	12 hrs	1½ hrs	24 hrs	48 hrs
5° to 15°C (41° to 59°F)	20 min	12 hrs	45 min	24 hrs	4 hrs	48 hrs	96 hrs
-16° to 5°C (3° to 41°F)	30 min	48 hrs	1 hr	96 hrs	72 hrs	8 days	8 days

- In damp or humid weather allow 50% more cure time; extended cure times are required for chemical applications.
- Important – Joint cure schedule is the necessary time needed before pressurizing system.

PRODUCT YIELD

ESTIMATED SOLVENT CEMENT REQUIREMENTS													
Average Number of Joints Per Liter of Westlake Pipe & Fittings Cement													
Pipe Diameter	½"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	12"	15"	18"
Number of Joints	300	200	125	90	60	40	30	10	5	2-3	1-2	¾	½

ESTIMATED PRIMER REQUIREMENTS													
Average Number of Joints Per Liter of Westlake Pipe & Fittings Primer													
Pipe Diameter	½"	¾"	1"	1½"	2"	3"	4"	6"	8"	10"	12"	15"	18"
Number of Joints	600	400	250	180	120	80	60	20	10	4-6	2-4	1½	1

Storing Solvent Cement Products

STORAGE AND HANDLING

These storage instructions deals with solvent cement products stored in distribution centers prior to sale and storage of cements on job sites, which are generally subjected to the outdoor elements.

STORING IN A WAREHOUSE

- Ideally products should be stored at room temperature to ensure that the installer/customer receives the product in a condition that can be applied immediately after purchase.
- Products subjected to freezing will thicken and will not be usable in this state but when placed in a warm area, after a period of time, will return to its original, usable condition.
- Keep away from heat, spark, open flame and other sources of ignition.
- Keep container closed when not in use.

STORING AT THE JOB-SITE

- Store in the shade between 40°F and 110°F (5°C and 45°C) or as specified on the label. If the unopened container is subjected to freezing*, it may become extremely thick or jelled. 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 jelling 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.
- Westlake Pipe & Fittings' 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.
- Containers of cement should be shaken or stirred before using.
- Do not shake primers.

**At temperatures below freezing (32°F/0°C), solvents penetrate and soften PVC surfaces more slowly than in warmer weather. For this reason, it is recommended that testing be done on a piece of scrap pipe of the same lot, to determine if satisfactory penetration of the surfaces can be achieved at the extreme temperature. Applying the primer, waiting a few minutes and scraping the surface with a knife-edge can do this test. If sufficient penetration is achieved, some of the plastic surface of the pipe should be soft enough to be removed. If sufficient penetration is not achieved, even with multiple applications of primer; it is unlikely that a suitable joint will result.*

Solvent Welding During Cold Weather

Working in freezing temperatures is never easy. However, if the job of solvent cement welding is necessary, you can do it successfully with Solvent Cements.

By following our standard instructions and using a little extra care and patience, successful solvent cemented joints can be made at temperatures even as low as -15°F (-26°C). In cold weather, solvents penetrate and soften the plastic pipe and fitting surfaces slower than in warm weather. In addition, the plastic is more resistant to solvent attack, making it more important to pre-soften surfaces with an aggressive primer. Because of the 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.

For all practical purposes, good solvent-cemented joints can be made in very cold conditions <u>with proper care and a little common sense.</u>

CAUTION: DO NOT ATTEMPT TO SPEED THE SETTING OR DRYING OF THE CEMENT BY APPLYING DIRECT HEAT TO THE SOLVENT WELDED JOINT. Forced rapid drying by heating will cause the cement solvents to boil off, forming porosity, bubbles and blisters in the cement film.

Tips to Follow

1. Prefabricate as much of the system as is possible in a heated work area.
2. Store cements, cleaners and primers in a warmer area when not in use and make sure they remain fluid.
3. Joints that must be made outside should be protected with a portable shelter and heated with indirect heat to surface temperatures above 5°C (41°F) before joining. The shelter and heat should remain in place for at least two hours after joint assembly.
4. Take special care to remove moisture including ice and snow from the surfaces to be joined. On PVC and CPVC pipe and fittings the surfaces must be cleaned.
5. Before assembly, after the pipe has been cut, cleaned and dry fitted as per the instructions on the label, Primer must be used to soften the joining surfaces on PVC or CPVC installations before applying cement.. More than one application may be necessary.
6. Allow a longer cure period before the system is used. A heat blanket may be used to speed up the set and cure times.
7. It is extremely important to read and follow all our directions carefully before installation.

Relevent Standards

- **ASTM D2564:** Standard Specification for Solvent Cements for Poly(Vinyl Chloride) (PVC) Plastic Piping Systems
- **ASTM F493:** Standard Specification for Solvent Cements for Chlorinated Poly(Vinyl Chloride) (CPVC) Plastic Pipe and Fittings
- **ASTM F656:** Standard Specification for Primers for Use in Solvent Cement Joints of Poly(Vinyl Chloride) (PVC) Plastic Pipe and Fittings
- **ASTM F402:** Standard Practice For Safe Handling Of Solvent Cements, Primers, And Cleaners Used For Joining Thermoplastic Pipe And Fittings
- **ASTM F3328:** Standard Practice for the One-Step (Solvent Cement Only) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets
- **ASTM D2855:** Standard Practice for the Two-Step (Primer and Solvent Cement) Method of Joining Poly (Vinyl Chloride) (PVC) or Chlorinated Poly (Vinyl Chloride) (CPVC) Pipe and Piping Components with Tapered Sockets