WHAT TYPE OF FITTING DO I NEED – SCHEDULE 40 and 80 Fittings?

We here at FlexiblePVC.net know that one of the biggest questions that our customers ask is, "what kind of fitting do I need to complete my project"? Unless you are a professional or a very serious D-I-Y'er, you may not be aware of all of the different types of fittings that are available. In this article, we will be discussing Schedule 40 and Schedule 80 fittings, sometimes also referred to as "pressure fittings".

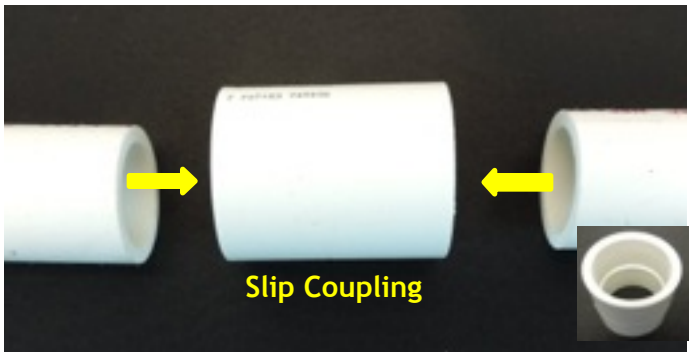
Schedule 40 and Schedule 80 fittings are used in potable water, irrigation, pool, spa, construction and some chemical applications, as well as a host of other uses as well. They provide excellent rigidity while providing good chemical and corrosion resistance. Schedule 40 and Schedule 80 fittings are meant to be "glued" or "cemented" or "solvent welded" into place using approved and appropriate PVC cement. It is not recommended that these fittings be used with clamps or other means of connection unless otherwise approved by the manufacturer. PLEASE NOTE – Schedule 40 and Schedule 80 "sizes" are "nominal". This means that measuring the fitting or the pipe won't necessarily provide you with the proper size. See our charts for the proper sizing. PVC fittings are comprised of Polyvinyl chloride (PVC). PVC is one of the most commonly specified thermoplastic material because it is lightweight, durable and relatively cost-effective. Schedule 40 PVC fittings are easy to use and are generally joined by solvent cementing or threading. PVC fittings exhibit high corrosion and chemical resistance and will not rust, scale, pit or corrode under common conditions.

COUPLERS AND UNIONS

The first issue you may be facing is, "How do I join or connect two pieces of Schedule 40 or Schedule 80 pipe (we're just going to use the word "pipe" to refer to Schedule 40 and Schedule 80 for the remainder of this article)"?

Couplers simply connect two pieces of pipe together and they are available in a variety of options.

If you are just making a connection or repair and do not foresee the need to take the connection apart in the future, the easiest way to connect two pieces of pipe of the same size is with a "**slip coupler**". "Slip" couplings are used when the pipe doesn't need to be taken apart and you are simply joining two smooth pipe "ends" together. Both pipe ends are glued into the coupling, forming a joint.



We also offer **"deep slip couplings"** for use in special situations. They are simply "slip" couplings that both ends of the pipe glue into, but are longer

overall, allowing the pipe more area for cement contact. Deep or "extra deep" couplings are perfect for higher pressure situations and also work well with flexible PVC pipe, providing an extra layer of protection against pipe separation.

If your one or both of your pipes have threads on the ends, you will need something other than a "slip" coupler to join the pipes together.

If both pipes have threads on the end, you will need a **"threaded coupling"** or "FIPT" by "FIPT" coupling. The abbreviations simply stand for "female inside pipe thread" and mean that the coupling has female threads inside. A "FIPT" coupling has female threads on both sides, meaning that both of your pipes will need to have male threads. The pipe ends are simply screwed into the fitting to form the joint.

If one pipe has a thread on it and the other end is smooth or has no thread, you will need a **"SLIP/FIPT coupling"**; more commonly called a **female adapter**. These couplings or "adapters" have a slip end on one side that your pipe glues into, and a thread on the other side that accepts the male pipe thread. The fitting is normally screwed onto the threaded pipe first and then cemented or "glued" onto the pipe with no thread to complete the fitting.

There are also some "specialty couplings" available to help in certain situations with your project.

One specialty coupling is a "**slip reducing coupling**". Much like the slip coupling, "Slip reducing couplings" are used when the pipe doesn't need to be taken apart and you are simply joining two pipe "ends" together. These couplings are used when one pipe is larger than the other, so one end of the fitting accepts a larger size pipe than the other. Both pipe ends are glued into the coupling, forming a joint.

Another type of "specialty" coupling is used only for repairs. This type of coupling is called a **"PVC compression coupling"**, and it is used to join two pipe ends without threads. PLEASE NOTE – standard compression couplings are only for use in low pressure applications. For example, they work great for repairing leaks or breaks in the irrigation lines the lead to sprinklers because they require no cement or glue and as a result they can be applied in a wet or even submerged environment. They should NEVER be used in higher pressure situations, like water supply lines.

"Unions" are used when you have a need to take the pipes apart again. Like the couplings we discussed

above, they are used to join two pipes together. However, unions have some special properties that allow them to be taken apart for repairs or for mobility. Once the pipes are connected to the two halfs of the union, they screw together (without the need for the pipes to turn) and include a washer to provide a water-tight seal.

"Slip Unions" are used when joining two smooth pipe ends together. The male and female union sections "cement" or "glue" onto the smooth pipe ends and then the union is screwed together to form the joint.

If one pipe has a thread on it and the other end has no thread, you will to use a **"FIPT/SLIP Union"**. These unions have a slip end on one side that your pipe glues into, and a female thread end on the other side that accepts the male pipe thread from the pipe. Once the union sections are connected to the pipes, the union is screwed together to form the joint.

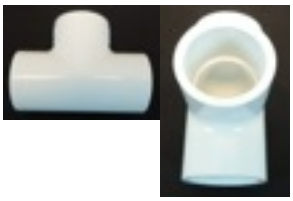
If both pipes have threads on the end, you will need a **"FIPT/FIPT union"** or "threaded union". The abbreviations simply stand for "female inside pipe thread". A "FIPT/FIPT" union has female threads on both sides, meaning that your pipe will need to have male threads on both sides. Once the union sections are connected to the pipes, the union is screwed together to form the joint.

TEES

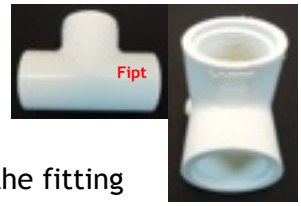
Another issue you may be facing is, "How do I connect three pieces of pipe together"?

Tees or "T"s simply connect three pieces of pipe together and they are available in a variety of options.

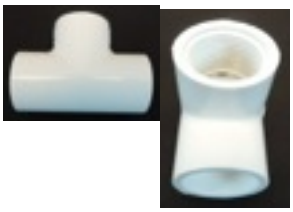
If you are connecting three pipes together, and they all have smooth ends on them, you will want to use a **"slip tee"**. Slip tees represent the easiest way to connect three pieces of pipe of the same size. The ends of all three pipes are glued into the tee, forming a three-way joint.



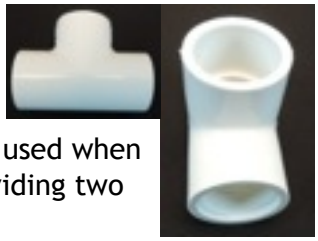
If all three of your pipes have male threads on the ends, you will need a **"threaded tee"** or "FIPT" or "FPTxFPTxFPT" tee. The abbreviations simply stand for "female inside pipe thread" and mean that the tee has female threads inside. A "FIPT" tee has female threads on all three sides, meaning that your pipes will all need to have male threads. The pipe ends are simply screwed into the fitting to form the joint. No cement is required.



Sometimes you will need a tee that connects different pipe configurations. One such tee is the **"SLIPxSLIPxFIPT"** tee. Sometimes the nonemclature can be confusing, so please be careful if ordering. The slip-slip-fipt tee has a "slip" fitting on both opposing ends with a "fipt" or female iron pipe thread fitting

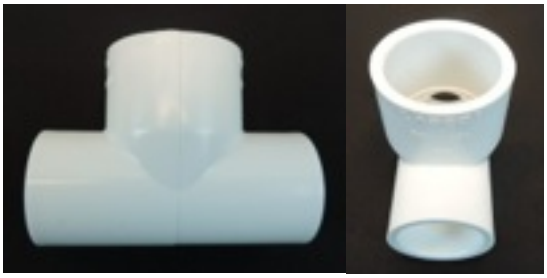


in the center of the tee. This tee is used primarily to connect two pipes that are "slip" ends with no threads or fittings while connecting with a "male" pipe thread pipe on the top. One such example use is a "riser" where the main line continues straight while the threaded "top" allows for the riser to "tee" off the main line.



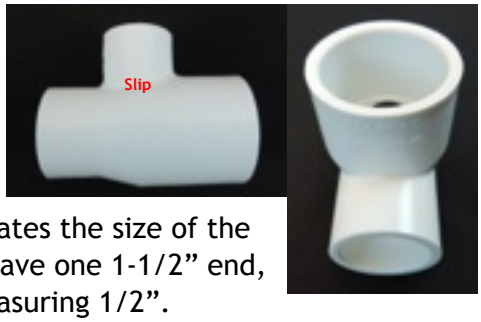
Another way to connect two "slip" pipes to one "thread" pipe is to use a **"SLIPxFIPTxSLIP"** tee. Again, the nomenclature can be confusing here, so again please be careful. The slip-fipt-slip tee has a "slip" fitting on one end, a "fipt" fitting on the opposite end with a "slip" fitting in the center. This type of tee is primarily used when tapping off a main line that is threaded (into the fipt end) and providing two 90 degree slip lines.

There are also various "specialty tees" available to help in certain situations with your project.



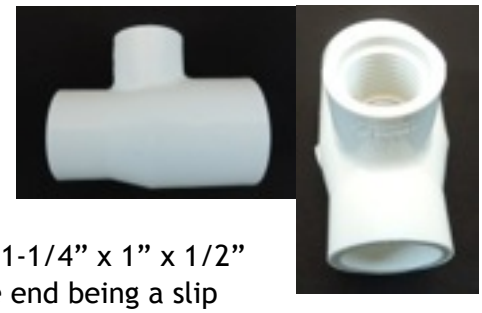
One specialty tee is the called the **"bullhead tee"**. Bullhead slip tees are slip tees that connect a smaller "main" line with a larger "riser" line. In other words, if you have a main supply line that is ¾" and you want to connect a riser to that line that is 1", you would use a bullhead tee. The two opposite ends of the bullhead tee are the same size (the first number in the tee description) and the "top" of the tee is the larger number (the second number in the tee description). All three ends have slip fittings.

Another specialty tee is called the **"manifold tee"**. Manifold tees are primarily used in irrigation systems, allowing the "main" line to be connected on a slip-to-slip basis while allowing a threaded connection to the "manifold" line. The two opposite ends of the manifold tee have slip fittings while the "top" of the tee has a male thread fitting.

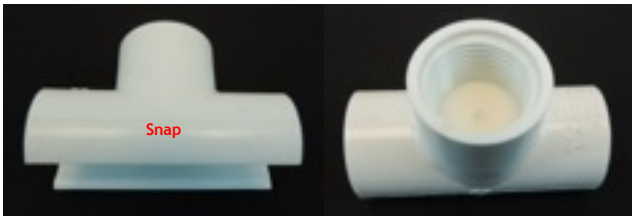


In some cases, you will want to be able to connect three different lines that have different sizes. In this case, one option is to use a **"slip reducing tee"**. This tee has "slip" fittings on all three sides, and can allow for up to three different smooth pipe sizes. Again, be very careful with the nomenclature on these tees. The first two sizes indicate the "opposing end" sizes of the tee while the third size indicates the size of the "top" of the tee. So a 1-1/4" x 1" x 1/2" reducing tee will have one 1-1/2" end, with the opposite end measuring 1" and the "top" fitting measuring 1/2".

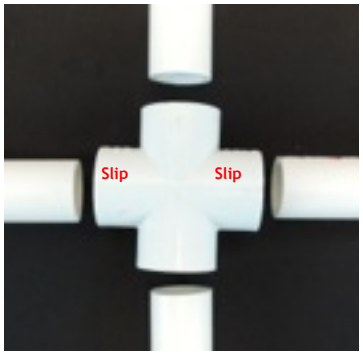
Another reducing tee option is the **"slip x slip x fipt reducing tee"**. This tee has "slip" fittings on the two opposing sides, with a "fipt" or female pipe thread fitting on the "top" of the tee and can allow for up to three different smooth pipe sizes. Again, be very careful with the nomenclature on these tees. The first two sizes indicate the "slip end" sizes of the tee while the third size indicates the fipt or female pipe thread size of the "top" of the tee. So a 1-1/4" x 1" x 1/2" reducing tee will have one 1-1/2" slip end, with the opposite end being a slip fitting measuring 1" and the "top" fipt fitting measuring 1/2".



Another type of "specialty tee" is the **"snap tee"** or the "snap-on tee". This type of tee can be used to add a tee to any piece of rigid pvc pipe. They are called "snap-on tees" because you simply apply glue or cement to your pipe and to your fitting and "snap" the tee onto the pipe. Once the cement is dry, simply use a drill to make a hole in the original pipe. Then simply screw your new pipe addition to the snap fitting. While these tees are not meant for higher pressure situations, they perform quite well in many applications, including irrigation and sprinkler systems.

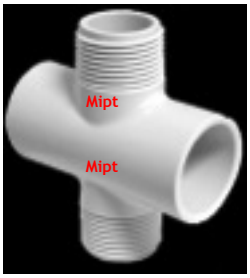


Another type of specialty fitting is called the **"slip cross"**. Cross fittings are sometimes also referred to as four-way fittings. When a "branch" line passes through a tee (four-way), the fitting becomes a cross. Cross fittings have one "inlet" fitting and three "outlet" fittings. Slip cross fittings have four "slip" fittings for connection with four "same-sized" smooth end pipes. Care should be taken when using crosses in plumbing applications as they can generate large amounts of stress on the connecting pipes as temperature changes occur. These fittings are generally used in fire sprinkler and irrigation systems, but are not recommended in regular plumbing applications.



"Reducing slip cross" fittings allow for two different size lines to "cross" each other. One size line "crosses" the other size line at the center of the cross. The sizes are expressed as the "crossing lines". In other words, a 3" x 1" slip cross would have 3" slip fittings going one direction, with the 1" slip fittings going in the opposite, or "crossing" direction. Care should be taken when using crosses in plumbing applications as they can generate large amounts of stress on the connecting pipes as temperature changes occur. These fittings are generally used in fire sprinkler and irrigation systems, but are not recommended in regular plumbing applications.

"Manifold cross" fittings are "cross" or "four-way" fittings with two "slip" fittings at opposing ends and two "mipt" or "male iron pipe thread" fittings at the other opposing ends. Care should be taken



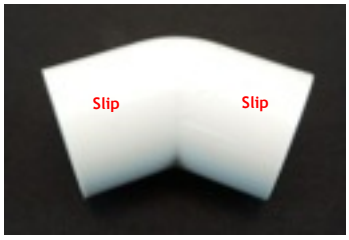
when using crosses in plumbing applications as they can generate large amounts of stress on the connecting pipes as temperature changes occur. Manifold crosses are primarily used in fire sprinkler and irrigation systems, allowing the “main” line to be connected on a slip-to-slip basis while allowing the “cross” connections to the “manifold” line to be threaded connections.

ELBOWS

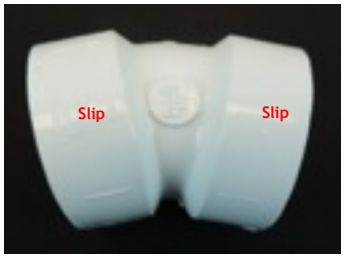
Another issue you may be facing is, “How do I connect pieces of pipe together that make a turn to go in different directions”? Elbows or “Ells” simply connect two pieces of pipe together that are making a turn or going in different directions.

If the pipes needing joined form a 90 degree angle or turn, and both ends have smooth ends, you would use a **90° slip (or slip x slip) elbow**. Schedule 40 PVC 90 ° ells are designed to turn the flow of a liquid at a 90-degree angle. Both pipe ends are glued into the ell, forming a 90° turn or joint.

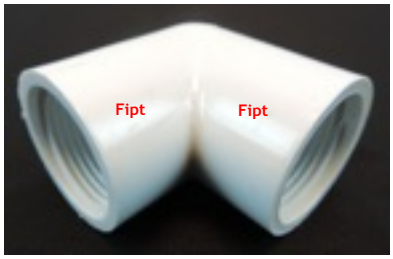
Sometimes you will need to join two pipes that form a 45 degree angle or make a 45 degree turn. **Schedule 40 PVC 45° ells** are designed to turn the flow of a liquid at a 45-degree angle.If both ends of your pipe have smooth ends, you would use a 45° slip elbow. Both pipe ends are glued into the ell, forming a 45° turn or joint.



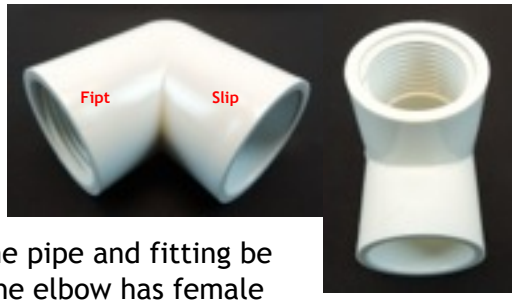
At times, the two pipes that you need to join form a 22.5 degree angle or turn. If both ends of your pipe have smooth ends, you would use a 22.5° slip elbow. **Schedule 40 PVC 22.5 ° ells** are designed to turn the flow of a liquid at a 22.5-degree angle. Both pipe ends are glued into the ell, forming a 22.5° turn or joint.



Sometimes you need to connect two pipes together that are making a bend or a turn, but the two pipes have threaded ends on them so a “slip elbow” won’t work. If the two ends of the pipe you are joining are threaded, you would use a **Schedule 40 “Fipt elbow”** or **“threaded elbow”.** The abbreviation FIPT simply stands for “female inside pipe thread” and it means that the elbow or “ell” has female threads inside both sides. If the pipes needing to be joined form a 90 degree angle or turn, you would use a 90° FIPT elbow. Both pipe ends are screwed into the ell, forming a 90° turn or joint. No cement or solvent-welding is necessary.

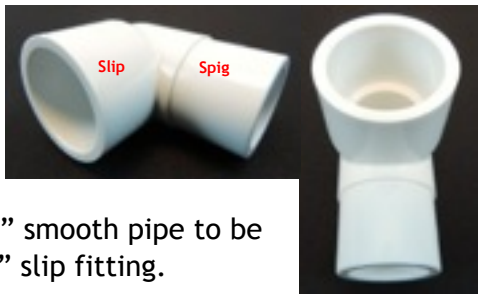


At times you will need an elbow that connects two different pipe configurations that are making a 90° turn or a bend. One such elbow is the **"SLIPxFIPT Elbow"** This elbow is used primarily to connect two pipes of the same size but with different ends – in this case, one smooth pipe and one pipe with threads. One side of this elbow is smooth inside to accept the smooth ended pipe and it requires that the pipe and fitting be cemented together on that side. The other side of the elbow has female threads which the pipe with the male threads simply screws into to make the connection.

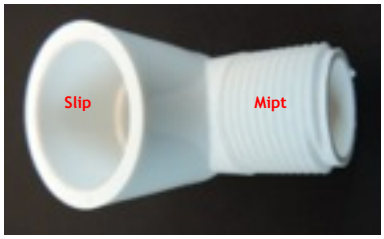


There are also various "specialty ells or elbows" available for use in specific situations with your project. One such "specialty" fitting is called the "street elbow" or "spigot elbow" or "spig elbow". A street elbow has a *female* fitting on one end and a *male* fitting on the other end. One end of the fitting is meant to fit into another fitting. Street or "spig" fittings can typically be used in tighter quarters than regular elbows since no pipe nipple is required - it can be connected directly to another fitting without having to use an additional short connecting piece. The "street" or "spig" end of the fitting can be either a slip (spigot) or a FIPT end, but that end is meant to be used to connect into another fittings socket.

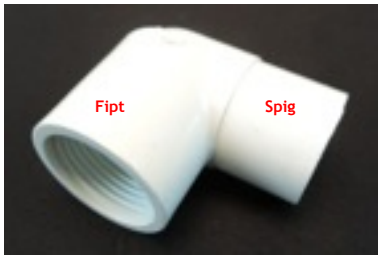
One type of 90° street ell is the **Schedule 40 "90° street spig slip elbow"**. This elbow has a regular "slip" socket on the end that connects to your pipe, and has a "spig" or "slip" fitting that is meant to glue into another fittings socket on the other end. In other words, the other end of the fitting will actually glue into another fitting. For example, a 3/4" spig slip 90° street elbow will allow a 3/4" smooth pipe to be glued into one side, and the other side will fit inside a 3/4" slip fitting.



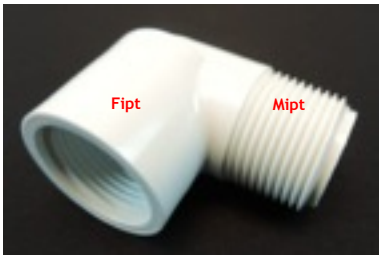
Another type of 90° street elbow is known as the **Schedule 40 "90° street mipt slip elbow"**. In this configuration, the elbow has a MIPT or male thread "spigot" end combined with a slip end on the other side. One side of this fitting (slip side) will accept a smooth pipe that will glue into the fitting. The "male" or MIPT end of this fitting will then screw into another fitting. For example, a 3/4" mipt slip 90° street elbow will allow a 3/4" smooth pipe to be glued into one side, while the other side will screw into a female or FIPT fitting.



A **Schedule 40 “Spig x Fipt Street Elbow”** is another configuration of street elbow. This street ell has as the “spig” side a spigot fitting which will glue into another fitting, and as the incoming side has a female pipe thread that will accept a male threaded pipe end. So, for example a 3/4” spig fipt 90° street elbow will allow a 3/4” male pipe thread to be inserted into one end and will cement (glue) into a 3/4” fitting with the spigot socket on the other end.



Yet another configuration of the 90° street elbow is the **Schedule 40 “90° street mipt x fipt elbow”**. This fitting has a female (fipt) “street” or “spigot” side that fits into another fitting, with a male thread (mipt) fitting that accepts the incoming pipe. So for example, a 3/4” 90° street mipt x fipt elbow would actually screw into a 3/4” fitting and then a 3/4” male pipe would screw into it.

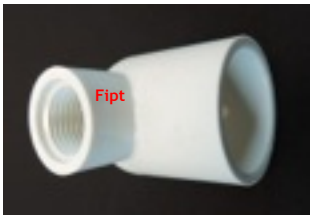


One type of 45° street ell is the **Schedule 40 “45° street spig slip elbow”**. This elbow has a regular “slip” socket on the end that connects to your pipe, and has a “spig” or “slip” fitting that is meant to glue into another fitting’s socket on the other end. In other words, the other end of the fitting will actually glue into another fitting. For example, a 3/4” spig slip 45° street elbow will allow a 3/4” smooth pipe to be glued into one side, and the other side will fit inside a 3/4” slip fitting.

There are certain situations where you need to make a 90 degree angle in your plumbing project, but one pipe is larger than the other. This situation calls for a “reducing elbow” or “reducing ell”. This elbow has two different size inputs – one smaller than the other, and comes in a variety of configurations.

One configuration of the 90 degree reducing ell is the **Schedule 40 “90° reducing slip x slip elbow”**. This 90° elbow allows for two different size pipes to be connected at a 90° angle by cementing both pipes into the elbow. Both pipe ends are glued into the ell, forming a 90° turn or joint comprised of two different size pipes.

Another configuration of the 90 degree reducing elbow is the **Schedule 40 “90° reducing slip x fipt elbow”**. Using this elbow allows the user to connect two different size pipes at a 90° angle when one pipe has a smooth exterior and the other has a male pipe thread. The nomenclature can be a little tricky on these fittings.

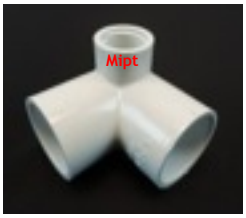


The first size stated is the “slip” size and the second size stated is the “fipt” size. An example would be our 2” x 1” 90° reducing slip x fipt elbow. You would glue a 2” smooth pipe into this end and turn or screw a 1” male threaded pipe into the other end.

Another type of “specialty ell fitting” is the side outlet elbow. Schedule 40 side out ells are similar to standard 90° PVC elbows, but have three outlets at 90° angles instead of two ends at a 90 degree angle. “Side-Out Elbows” are used in a variety of applications to change the direction of flow of water or a fluid.

Side Out elbows with slip socket fittings on all three outlets are the most common, and are known as **Schedule 40”Slip Side Out Elbows”**. All the three smooth-end pipes coming into the fitting at right angles are all cemented into the fitting for a secure connection. All three incoming pipes are equal in size.

Another configuration of the Schedule 40 Side Out Elbow is the slip x slip x fipt configuration. In this configuration, the two opposing ends are both slip and the “top” of the fitting is the fipt connection. For example, if you had two smooth pipes intersecting at a 90° angle and then wanted to do a “take off” on the top of the fitting with a threaded (MIPT thread) pipe, you would use this fitting.



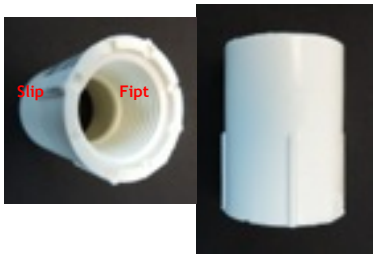
ADAPTERS & BUSHINGS

Schedule 40 PVC adapters and bushings are specialized fittings designed to fit a need. It could be joining two different styles of pipe (i.e. slip and fipt) or it could be capping or plugging a line.

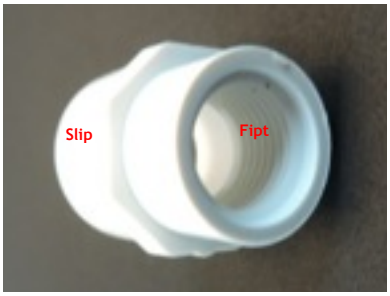
Female Adapters

Female adapters are used to connect two parts with two different end types; a female adapter has a female (fipt) socket on side and a slip socket on the opposing side. They are used to adapt a cemented or solvent welded connection to a male thread connection.

A **Schedule 40 “Slip x Fipt Female Adapter”** is the most common type of female adapter. It contains a female (fipt) connection one end and has a slip socket connection on the other end. So, for example, if you want to connect a 3/4” threaded pipe to a 3/4” smooth pipe, you would use a 3/4” Slip/Fipt Female Adapter.



If you want to connect a male threaded pipe of one size to a smooth pipe of a different size, you would use a **Schedule 40 “Slipt x Fipt Reducing Female Adapter”**. This fitting has a larger connection on one end and has a smaller connection on the other end. Be careful when ordering because the



nomenclature determines which size is the larger size. For example, if you were to order a 3/4" x 1/2" reducing female adapter, the 3/4" side of the fitting would accept the smooth pipe end while the 1/2" size would accept the male threaded end.

Male Adapters

Male adapters are used when connecting two parts with two different end types; a male adapter has a male (mipt) thread on one side and a slip socket on the opposing side. They are used to adapt a cemented or solvent welded connection to a female thread connection.

A **Schedule 40 "Slip x Mipt Male Adapter"** is the most common type of male adapter. It contains a male (mipt) connection on one end and has a slip socket connection on the other end. So, for example, if you want to connect a 3/4" smooth pipe to a 3/4" female socket, you would use a 3/4" Slip/Mipt Male Adapter.

If you want to connect a smooth pipe of one size to a female socket of a different size, you would use a **Schedule 40 "Slipt x Mipt Reducing Male Adapter"**. This fitting has a larger connection one end and has a smaller connection on the other end. Be careful when ordering because the nomenclature determines which size is the larger size. For example, if you were to order a 3/4" x 1/2" reducing male adapter, the 3/4" side of the fitting would accept the smooth pipe end while the 1/2" size would represent the male threaded end that would be turned into a female 1/2" socket.

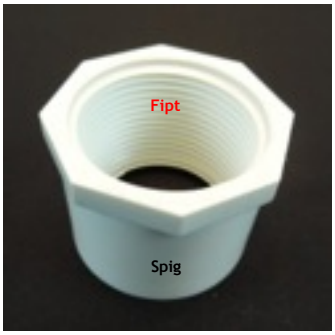
Reducer Bushings

Reducer bushings can fit your needs when your project requires the connection of pipes of two different diameters. These fittings are slightly different than couplings, although couplings can also connect two pipes of different sizes. Bushings, unlike couplings, tend to fit "inside" another fitting much like a "spigot" fitting, allowing the user to place the bushing into the larger fitting, thus reducing the diameter that the larger fitting requires.

The most common configuration of the Schedule 40 reducer bushing is the **"spig x slip" reducer bushing**. This bushing cements inside another fitting (the outer "spig" part of the fitting) allowing a smaller diameter pipe to be cemented into it (the inner "slip" part of the bushing). In this configuration, both connections are cemented or solvent welded together. So for example, a 2" x 1"

Schedule 40 spig x slip reducer bushing would work like this – the bushing would be glued into a fitting that accepts a smooth 2” pipe or fitting. Then a 1” smooth end pipe would be cemented into the bushing, allowing the 1 “ pipe to fit into the 2” pipe.

Another configuration of the Schedule 40 reducer bushing is the **“spig x fipt reducer bushing”**. This fitting cements into a larger fitting and then allows a smaller male threaded pipe to be inserted into it. The “spig” side of the fitting is cemented or solvent welded and then the male pipe end is threaded into the fitting. For example, a 2” x 1” Schedule 40 spig x fipt reducer bushing works in this fashion. First the 2” end of the fitting is cemented into a 2” slip fitting or opening. The 1” male thread pipe or fitting would then be screwed into the fitting, allowing the 1” pipe to fit into the 2” pipe.



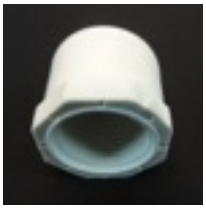
If you have a larger threaded fitting or opening and you need to insert a smaller threaded pipe into it, you would use a **Schedule 40 Mipt x Fipt reducer bushing**. This fitting has a male pipe thread (mipt) on one and and allows another, smaller male pipe thread to be screwed into it. For example, if you are using a 2” x 1” Schedule 40 mipt x fipt reducer bushing, you would first screw the male part of the bushing into a 2” fitting and then simply screw your 1” male threaded pipe or fitting into it.

Caps and Plugs

There are situations when a pipe or a fitting needs to be plugged or capped either permanently or temporarily (for testing, etc.). We offer a variety of Schedule 40 caps and plugs to fit your needs.

Schedule 40 Slip Caps are used when a more permanent cap is needed for your project, or where a threaded solution is either not practical or available. Slip caps solvent weld or cement onto a smooth Schedule 40 pipe for a secure connection. They must be cut off if they need to be removed.

Schedule 40 Fipt Caps are meant for use in situations where a threaded option is available, or where the caps is only temporary or needs to be easily removed. Fipt caps screw or thread onto a male thread Schedule 40 pipe.



Schedule 40 Plugs are meant for use in situations where a male threaded (mipt) fitting requires closure or plugging. The plugs have male pipe threads (mipt) and screw into any Schedule 40 female threaded fitting. Unlike slip caps, these plugs can be rather easily removed for cleaning or further plumbing.

NIPPLES

Schedule 80 nipples are essentially a "pipe extender" with threads on both ends. Mipt x mipt nipples contain male threads on both ends and are the most common. They can thread into any Schedule 40 or Schedule 80 fipt connector. Most nipples have threads on one end with a smooth piece in the center and then threads on the opposite end. In some cases, there is little to no distance between the threads. This is known as a "close" nipple, or one that is just long enough to thread both ends into fittings.