



# Specifier's Notebook

COMMENTARY

## Getting the Most from Plastic Pipe and Fittings

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**P**olyvinyl chloride (PVC) and chlorinated polyvinyl chloride (CPVC) are thermoplastic products that have quickly become the material of choice for pipe and fittings commonly used for drainage, waste and venting, as well as domestic water applications. The advantages, when compared to traditional metal pipe, include immunity to microbiologically influenced corrosion, easier and less costly installation, and high-quality flow characteristics.

However, in order to take full advantage of these benefits, thermoplastic pipe and fittings must be joined correctly in order to provide a tight, leak-free fit. Although it is not a complicated task, it is crucial that a few fundamentals be followed.

### Debunking myths

First, appreciating the integrity of thermoplastic joints requires an understanding of how pipe and fittings are joined. A common misconception is that a PVC joint is made when the solvent cement hardens and fills the void between the pipe and fitting, and that the joint will last only as long as the cement does.

Conversely, what has made ABS, PVC and CPVC plastics so reliable and popular, in part, is due to their unique capability of being softened or melted by solvent cements. Consequently, where the softened pipe is forced into direct contact with the softened fitting, the thermoplastic material at the surfaces becomes co-mingled, forming a cross-molecular bond. Once the surfaces cure and harden, the resulting weld is permanent — not dependent upon an adhesive for its integrity.

Of course, the pipe and fitting must be forced into direct contact with each other to form a cross-molecular bond. For solvent-welded systems, the dimensional standards of the American Society for Testing and Materials (ASTM) stipulate that the outside pipe diameter must be larger than the bottom of the fitting socket to create an interference fit. For example,

when manufactured to the nominal ASTM dimension, 2-in. PVC pipe has an outside diameter of 2.375 in., and the fitting at the bottom of the socket has an inside diameter of 2.37 in. The pipe is 0.005 in. larger than the fitting socket, ensuring the pipe and fitting will be forced into contact.

### Guarantee a strong joint

Insuring a sound joint requires more than an interference fit between pipe and fitting. The correct cement and primer must also be applied, as indicated by the applicable ASTM standard. Specifically, formulated cements are available for PVC and CPVC plastics and varying pipe diameters.

Also, it is important to note that not all pipe and fittings are the same. It is possible for an installer to receive pipe and fittings that do not fit together properly, even though they meet all applicable ASTM standards. If the pipe and fittings come from the same manufacturer, that manufacturer should accept responsibility, which is a good reason

to specify pipe and fittings from the same manufacturer.

According to ASTM standards, a 2-in. fitting can have an inside diameter that ranges between 2.365 in. and 2.375 in. A 2-in. pipe can have an outside diameter between 2.369 in. and 2.375 in., and still be within the standard. If the pipe and fittings are manufactured to the middle of the standard, the fitting will measure 2.370 in. and the pipe 2.375 in., ensuring contact during installation for a consistently tight or interference fit.

On the other hand, if the fitting diameter is manufactured to the high end of the tolerance (2.375 in.) and the pipe is manufactured to the low end of the tolerance (2.369 in.), there would be a gap between the pipe and fitting of .006 in., meaning there will be an insufficient contact between pipe and fitting for a strong weld.

Consequently, careful attention to these measurements is essential, as is the correct selection of cement and primer. Finally, specifiers must hold manufacturers responsible for accurately fit pipes and fittings. The results will speak for themselves.

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### PVC/CPVC Pipe Fitting Tips

- ▶ Reference ASTM standard for cement and primer
- ▶ Order pipes and fittings from one manufacturer
- ▶ Watch fitting diameters