Plastics Industry Pipe Association of Australia Limited
ACN 086 511 686

Industry Guidelines

SOLVENT CEMENT WELDING OF PVC PIPE

ISSUE 1.3

Ref: POP102
4 February 2014

Pipelines Integrity For a Cleaner Environment

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SOLVENT CEMENT WELDING OF PVC PIPE

Solvent Cements and Joint Type

Whilst unplasticised PVC (PVC-U) is by far the most common plastics pipe material that is routinely joined using the solvent weld process it is not the only plastics pipe material to take advantage of this technique. ABS and PVC-C also use solvent cement as a jointing technique. Typically ABS and PVC-C pipe systems are used in specialised industrial applications. It is important to only use the solvent cement and primer applicable to the pipe material you are joining. Products designed for solvent welding different pipe systems will not achieve a good joint. Seek the advice of the supplier when joining these alternate materials.

It is not possible to remake a solvent weld joint – it must be made right the first time.

PVC-U pipe systems have three different types of solvent weld joint. Each requires a different type of solvent cement. Pressure pipes and fittings generally use a high strength, interference fit joint while non-pressure pipe and fittings require less bond strength with either interference joint or a clearance fit joint with a small gap.

Always use the correct solvent cement for the application.

AS/NZS 3879, Solvent cements and priming fluids for PVC (PVC-U and PVC-M) and ABS and ASA pipes and fittings, specifies the requirements for the solvent cements used with PVC pipe systems. The solvent cements are specific to the pipe material and to the joint type. They are colour coded, along with the primer in accordance with AS/NZS 3879 as follows:

- Type P is for pressure applications, including potable water installations, designed to develop high shear strengths with an interference fit joint geometry. (green)
- Type N is for non-pressure applications, designed for interference fit joints where maximum strength is not a requirement. (blue)
- Type G is for pressure or non-pressure applications, designed for its gap filling properties in parallel or clearance fit joints. (clear)
- Priming fluid is suitable for use in conjunction with type P, N and G type solvent cements. (red)

AS/NZS 1477 (PVC pressure pipes and fittings) and AS/NZS 4765 (PVC-M pipes) specify a tapered, interference-fit joint geometry for solvent weld joints in pressure applications. These pipes and fittings should be jointed using Type P green solvent cements. The only exception is in the case of larger diameter fittings (main diameter greater than DN150) where parallel sockets are permitted. These fittings are required to be labelled as having a parallel socket requiring the use of Type G, gap filling solvent cement.

Imported pipe and fittings or products not manufactured to AS/NZS 1477 or AS/NZS 4765 may not have the same joint geometry. If jointing pipes manufactured to another Standard, seek the advice of the supplier regarding which solvent cement should be used.

AS/NZS 1254 (Stormwater pipes and fittings) and AS/NZS 1260 (DWV pipes and fittings) specify tapered, interference-fit joints for pipes and either tapered or parallel type joints for moulded fittings. Pipes and fittings with tapered joints should be jointed with Type N blue solvent cement. Moulded fittings with parallel sockets are required to use Type G, gap filling cement and are labelled as such.

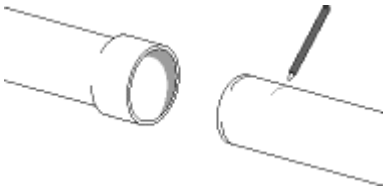
Jointing Procedure

1) Prepare the pipe

Before jointing, check that the pipe has been cut square and all the burrs are removed from the inside and outside edge. Remove the sharp edge from the outside and inside of the pipe with a deburring tool. Do not create a large chamfer that will trap a pool of solvent cement.

Proper deburring of the pipe end avoids wiping the cement from the inside of the socket when the spigot is inserted to make the joint. Failure to properly deburr may result in inadequate pipe penetration and/or detrimental accumulation of solvent cement at the socket root. Remove all dirt, swarf, and moisture from spigot and socket.

2) Witness mark the pipe



It is essential to be able to determine when the spigot is fully home in the socket. Mark the spigot with a pencil line ('witness mark') at a distance equal to the internal depth of the socket.

Other marking methods may be used provided that they do not damage or score the pipe.

3) Prepare with priming fluid

Priming is vitally important, as it cleans and primes the PVC surface for the solvent cement's effective bond.

Using protective gloves, dry, degrease and prime the spigot and socket with a lint-free cloth (natural fibres) dampened with priming fluid.

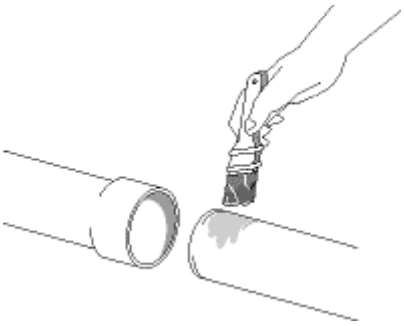
Other application techniques that achieve the same purpose may be used.

4) Brush selection

The brush should be large enough to apply the solvent cement to the joint in a maximum of 30 seconds. Approximately one third the pipe diameter is a good guide. Do not use the brush attached to the lid for pipes over DN 100 in size.

For large diameter pipes, it may be necessary to decant solvent cement to an open vessel for a large brush to be used. Excess should never be returned to the can.

5) Apply solvent cement

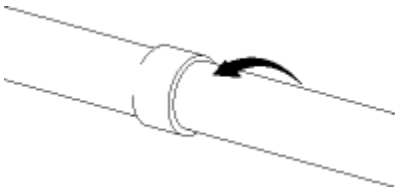


Using a suitably sized brush, apply a thin even coat of solvent cement to the internal surface of the socket first. Solvents will evaporate faster from the exposed spigot than from the socket. Special care should be taken to ensure that excess solvent cement isn't built up at the back of the socket (pools of solvent will continue to attack the PVC and weaken the pipe). Next apply a similar even coat of solvent cement up to the witness mark on the spigot. Ensure the entire surface is covered.
A 'dry' patch will not develop a proper bond, even if the mating surface is covered, and may also make it difficult to obtain full insertion.

Special consideration should also be given to the temperature in which the joining will be performed. High

temperatures may require a marginal increase in application thickness to allow for evaporation before the joint is made. See additional tip #4 below for more detail.

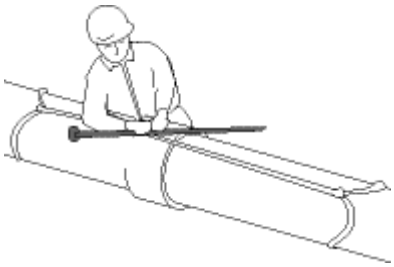
6) Inserting the spigot



Make the joint immediately, in a single movement. Do not stop halfway, since the bond will start to set immediately and it will be almost impossible to insert further.

It may aid distribution of the solvent cement to twist the spigot into the socket so that it rotates about a 1/4 turn whilst (not after) inserting. Where this cannot be done, particular attention should be paid to uniform solvent cement application.

7) Push the spigot home



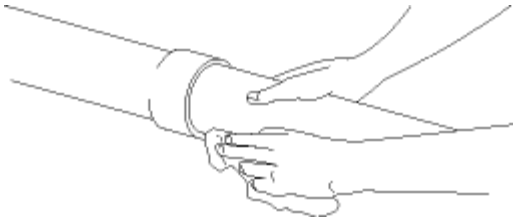
The spigot must be fully inserted to the full depth of the socket. The final 10% of spigot penetration is vital to the interference fit.

Mechanical force will be required for larger joints. Be ready in advance. Pipe pullers are commercially available for this purpose. Polyester pipe slings are very useful for gripping a pipe, in order to apply a winch or lever.

8) Hold the joint

Hold the joint against movement and rejection (i.e. pushback) of the spigot for a minimum of 30 seconds.
Disturbing the joint during this phase will seriously impair the strength of the joint.

9) Wipe off excess solvent cement



For a neat professional joint, with a clean rag, immediately wipe off excess solvent cement from the outside of the joint.

10) Do not disturb the joint

Once the joint is made, do not disturb it for five minutes or rough handle it for at least one hour. Do not fill the pipe with water for at least one hour after making the last joint. Do not pressurise the line until fully cured.

11) Cure the joint

The process of curing is a function of temperature, humidity and time. Joints cure faster when the humidity is low and the temperature is high. The higher the temperature, the faster the joints will cure. As a guide for pressure applications, at a temperature of 16°C and above, 24 hours should be allowed, at 0°C, 48 hours is necessary.

Additional Tips for Successful Jointing

1. Cut the pipe using a fine toothed saw and mitre box or circular saw with an abrasive disc. To ensure full interference fit, the last few millimetres of spigot count so the spigot must be cut square.
2. Do not attempt to joint pipes at an angle. Curved lines should be jointed without stress, then curved after the joint is cured.
3. Support the spigot clear of the ground when jointing, this will avoid contamination with soil or sand.
4. Jointing of larger diameter pipe and fittings ($\geq$ DN150) in higher temperatures (above 30°C) should be performed in a shaded area, keeping the pipe surfaces cool. Type G solvents are heavier bodied so the effect of premature solvent evaporation is lessened. This is significant when jointing large diameter pipes and fittings especially in hot conditions. There are also some type P solvent cements that are heavier bodied and intended for large diameter joints.