

# Plumbing Fitting Primer

Plumbing fittings are essential to almost any pipe installation or repair, even when you use flexible hose and tubing. Pipe fittings play a critical role in joining pipes together, joining different size pipes or hoses together, and also in changing directions or making “special” or “custom” connections. Depending on the type of pipe you are using, a certain type of fitting may be required. For example, Schedule 40 pipe will only work well with Schedule 40 fittings. PVC materials should not be mixed with ABS or CPVC materials, etc. Plumbing fittings are constructed in a variety of different shapes and connection varieties that allow your series of pipes to connect in a proper manner or around corners or obstacles. Knowing what your job requires, as well as what type of material you are working with, will make your choice of fitting much easier. In most cases, specific types of fittings will be required to ensure a smooth job and ensure that your project connects properly. We’ll explore Schedule 40 PVC fittings first, but before we do, let’s discuss the differences between the supply fittings and waste fittings. Then we will discuss the different varieties or configurations of fittings are available.

## Supply vs. Waste Fittings

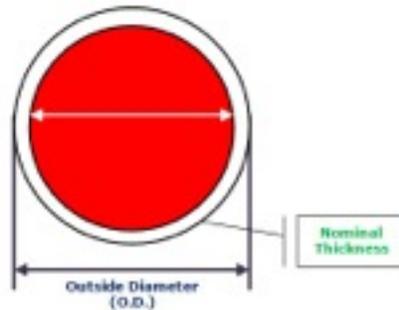
Almost all types of fittings, regardless of their composition, can be classified as either “supply” or “pressure” fittings and “waste” or “drain-waste-vent” (DWV) fittings. Mixing the types of fittings can provide disastrous results, so be careful when selecting your fittings. Supply or pressure fittings primarily used to supply water or other liquids. Waste or DWV fittings are primarily used to carry water and/or waste away from a fixture or other connection.

## SCHEDULE 40 Fittings

Schedule 40 fittings have many different “names”. They are referred to as Schedule 40 fittings, pressure fittings and PVC pipe fittings among other names. Schedule 40 fittings come in different types of materials. They are most often used to connect flexible PVC pipe and rigid PVC pipe. Schedule 40 fittings are meant to fit OVER the pipe, not inside it. They provide excellent rigidity with good chemical and corrosion resistance. We will be dealing with Schedule 40 fittings formed from PVC in our discussions, but Schedule 40 fittings are also available in CPVC and ABS materials. As we mentioned earlier, you should NEVER mix types of fittings or types of fittings with different types of pipe. Different material and compounds react to changes in pressure and temperature in different ways. Hot liquids or temperatures will cause pipes and fittings to expand. The rate of expansion, however, will vary based upon the material composition of your pipe and fittings. As you can imagine, a fitting that expands more rapidly than the pipe it is connected to can cause a myriad of problems. So, for example, Schedule 40 PVC fittings are meant to be used with Schedule 40 PVC pipe. You wouldn’t use ABS or CPVC fittings with PVC pipe because of the material composition differences. Doing so could prove troublesome at best or disastrous at worst.

Also, don’t be confused by the actual “size” of your Schedule 40 pipe or fittings. Schedule 40 pipe and fittings never measure the exact size that they are intended to be used for. The

standards or “schedules” and sizes work like this. The outside diameter of a single “nominal” pipe size is kept constant. So when you are buying a fitting for a Schedule 40 pipe, the outside diameter of the pipe and the fitting size will always be the same. This is the reason for the “schedules” - so that fittings and pipe can easily match across a broad spectrum of manufacturing, and within “acceptable” tolerance and standards. So the outside diameter remains constant, and as a result the inside diameter of a pipe will depend on the "schedule" or the thickness of the pipe. The schedule and the actual thickness of a pipe vary with the size of the pipe. So.....that means that you need always need to measure the OUTSIDE (O.D.) diameter of your flex PVC Schedule 40 pipe...



...and then compare that measurement to the following chart in order to order/receive the correct size. We know, this does not pass the “common sense test”, but it’s the way the industry works...and it will keep you from ordering the wrong size flexible PVC pipe! We know this is confusing, if you have questions on what size flex PVC pipe or fittings to use, call or email us any time!

FLEX PVC PIPE ORDERING DIMENSION CHART			
Outside Diameter (O.D.) Measures (in inches)	Order FLEX PVC Pipe size	Approx. Inside (I.D.) Diameter	Nominal Pipe Thickness
0.540	1/4"	0.364	0.088
0.840	1/2"	0.622	0.109
1.050	3/4"	0.824	0.113
1.315	1"	1.049	0.133
1.660	1-1/4"	1.380	0.140
1.900	1-1/2"	1.610	0.145
2.375	2"	2.067	0.154
2.875	2-1/2"	2.469	0.203
3.500	3"	3.068	0.216
4.000	3-1/2"	3.548	0.226
4.500	4"	4.026	0.237
6.625	6"	6.065	0.280

Schedule 40 PVC fittings are meant to be “glued” or “cemented” to the pipe, or to each other as applicable. Never use these fittings without the proper glue or your project will meet with

disaster. Many people will “dry fit” their projects; in other words, try to put all the fittings on the pipe without glue first to be certain that everything will fit properly, etc. Do not be dismayed if your Schedule 40 pipe will not fit the entire way into your Schedule 40 fittings if you attempt to “dry fit” your project. The “cement” that is used to join the fitting to the pipe actually “melts” the two pieces of PVC together as one “welded” piece. When you apply the cement to both the fitting and the pipe, the two should easily slide together until the cement begins to set. PLEASE BE CERTAIN that the product you purchase is specified for use with PVC pipe (even better if it states it is for use with flexible PVC pipe). There are cleaners and glues made specifically for PVC, for CPVC and for ABS and they generally do not play well together. As always, it is best to read the instructions on the glue/primer that you purchase for use to ensure it will work with your product, and that you are utilizing it properly.

## **Insert or Barbed Fittings**

Insert or “barbed” fittings, unlike Schedule 40 fittings are meant to fit “inside” the pipe or tubing. They are appropriately named because they are “inserted” into the pipe or hose, and they have “rings” or “barbs” on them which help to make a proper seal as well as to hold them tightly in place. They are generally not glued in place, but are generally rather held in place by a clamp or compression ring. When they are properly matched with the correct pipe or tubing and clamped properly, they provide a leak-tight seal, but are not as secure as the cemented, Schedule 40 type. These types of fittings are most often used to join vinyl tubing, non kink hose, suction hose, irrigation pipe and hose, sprinkler pipe, PVC hose and garden hose. There are several different types of insert or barbed fittings, and each of those types is better suited for specific materials.

### **PVC Insert Fittings**

As their name suggests, PVC “insert” or “barbed” fittings are constructed of PVC materials. These PVC insert fittings have very “sharp” or “raised” barbs and are generally used with non kink tubing, PVC hose, irrigation pipe, lay flat discharge hose, and sprinkler hose. They are most often used in fluid applications, but also work well with certain low pressure gases and air transfer. There are many different configurations of PVC insert fittings, making them the most popular type.

### **Black Poly Insert Fittings**

These fittings are constructed of black polyethylene. Their “barbs” are not quite as prominent or “sharp” as those on the PVC insert fittings and are used in fluid applications only, with lay flat discharge hose, non kink tubing, PVC hose and sprayer hose. There are many different configurations of black poly insert fittings, but not as many as PVC insert fittings. They have a wider temperature use range than do their white nylon counterparts, and offer good chemical resistance.

### **White Nylon Insert Fittings**

While closely resembling our black poly insert fittings, these white fittings are comprised of nylon - a “harder” material. Their “barbs” are not quite as prominent or

“sharp” as those on the PVC insert fittings. They are most commonly used in water and other liquid transfer applications like garden hoses. Their working temperature range is not as wide as that of their black polyethylene counterparts, but these nylon fittings offers good tensile strength for general purpose applications.

### **White (Natural) Polypropylene Vinyl Tubing Insert Fittings**

These white or “natural” color polypropylene insert fittings are specially made to work with vinyl tubing and soft PVC tubing. They have much more pronounced barbs that the standard “black poly” and “white nylon” fittings, enabling them to grab and seal more easily on softer materials, like vinyl tubing and soft PVC hose. Natural Polypropylene offers good chemical resistance, max. pressure 150 psi, temp range 32° to 212°F.

### **Black Nylon Vinyl Tubing Insert Fittings**

These black nylon insert fittings are specially made to work with vinyl tubing and soft PVC tubing. They have much more pronounced barbs that the standard “black poly” and “white nylon” fittings, enabling them to grab and seal more easily on softer materials, like vinyl tubing and soft PVC hose. Black Nylon offers good tensile strength for general purpose applications, max. pressure 150 psi, temp range -40° to 200°F.

## **Suction and Discharge Fittings (Connectors)**

Suction or discharge fittings or connectors, like insert fittings are meant to fit “inside” the pipe or tubing. They are appropriately named because they are “inserted” into the pipe or hose, and they have “rings” or “barbs” on them which help to make a proper seal as well as to hold them tightly in place. They are specifically manufactured for use in suction and discharge applications where low or medium pressure is present. There are several different materials used in the construction of these connectors. Polypropylene connectors are lighter in weight, but not as durable as the aluminum alloy connectors. The aluminum alloy connectors offer high tensile strength and rigidity, but are not as light as the polypropylene connectors. Both materials offer good chemical resistance properties. Neither of these products are not intended for potable water applications (human consumption for drinking or cooking).

### **Quick Connect Suction and Discharge Fittings**

These fittings and connectors make connecting a snap. Once in place on the hose, just close the handles and engage the locking mechanism. No need to screw or tighten the connector in place. They allow fast and easy connecting and disconnecting without tools and reduce the possibility of unintentional spilling and leaks. They are the best choice where connections are open and closed or moved often.

### **Pin-Lug Suction and Discharge Fittings**

Many believe that these fittings and connectors provide a more secure and leak-proof fitting, because they are literally “screwed” together utilizing a pin and lug tightening system. While not as convenient as the quick disconnect connectors, they are very secure and relatively easy to use. These fittings are constructed of aluminum alloy specifically designed for high tensile strength, lightness and rigidity.