About Fittings

Before we get into the different **types of pipe fittings**, we need to cover a few basics. Most of what we discuss here is for **plumbing** (https://www.plumbersstock.com/plumbing.html) applications, but keep in mind a lot of this applies to **HVAC** (https://www.plumbersstock.com/hvac.html) and **sprinkler** (https://www.plumbersstock.com/lawn-garden/sprinklers.html) installations, as well. Without further ado:

What Is a Plumbing Fitting?

A plumbing fitting is a component of a water system that is **used for connecting pipe**, tubing, fixtures, valves, and meters. Fittings can divide or combine water flow, they can be used to reduce or increase plumbing lines as needs dictate. They can even be used to join two different types of piping together. For fittings to connect with other components, you must have a **male** end (the piece that fits within the other piece) and a **female** end (the piece that fits around the other piece. Generally speaking, the fitting is the female component, but there are exceptions to this rule.

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What Are the Types of Pipe Fittings?

Today, we are fortunate to enjoy a diverse offering of fitting types, compared to past decades. Pipe fittings are designed to do 1 of 3 things:

1. Split the direction of flow
2. Stop the flow
3. Or adjust the level of flow

Here are some terms that you may need to know when dealing with fittings:

- **Street** - a street fitting, also called a *spigot*, has one end that is the same size as the pipe so that it can fit into other fittings.
- **Degree** - is the measurement used to determine the bend of an elbow.
- **Swivel** - is the ability to adjust a connection through the use of a spin-able connection.
- **Barb** - this is a tapered end of a fitting, designed to insert into flexible pipes, like PEX or HPET.

Here are all the types of pipe fittings:

- Adapter
  - Female Adapter
  - Male Adapter
  - Trap Adapter
  - Clean out Adapter
- Bushing
- Cap
- Comby
- Coupling/coupler
- Cross
- Elbow
  - Drop ear elbow
  - Side out elbow
  - Long Sweep
  - Vent/Short Sweep
- Increaser
- Nipple

- Tee
- Reducing Tee
- Diverter Tee
- Baffle Tee
- Cushion
- Valve
  - Ball Valve
  - Butterfly Valve/ Diaphragm Valve
  - Gate Valve
  - Globe Valve
  - Check Valve
  - Needle Valve
  - Wye
- Side Inlet Wye
- Double Wye

Fittings are generally identified by the material they are made from and the method by which they are connected:

Fitting Connections

There are a number of different ways to connect fittings. Some can be rather expensive and require careful study and practice to get right, while others are quite simple to figure out. Below is a list of the different methods used to connect plumbing and HVAC fittings together.

- **Brazing** - Brazing is a lot like soldering. The main differences between brazing and soldering are the temperature and the material used to seal the fittings together. Because the brazing process heats fittings in excess of 850 degrees F, it requires a base material that can withstand the heat. A joint that has undergone the proper Brazing process is as strong as their parent-metal pieces. It is able to withstand the stress commercial applications often endure.
- **Compression** - Compression fittings (sometimes called Ferrules fittings) are a multi-part fitting that normally consists of 3 parts: the threaded fitting itself, a tapered, brass or plastic compression ring (called a ferrule) and a compression nut which, when tightened onto the fitting, cinches down on the ferrule. This squeezes the ferrule so tight that it becomes form-fitting and makes a watertight and pressure fitting seal. This type of fitting does not require any glues or solvents but will require a couple of really good wrenches to complete the compression process.
- **Crimp** - Crimp fittings are used in PEX water systems and are generally made of brass, copper, or plastic. Each Crimp fitting has a male end on it that fits into PEX Pipe. A crimp ring acts as a collar over the pipe and is crimped on with either a hand crimper or a power press tool. **No glues or solvents are required**. They are simple to use. Anyone can pick up the nuances of crimp fittings in a very short amount of time. And because of their simple nature, jobs become quicker which in turn makes them very cost-effective.
- **Flange** - Flange fittings are most often used in commercial applications to connect valves, inline instruments or equipment nozzles. In most cases, an O-Ring, Gasket or other kinds of packing or grease is used to create the seal where a heavy-duty compression is used to withstand large amounts of pressure. Flange fittings are connected together using threaded bolts, clamps, or sometimes heavy-duty wedges. Flange fittings can be rated for pressure systems as high as 2500 PSI and are usually welded on to pipe to make the connection.
- **Flare** - A Flare fitting is similar to a compression fitting in that it uses a threaded connection to compress and seal the fitting, but instead of using a ferrule, the ends of both sides are tapered to fit tightly against each other. The threads are usually different than the ones found on compression fittings, so they are not generally compatible. In order to create flare connections, a specialized flaring tool is needed to enlarge tubing into a 45 degree tapered bell shape that matches the coordinating shape of the other flared side. A previously installed flaring nut is tightened onto the flared fitting which in turn holds the two sides snugly together. Along with the flare tool, a couple of wrenches are required to make a secure seal. Flared connections are a time-intensive but create a very reliable seal. So much so that they are often used for high pressure, hydraulic, and other "high reliability" applications like brake lines on a car.
- **Gasketed** - There a couple of fittings types that use a gasket to create a seal. The first one we talked about earlier in the threaded fittings section and a gasket joint fitting. This is primarily used on sewer and water lines but can include any product that uses a gasket to fill the space between two pieces. **Bell ends** (or sockets) are the female ends, and spigots, which would be the male or pipe end. These connections require the application of lubricating grease on both bars and a large amount of force to ensure a proper seal. (Depending on the pipe size, between 500 and 1000 pounds of force may be required for assembly).
- **Press** - Press fittings are fairly new to the industry and are becoming more popular as press tools come down in price. Press fitting can be used on multiple arrays of materials including black iron, copper and Galvanized pipe. The idea of the Press fitting is to crimp an O-ring, located on the inside of a fitting, around the outside of a pipe or other male fitting using a powerful press tool that compresses the fitting to an exact size or pressure. Press tools for these applications can be either a manual crimper, powered by battery, or electricity. As the price to buy cordless press tools continues to drop, this option is becoming more popular. Although more expensive than sweat or threaded fittings, a press-fitting is just as durable, cleaner, and **does not require the use of solvents, solders, or flame**. Another advantage press fittings have over other fittings is that it can be installed when water is present.
- **Push-fit** - Also fairly new to the plumbing world, these fittings are great time savers. No special equipment is needed or even tools for that matter. Commonly known as "Sharkbite" fittings, push-fit fitting is designed to attach to the pipe or other fittings by using spring-loaded steel teeth that "bite" into the inserted piece hard enough to keep the two pieces together. The seal comes from a rubber O-ring on the inside that is designed to fit perfectly around the insert leaving no room for water or air leaks. Many tests have been made to prove the durability and reliability of push-fit fittings and so far they seem to stand up to the criticism of more traditional installers. Push-fit fittings are reusable and durable and are increasingly popular.