PRINCIPLES OF SOLVENT WELDING PVC PIPE AND FITTINGS

THE UNIVERSITY OF WHITLAM

THE POWER TO PERFORM™

PRINCIPLES OF SOLVENT CEMENTING

The practice of joining PVC to PVC, CPVC to CPVC, or ABS to ABS utilizing a solvent based primer and solvent/resin based cement to soften and fuse pipe and fittings together. The following points should be understood to make consistently good joints:

1. Prior to solvent welding, all fittings and couplings should be removed from their cartons and exposed for at least one hour to the same temperature conditions as the pipe to assure that they are thermally balanced before joining.

2. Joining surfaces of pipe/conduit and fittings must be softened and made semi-fluid. This is achieved with the use of primer.

3. Sufficient cement must be applied to fill gap between pipe and fitting socket.

4. Assembly must be made while pipe and fitting surfaces are still wet and semi-fluid.

5. During assembly, while in a semi-fluid state, the surfaces will combine together and form a effective whole.

6. Use a primer that meets ASTM Specification F656

7. For PVC, use PVC solvent cement that meets ASTM Specification D2564.

8. For CPVC, use CPVC Solvent cement that meets ASTM Specification F493.

9. Always keep the cement can closed and in a cool place when not in use.

10. Discard the cement when an appreciable change in viscosity takes place, or at the first sign of gelling. A gel condition is indicated when the cement does not flow freely from the brush, or when the cement appears lumpy or stringy.

11. The cement should not be thinned.

12. Keep the brush immersed in cement between applications.

13. Solvent cements are fast drying and therefore should be applied as quickly as possible. It may be necessary for two workers to perform this operation for larger size pipe. Under conditions of high atmospheric humidity, quick application is important to minimize condensation on the cement surface.

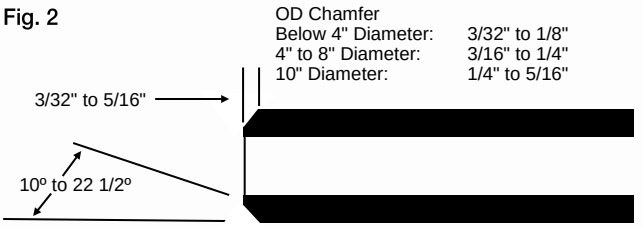
13. The surface temperature of the mating surfaces should not exceed 110ºF (45ºC) at the time of assembly. In direct sunlight, or in ambient temperatures above 110ºF, the pipe surface may exceed 110º. In this case, the pipe temperature may be reduced by swabbing the surface to be cemented with clean, wet rags, provided the pipe is thoroughly dried before the primer and cement are applied.

PROCEDURES FOR PRIMING/CEMENTING PVC AND CPVC PLASTIC PIPE, CONDUIT AND FITTINGS

1. Always cut pipe square with the axis, using a PVC ratchet cutter, fine-tooth hand saw and miter box, fine-tooth power saw with a suitable guide. A tube cutter may be used if the cutting blade is specifically designed for cutting plastic pipe in such a way as not to raise a burr or ridge (flare) at the cut end of the pipe. Care must be taken to remove any ridge that might be raised at the pipe end by the wedging action of the cutting process. 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.

2. Chamfer pipe, approximately 10º to 22 1/2º as illustrated in Fig. 2. Failing to chamfer the edge of the pipe may remove the cement from the fitting socket and soften material, resulting in a leaking joint. Check dry fit of pipe and fitting. Pipe should enter fitting 1/3 to 3/4 of the total depth.

Fig. 2



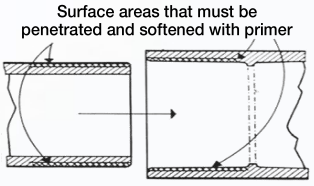
3. Using a clean, dry, cotton rag, wipe away all loose dirt and moisture from the inside diameter (I.D.) and the outside diameter (O.D.) of the pipe end and inside diameter (I.D.) of the fitting. Surfaces to be joined should be clean and free of moisture before application of the primer or cement.

4. Prior to applying primer or cement check that interference fit between the pipe and fitting occurs at approximately 1/3 to 2/3 of the socket depth by gently inserting pipe into fitting until first sign of resistance. DO NOT FORCE TOGETHER.

5. Measure the socket depth of the fitting and transfer this measurement to the OD of pipe with a mark. Add a second mark 2 inches from first mark to aid in determining insertion depth after primer and cement are used.

For the following steps use an applicator that is approximately half the size of the nominal pipe diameter being joined (i.e. Use a 1 1/2" inch dauber on nominal size 3" pipe and fittings

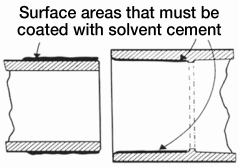
6. Apply the primer to the fitting socket with dauber supplied in the can or an applicator brush. Use an aggressive scrubbing motion to work primer into the socket surface, breaking down the surface tension and to soften fitting surface. A rag is not recommended, as repeated contact with skin may cause irritation or blistering.



7. Using an aggressive scrubbing motion, apply the primer to the pipe end to just beyond the mark for the depth of the fitting socket.

8. Apply second application of primer to fitting socket.

9. Immediately after the primer has been applied, liberally coat the pipe to the depth of the fitting socket with solvent cement.



10. Apply cement lightly, but uniformly, to the inside of the fitting socket, taking care to keep excess cement out of the socket. This is to prevent solvent damage to the pipe. Time is important at this stage.

11. Apply a second coat of cement to the pipe end.

Special Instructions for Bell-End Pipe: The procedure in Steps 4, 5 & 6 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, nor should any cement be applied on the bell-to-pipe transition area. This precaution is particularly important for installation of bell-end pipe with a wall thickness of less than 1/8" (3 mm).

12. 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, forcefully bottom the male end of the pipe into the socket. Turn the pipe or fitting 1/4 turn during assembly to distribute the cement evenly (but not after pipe is bottomed). Assembly should be completed within 20 seconds 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 re-coated, taking care again not to apply a surplus of cement to the inside of the socket, particularly in bell-end pipe.

13. Hold pipe and fitting together to keep pipe from pushing out of fitting socket. Time will vary with pipe diameter, type of pvc cement, and ambient temperature.

14. A properly made joint will show a bead around its entire perimeter. Once this is observed, wipe excess cement from the pipe at the end of the fitting socket with clean, dry rag. Any gaps at this point may indicate a defective assembly job, due to insufficient cement or the use of regular bodied cement on large diameter pipe where heavy bodied cement should have been used.

Large Diameter Pipe and Fittings

It is important to use the proper sized applicator (swab or roller) to insure that enough solvent cement is applied to fill the larger gap that exists between large diameter pipe and fittings. In addition a Heavy Bodied Cement must be used on pipe diameters up to 12" (304.8 mm) or an extra heavy bodied cement on diameters above 12" (304.8 mm). Large forces may be necessary for the assembly of large diameter pipe; two to three people are needed for joints of 6" to 8" (152.4 to 203.2 mm) and three to four people are needed for pipe joints of 10" to 30" (254 to 762 mm). Mechanical forcing equipment, “come-alongs”, 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 if not held in place for approximately one minute after assembly. Care should be taken during assembly not to disturb or apply any force to joints previously made. Fresh joints can be destroyed by early rough handling.

Set Time

Initial Set Time—The time it takes cement to produce a firm enough grip to produce a bond between fitting and pipe.) Handle the newly assembled joints carefully until the cement has gone through the complete set period. Recommended set time is related to temperature and type of solvent cement used:

Allow 50% longer set time for humid conditions or Heavy Bodied Cement

Temperature Range	Pipe Sizes				
	1/2" to 1 1/4"	1 1/2" to 2"	2 1/2" to 8"	10" to 15"	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

Cure Time

Cure Time—The time required before the system can be hydrostatically pressure tested. Recommended cure time is related to temperature and type of solvent cement used.

Allow 50% longer cure time for humid conditions or Heavy Bodied Cement

Temperature Range	Cure Time and Pipe Sizes							
	1/2" to 1 1/4"		1 1/2" to 2"		2 1/2" to 8"		10" to 15"	15"+
Temperature Range during assembly and cure period	Up to 160 psi	Above 160 psi to 370 psi	Up to 160 psi	Above 160 psi to 370 psi	Up to 160 psi	Above 160 psi to 370 psi	up to 100 psi	up to 100 psi
60° - 100°F	15 min	6 hrs	30 min	12 hrs	1.5 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

SET AND CURE TIMES CONSTITUTE A RECOMMENDATION ONLY AND DO NOT CREATE A WARRANTY.

ONE STEP APPLICATION OF SOLVENT CEMENTS

If permitted by local code, joints can be made successfully using cement without the application of primer. Extra care must be given in these applications. It is important that the interference fit is good between the pipe and fitting. It is also important that proper penetration and softening of the pipe and fitting surfaces is achieved. Though this can be achieved with standard solvent cements, J.C. Whitlam has formulated solvent cements ideally suited for these applications. Whitlam Weatherproof Clear and Blue Medium Bodied PVC Cement, and Whitlam Heavy Duty (HD) PVC Cement are designed to be used with or without primer, and offer an excellent solution for assembling PVC joints without the use of primer.

PRECAUTIONS

Consult SDS for precautionary statements and first aid instructions.

DO NOT USE compressed air or gases to test solvent welded systems. Water testing only should be used.

DO NOT USE any type of dry granular calcium hypochlorite as a disinfecting material for water purification in potable water piping systems. Violent chemical reactions may result when combined with PVC/CPVC solvent cements and primers (including vapors).

J.C. Whitlam Manufacturing headquarters. Whitlam products are manufactured in more than 100,000 square feet of offices, plant, warehousing and laboratory facilities in northeastern Ohio.

J.C. WHITLAM MANUFACTURING COMPANY

We have been manufacturing high-quality pipe-joining products since 1900. Our founding product, Tyte-Unyte was the first non-poisonous thread compound, which revolutionized the plumbing industry. Today, Whitlam thread compounds remain the standard. Whitlam now produces more than 300 reputable products, including our new HD PVC Solvent Cement and our Talon brand of products. We are pleased to continue the Whitlam tradition of developing state-of-the-art products for professionals around the world. Let us help you deliver the best. For more information on our solvent weld cements, the Talon brand or our other products, please contact us.

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