

# PVC Project Assembly Guide

a FORMUFIT field manual

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# **PVC Project Assembly Guide**

# Welcome.

This guide is designed to be friendly, knowledgeable and to provide options for different people from all settings and backgrounds. Whether you're a first time PVC builder, who has never picked up any type of tool, or a seasoned PVC enthusiast or maker who uses PVC in everyday ideas and activities, this guide should provide a general manual to assembling PVC pipe projects.

First, we'll cover all the basics, like general safety instructions. Then we'll get into what types of methods are available to use to connect PVC pipe and fittings, finally we'll show examples of how to perform each method to assemble your PVC project.

If your questions are not addressed here, feel free to contact our support team at [info@formufit.com](mailto:info@formufit.com). We'll be glad to help.

## About the Second Edition

We previously put all of our PVC tips online, in a basic HTML Web page format, however, we found that many of our users needed a printable copy that could be taken to the garage, workshop or a location where the cutting, assembling or pipe painting was being performed, away from a PC. This latest edition solves that problem, giving our end-users a printable 'field manual' that can be taken along with them to wherever they choose to construct their creations.

Additionally, we address some additional questions that have been raised about PVC pipe assembly tips since the development of our original online-only tips.

## Assembling PVC Summary

Structural PVC projects can be assembled in many ways. Unlike other building materials, where fasteners (screws, nails, etc.) are used, PVC can be assembled using a cementing method or by way of fasteners.

PVC assembles extremely easy. Other materials such as wood or metal are heavy and cumbersome to attach to each other. PVC is unique as it uses fittings to connect the pipes, for different angles and attachments.

Assembling PVC can be broken down into three methods and approaches: Attaching PVC to fitting by way of PVC Cement, which is a more permanent approach, using screws to temporarily attach the pipe to the fitting, which can be removed later, or just using the tight-fitting press together method.

All three of these methods will be detailed more in this guide.

## Necessary Legal Jargon

**DISCLAIMER:** The information provided within this manual is for informational purposes only. FORMUFIT accepts no responsibility, and is excluded from all liability for damage and/or loss which may be suffered by any other party as a result of using or in connection with such use or loss of use of this information, including but not limited to loss of profit, loss of opportunity, loss of business, indirect damages, incidental damages, special or consequential loss, injury or loss of life.



# Safety First.

As with any manual that involves tools, especially involving cutting or drilling, safety needs to be discussed.

## Use Caution.

Some methods to attach PVC pipe to PVC fittings involves tools the use high-speeds drills and power tools. Chemicals are also use to fusion weld PVC pipe together. Each of these tools can cause serious harm to an individual if not used properly. Be sure to read, understand, and follow all the safety rules that come with your hand or power tools. Failure to do so could cause bodily harm.



### HANDS

Always be aware of where your hands are when drilling PVC pipe with any tool. Make sure that your hands are clear of the area being drilled.



### EYES

Wear safety glasses, goggles or other eye protection when drilling or driving screws into PVC pipe, as fragments of pipe can be ejected from the area or a screw could come loose.



### MOUTH & LUNGS

Wear a mask or respirator. PVC pipe, when drilled, can emit small particles that can irritate the lungs or throat. PVC cement is also noxious when used, and may irritate the lungs.

## Clear the air.

Assembling your PVC project using PVC cement requires extra caution you are assembling the project using chemicals. These chemicals can make you nauseas, dizzy or lightheaded. They are also flammable in nature and can cause a fire if caution is not observed.

PVC Cement may cause dizziness, lightheadedness or nausea if used in a non-ventilated area. Be sure to assemble your PVC project in a well-ventilated area, such as an open garage, or outside.

When using PVC cement please keep in mind that it is flammable until it evaporates, and can cause a fire if it comes across a source of ignition. Do not smoke, or use any source of fire or spark, when assembling PVC projects with PVC cement.

# PVC Assembly Methods Explained

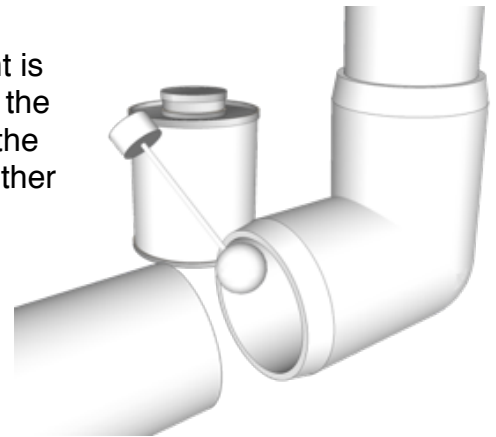
PVC pipe is one of the most versatile and useful structural building materials available, but you still need a method to connect it all. We've provided a few methods to assemble your PVC project, shown below.

## PVC Cement Method (Permanent)

When plumbing and electrical professionals connect PVC for their project, most often they are using PVC cement to connect fitting to pipe. This method is extremely strong and provides a permanent, lifetime connection.

The method of connecting PVC pipe to PVC fitting using cement is known as fusion welding, or chemical welding. This is because the PVC cement causes a chemical reaction that physically 'melts' the outer layers of the PVC pipe and fitting, and when pressed together causes them to fuse.

Once a PVC pipe and PVC fitting have been connected using PVC cement, there is no method available to remove the two from each other. This method also requires that the end-user work quickly to assemble and adjust a connection point, often within 30 or less, as the fusion weld sets very quickly.

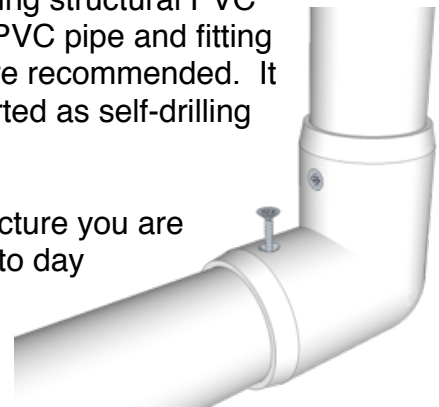


## Set Screw Method (Semi-Permanent)

Since PVC cement requires an extremely short work time, and a permanent bond, the option of the 'set-screw' method is available when constructing structural PVC projects. This method has the user insert screws between the PVC pipe and fitting to secure it into place. Self-tapping machine or wood screws are recommended. It is recommended that holes be pre-drilled for screws being inserted as self-drilling screws do not work well.



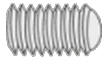
Using the set screw method is not recommended when the structure you are attempting to build is going to bear substantial torque in its day to day activities. This is because the screws, under torque, could de-thread and come loose from the pipe.

This method is not recommended for PVC pipe sizes 3/4" and under.



## SCREW TYPES

The following chart shows the type of screws and how they function when using them to connect PVC pipe and fittings. It also explains any type of pre-work required when using each type:

IMAGE	TYPE	USE	PRE-WORK
	Pan Head Self-Drilling Screw	Standard connection use. Will have exposed head.	Pre-drilled pilot hole recommended.
	Countersunk Head Self-Tapping	Standard connection use. Head will not be visible.	Pre-drilled pilot hole and countersink hole required.
	Set Screw	For precise structures that require minimal visibility of hardware.	Exact size pre-drilled hole required.

## SCREW LENGTHS

The following chart shows the recommended self-drilling or self-tapping screw length that should be used when working with particular sizes of PVC pipe and fittings. This is important so that the screw goes through both the PVC fitting and PVC pipe walls:

PVC PIPE SIZE	MINIMUM SCREW LENGTH
1/2"	NOT RECOMMENDED
3/4"	NOT RECOMMENDED
1"	1/2"
1-1/4"	3/4"
1-1/2"	3/4"
2"	5/8"

## Push and Set Method (Temporary)

The final method to assemble PVC projects is the 'push and set' method. This method does not use any source of cement or fastener to keep it together. Instead, it uses the pressure of the pipe into fitting connection to let it connect on its own. Most furniture grade PVC pipe and fittings have such close tolerances that this method is often all that is required to build a PVC structure.

This method will not work with all types and configurations of PVC pipes and fittings, as there are variances in the tolerances of PVC, and some fittings and accessories were designed to use PVC cement to connect. This method is only recommended for light or self-standing structures that will not bear weight or any torque. This method is very similar to 'dry fitting.'

# Additional Information

Below is additional information that is convenient to know before assembling your project and may assist in the process.

## Dry Fitting

Before final assembly (before connecting with PVC cement or screws), it is **highly recommended** to perform a 'dry fit' of all the PVC pipe and fitting elements. This will allow you to double check to make sure that the pipes are cut to the right size, that you have the proper fittings in place where they are required and that all pieces are readily available for cementing.

**Dry fitting is a necessity** if using PVC cement, as the working time is only around 30 seconds before the curing begins. All too often PVC projects are ruined because a dry fit was not performed and an incorrect pipe length or fitting was used incorrectly.

## MAKE IT EASIER TO REMOVE

You can use baby powder or hand lotion inside the fittings to assist in getting the PVC elements apart after dry fitting. This is recommended as the tolerances of PVC pipe and fittings are often so close they can be very difficult to get apart.

## TWIST AND PULL

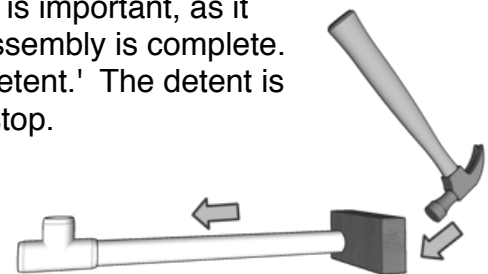
When removing the pipe from the fitting after a dry fit, twist the pipe, either by hand, or using a pipe wrench, while simultaneously pulling the pipe out of the fitting. If using a pipe wrench, place a towel or cloth over the teeth of the wrench to avoid damaging the PVC pipe.

## Seating

Seating of the pipe into the fitting is the act of pushing, or if necessary, hammering the pipe all the way into the fitting when assembling. Seating is important, as it makes sure that the pipe is completely into the fitting when assembly is complete. PVC pipe should be seated into a fitting until it reaches the 'detent.' The detent is the small lip inside the fitting, where the pipe is supposed to stop.

## HOW TO SEAT

To seat PVC pipe, be it through connecting with PVC cement, screws or just performing a test-run by way of a dry fit, use a rubber mallet or a block of wood and hammer, and tap the opposing end of the PVC pipe until it reaches the detent. The pipe should inch slowly into the pipe as you are hammering, and should stop when it is completely to the point of the detent.



# Check for Square

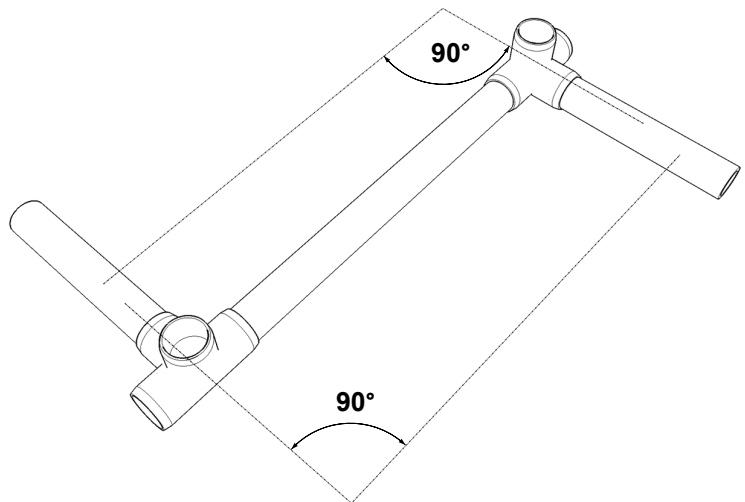
It is vitally important, that immediately after cementing and seating that you check that your project is square where you require it to be. This is critical when building boxes or items where the fittings and pipe connecting segments are required to be in parallel and perpendicular directions.

- If cementing, you have approximately 30 seconds to make any changes in direction of the fittings once the cement is applied. Checking for square should be done immediately after seating the pipe.
- If using the set screw method, you need to check for squareness before you drill the screws into the fitting and pipe.

## HOW TO SQUARE

To make sure that your project is square, you do the following:

- Place the structure on a flat, level surface and use that surface to square it up. Press down on the fittings and pipe so that they are at the same level.
- Use a straight edge between two perpendicular sections to make sure that they are at the same level.
- Place the structure on a flat surface and use a bubble level to make sure that it is even.





# Assembling PVC Projects with Cement

**CAUTION:** Be sure to perform all activity with PVC cement in a well ventilated area.

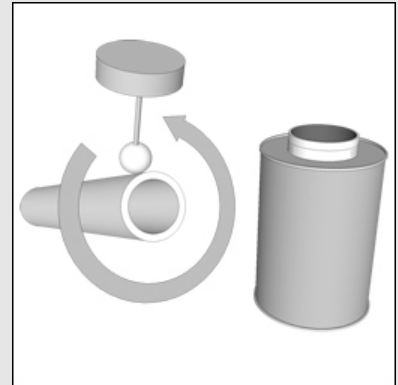
**WARNING:** The PVC cement method is permanent, and the PVC pipe cannot be removed from the fitting after 30 seconds. Be sure to perform a dry fit to ensure all pipes are cut correctly. Check to make sure your items are square immediately after seating, if required.

## PVC Cement Assembly Steps

### STEP 1 (OPTIONAL)

An optional step is to clean the areas of the fitting and PVC pipe with a PVC cleaner or primer. This will guarantee a secure bond, and is recommended.

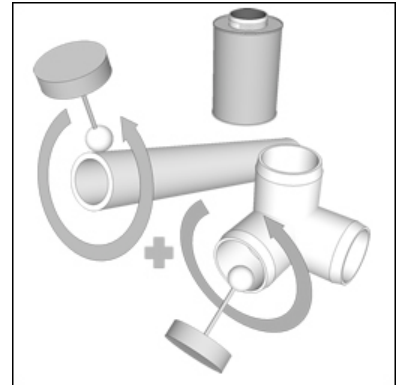
Run the primer or cleaner dauber around the outside of the PVC pipe and the inside of the fitting.



### STEP 2

Using the PVC cement dauber, found inside the can, apply a small amount of PVC cement to both the PVC pipe and the inside of the fitting. Apply the cement only to where the two will come into contact.

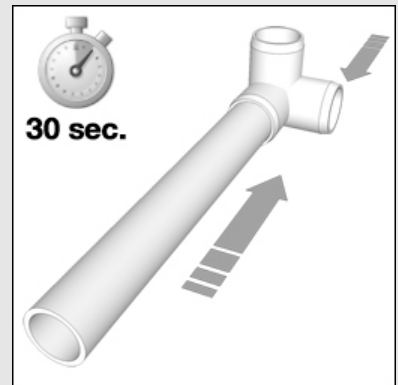
If using a primer or cleaner, apply the cement while the primer or cleaner is still wet.



### STEP 3

Quickly insert the pipe into the fitting, being sure that it is seated properly, to the point of impacting the detent.

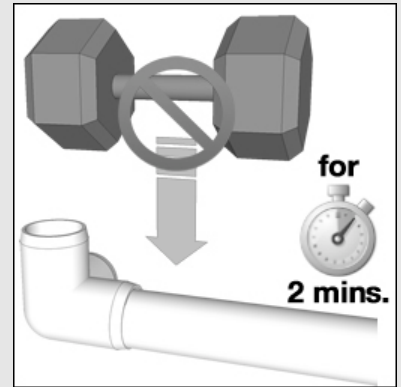
Check for squareness, if required and hold the pipe and fitting together firmly for 30 seconds.



#### STEP 4

Allow the pipe and fitting connection to set for at least 2 minutes before putting weight or additional pressure onto it. This will allow the chemical weld to cure.

You can join other fittings within the structure while waiting for the cure time to complete.



# Assembling PVC Projects with Screws

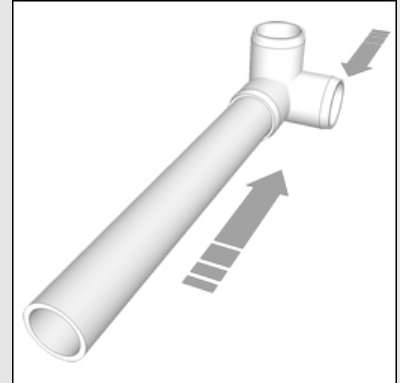
**WARNING:** Do not use this method in scenarios where high-torque or movement is expected. This may cause the screws to de-thread and come loose.

## Set-Screw Assembly Steps

### STEP 1

Insert the pipe into the fitting.

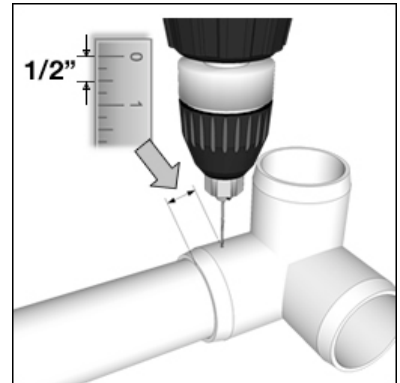
Use a rubber mallet or a piece of wood and hammer to tap the pipe into place until it is properly seated and reaches the detent inside the fitting.



### STEP 2

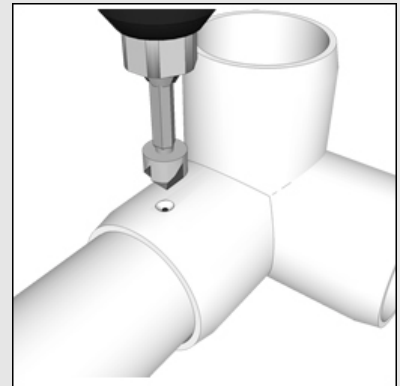
Drill a small hole approximately 1/2 to 3/4 of an inch from the open socket end of the fitting on one side.

Be sure that the hole is drilled through both the fitting and the pipe.



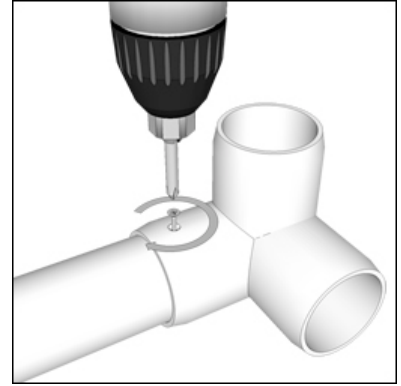
### STEP 3 (OPTIONAL)

If you wish to make the screws flush to the surface of the fitting, use a countersink bit to allow the end of the screw to set inside the fitting. This will leave a flush, smooth surface.



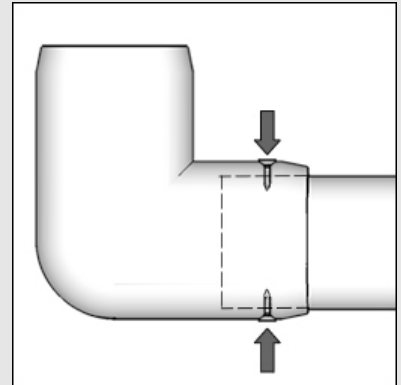
#### **STEP 4**

Drive the screw into the pre-drilled hole and through both the fitting and the pipe.



#### **STEP 5 (OPTIONAL)**

For an extremely secure connection, the above process can be repeated on the opposite side of the pipe.



# Assembling PVC Projects with the Push and Set Method

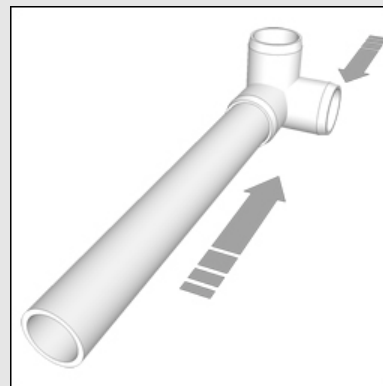
**CAUTION:** This method should never bear heavy weight, torque movement and should be considered a temporary solution. If any of the PVC elements seem loose, or their tolerances are incorrect, do not use this method.

## Push and Set Assembly Steps

### STEP 1

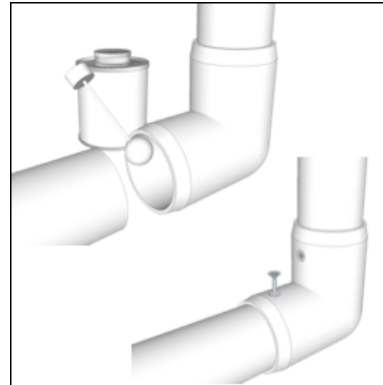
Insert the pipe into the fitting.

Use a rubber mallet or a piece of wood and hammer to tap the pipe into place until it is properly seated and reaches the detent inside the fitting.



### STEP 2

Repeat the above process until all items are assembled. Secure with PVC cement or screws if desired result is permanent.



# Wrap Up

## Post-Assembly Cleanup

### PVC CEMENT REMOVAL

In some instances, residue of PVC Cement may be left behind during the fusion welding process. This often occurs along the end of the PVC fitting socket where the pipe exits.

You can clean some of this up by using an **ultra-fine (200 to 300 grit)** sandpaper, cut into strips, which can be wrapped around the point where the fitting and pipe meet and moved in a back and forth motion.

**WARNING:** Sanding the surface of Furniture Grade PVC may cause the glossiness to fade and leave a matte-dull finish. Wet sanding is recommended.

# FORMUFIT Support

If you've read through this guide and still have questions, feel free to contact us. We are constantly revising our documents and website with information provided from users just like you.

If you want to contact us with questions or suggestions, please email them to [info@formufit.com](mailto:info@formufit.com).

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