

Easy Tips for Home Plumbing Repairs

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“What Am I Getting Myself Into?”

This may be the first question an aspiring do-it-yourselfer might ask when faced with a plumbing emergency in their home.

After a frustrating attempt at making a do it yourself (DIY) repair, the urge to simply call a professional may be overwhelming. With the Internet as an ever present and all knowing resource, virtually every kind of repair is explained in detail with step-by-step narration and photos to assist the would be do it yourselfer.

In a time when every penny counts, hiring a professional may mean dipping into funds that have been reserved for more rewarding expenditures. There are many DIY jobs someone with modest experience can master, including everyday plumbing repairs.

So what exactly is plumbing? The word itself, plumbing, is derived from the Latin word for lead, plumbum, because early pipes were made from lead. The Romans used sheets of lead that were rolled into tubes to transport water from the aqueducts to their public baths. “Plumbers” then



were those tradesmen skilled in lead working. As the dangers of lead poisoning became known in the mid 20th century, the use of lead in plumbing was disallowed.

Lead pipe was used in ancient Roman baths.
(Photograph by Andrew Dunn, 15 September 2005)

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Tools of the Trade

The first and possibly most important piece of advice for the do it yourself plumber is to always start a job with the right tools. Not having the proper tools at hand can turn an easy repair into a drawn out nightmare. Here is a list of important tools every do it yourself plumber should have:

- **Sink Auger** A sink auger will give you the ability to clear clogged drains in sinks, showers and bath tubs.



- **Adjustable Pipe Wrench** This wrench is adjustable to fit the varying sizes of pipes on which it is used and is also available in a range of sizes. For home use an intermediate size will do.



- **Adjustable Wrench** This wrench is also adjustable, and is designed to be used on hex nut fittings.



- **Channel Lock Pliers** These pliers are adjustable to fit pipes and fittings, and are also available in a range of sizes.



- **Valve Seat Wrench** This specialty wrench is specifically designed for the removal of valve seats in faucet valves.



- **Torch With Soldering Kit** A butane, propane or MAPP gas torch, with the proper preparation and a bit of practice, will allow you to solder copper pipe fittings.

- **Cup and Flange Plunger** A flange plunger is designed for use in toilets and will come in handy when your three year old tries to flush a whole roll of tissue paper. A cup plunger is for use in sinks, showers and bath tubs and it can make quick work of small drain clogs.
- **Teflon (PTFE) Tape** This special tape is designed for plumbing use, to lubricate threaded pipe fittings, which facilitates a better seal.



- **Pipe Cutting Tool**

This tool will cut through metal pipe by revolving it around the pipe and tightening the cutting wheel to increase the depth of the cut until cutting is complete.



- **Hacksaw** A hacksaw will cut through all types of pipe.



(Photograph by Evan-Amos, 1 September 2010)

Keeping this set of tools handy can mean big savings as even minor plumbing repairs can be costly if you have to call a professional plumber. Once you have a reasonable set of tools, you will need a tool box or bag to keep them in. No one likes to spend an hour or more tracking down the tools that are needed for a simple repair job; keeping your tools clean and stored in a single container will make your work easier and more efficient.



Digging through a disorganized tool box can be frustrating.



Keep your tools clean and organized.

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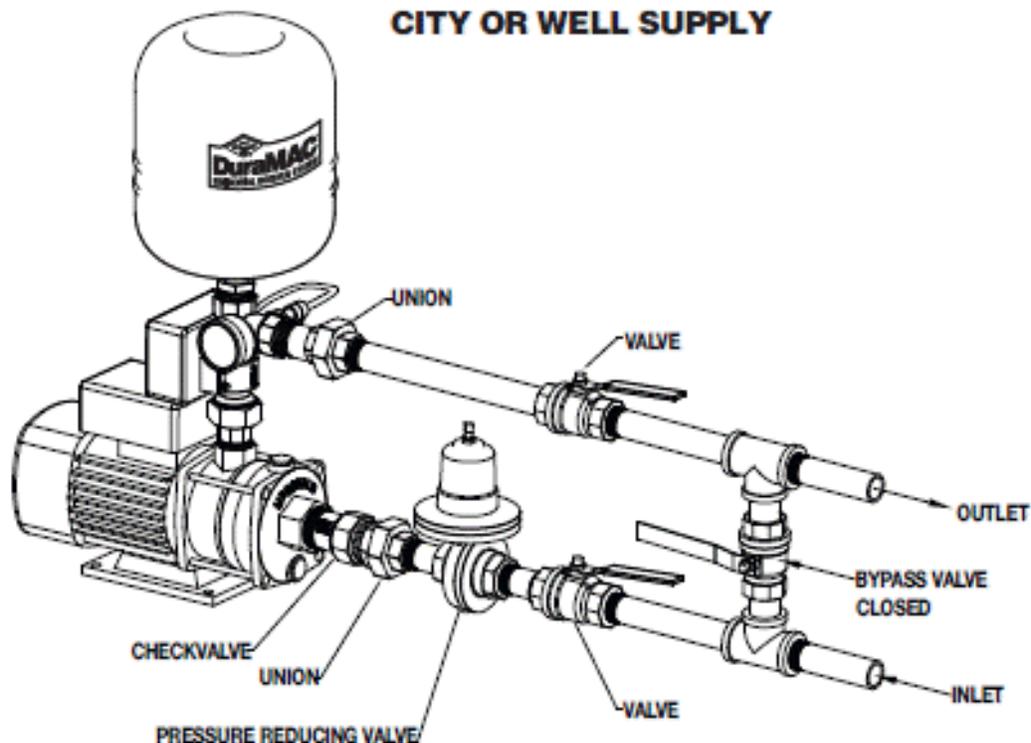
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Understanding Your Plumbing System

In order to be a competent in DIY plumber it makes sense to first gain a basic understanding of how your home plumbing system works.

The water supply is what brings fresh water into the system. Your supply may be municipal, that is a pressurized water main that supplies water to a whole community; or if you live in a rural area your supply may be provided by a well, with a pump to provide water pressure.

The pressure of the water supply is between 40 and 80 pounds per square inch (PSI). If the water supply is initially below or above this range, your system may have an auxiliary pump and pressure tank, or a pressure reducing valve to maintain the appropriate pressure.



Typical Pressure Regulating System

The main water line will have a shut off valve, called a stop valve, both at the exterior water main and inside your home at the water meter.

- You will generally never need to access the exterior water main stop valve.
- Some water meters are located outside the house, in which case there may be a stop valve both at the water meter and inside the house basement or crawlspace.
- Exterior water meters will be located underground in a valve box



Main Water Valve at Pressure Regulator



Water Meter

From the water meter; the water supply line will provide water to the hot water heater

and the various cold water fixtures in your system.

- Sprinkler systems
- Exterior and interior hose bibs
- Toilets
- Cold faucet valves for your sinks, showers, bath tubs
- Any appliances such as a washing machine or ice maker

Familiarize yourself with the locations of the hot and cold stop valves.

- At the sprinkler system supply line
- At the hot water heater
- At sink, shower and tub fixtures
- At appliances such as dishwashers and washing machines

- If your system has ever been modified to provide plumbing to an added bathroom there will generally be stop valves in the hot and cold supply to the added bathroom

Your hot water heater will have a cold water supply inlet and a hot water outlet. There will be a shut off valve in the cold water supply that feeds the hot water heater; closing this valve will shut off the hot water that is provided to your hot water fixtures and appliances. When servicing plumbing that requires you to shut off the water supply to your hot water heater, you will also

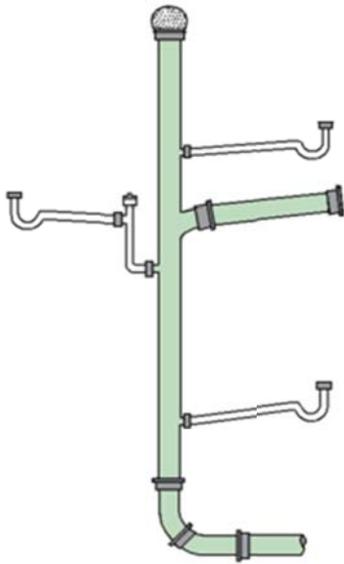


want to switch the hot water heater to its lowest setting, and turn the hot water heater off entirely for any extended periods of time without cold water supply. The stop valve is on the right in the photo.

The supply side of your plumbing may be copper, iron or galvanized steel, or it may be polyvinyl chloride (PVC) or polyethylene (PEX or Poly) pipe. Your system may even have a combination of these.

The waste and drain side of your plumbing system will be either PVC or iron, or both, and depending upon the age of your home you may even have some older lead drain components. The operation of the waste and drain system is fairly simple.

- Fixtures drain water into a component called a trap. The trap is a “U” shaped pipe where water is allowed to stand, blocking sewer vapors from entering the house.
- From the trap, the waste water drains into main drain pipes, which slope downward as they run horizontally, into a single main drain which then runs into a sewer or septic system.
- In order for your system to drain properly it must be ventilated. Just like putting your finger on top of a straw, improper ventilation will prevent waste water from draining effectively.

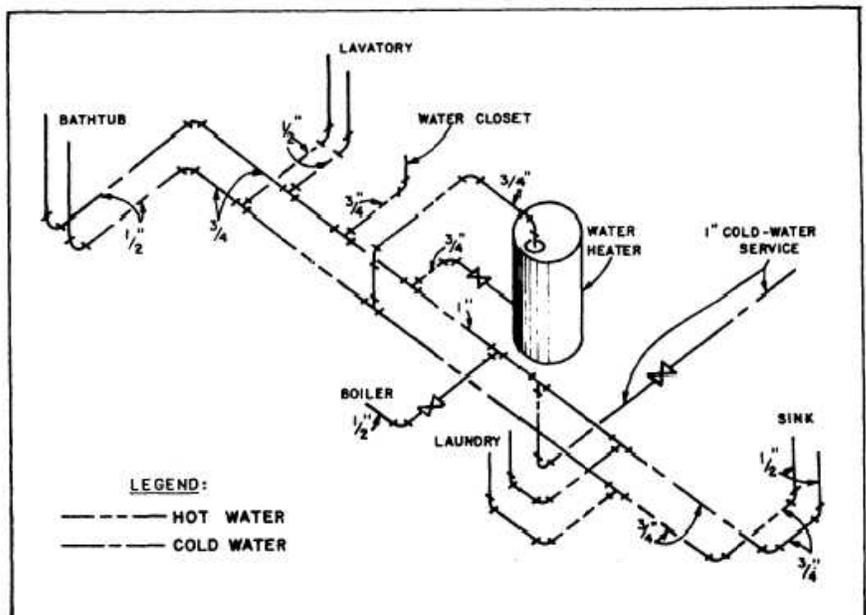


- Somewhere along the main drain close to its lowest point, there will be an access utility called a cleanout; the cleanout is used to service the main drain pipe when clogs occur.

A basic soil stack waste and drain system is shown at left. The P-traps are the U shaped extremities, and the vent is at the top.

Once you have familiarized yourself with your plumbing system, you may draw a diagram for future reference. If you ever decide to add to your plumbing, such as in the case of adding a bathroom, you will need a diagram in order to apply for the proper building permit. This book will not be discussing any plumbing work that would require a building permit.

- A plumbing diagram will show all of the components of the system.
- Include supply lines and valves, intersections and fixtures.
- If you are providing a diagram to apply for a building permit there are various symbols to use for each component and the diagram should be isometric.
- Isometric diagrams use a three dimensional perspective, as an observer would



view the system from above at an angle. Note the opposing triangle symbols used to identify the valves in the sample diagram at right.

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Leaking Pipes and Fittings

Having knowledge of your plumbing system; how it works and where the various components are located; will prepare you for one of the most common types of plumbing problems: leaking pipes.

Leaking pipes can be easy to fix if you have two basic pieces of information.

- Which specific pipe is leaking?
- Where is the leak located?

If the leak is in an easily accessible area you will likely easily determine the exact location. Leaks can be caused by any one of a number of underlying issues.

- Deterioration or corrosion of fittings or pipe
- Freezing of water in pipes can cause them to burst
- Movement places stress on fittings, causing them to lose their seals.

A fitting or pipe which has deteriorated or burst after freezing will need to be replaced but a fitting that is merely leaking may be easily repaired.

- The obvious first step is to shut off the water supply to the leaking component.
- You may want to immediately close the main supply valve at the water meter, then trace the water supply to the leaking component and turn off the valve that would isolate that particular component.
- Once the leaking component has been isolated from the water supply you can open the main supply valve to restore water to the unaffected parts of the system.
- If it is not possible to isolate the leaking component the only alternative is to leave the main valve closed during the repair but you may also take this opportunity to add a stop valve to the system in an appropriate location.

Once the water has been turned off, remove the leaking component. In the case of a burst pipe, the defective section can be cut out and replaced with a new length of pipe and coupling fittings. There are different types of fittings: fittings can be compression type, they can be male and female threaded or they can be male and female slip fit; slip fittings can be either sweat type (soldered) or clamped.

- Compression fittings can be found in the hot and cold water supply hoses for sinks and dishwashers, or in the cold supply to toilets.
- Leaking compression fittings generally will only need to be loosened with an adjustable wrench, reset and tightened and do not require any type of sealant.



Copper compression fittings with a brass ferrule.

- If the ferrule or flared end of the pipe has been damaged, the ferrule can be replaced or the damaged flare can be cut off and the pipe re-flared with a special tool.
- For temporary repairs, a damaged ferrule or flared pipe can be wrapped with pipe thread sealing tape.

Male and female iron or steel pipe thread fittings can be found in older water supply plumbing and in transitions from one type of pipe to another, and can sometimes require a pipe to be cut in order to service them.

- They can be loosened with an adjustable wrench once they are free from any pipe preventing them from being turned.
- If it is necessary to hold a pipe to keep it from turning while a fitting is removed, use an adjustable pipe wrench on the pipe.



A pipe wrench is designed to firmly grip round pipe as well as hex nuts.

Application of pipe thread compound

- If the fitting has not burst or corroded, it can be cleaned and reused.
- Threaded pipe fittings are sealed by wrapping the male threads with PTFE pipe sealant tape. Ensure that the threads are clean and free of rust, corrosion or other damage before applying tape.
- Tape should be applied in the same direction as the threads; starting at the end and overlapping each layer by 2/3 the width of the tape.
- Higher pressure systems may require a pipe thread compound or "pipe dope" rather than tape.

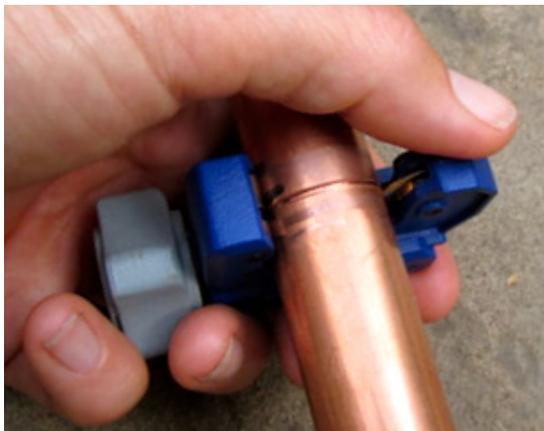
Tighten the fitting until it is hand tight and then two or three turns with a pair of adjustable wrenches. This process is for iron and copper threaded fittings only. Do not use PTFE tape on PVC fittings.

Threaded PVC fittings are found in some newer plumbing systems and in sprinkler systems. When assembling threaded PVC fittings, the process is identical to that for metal fittings with two exceptions.

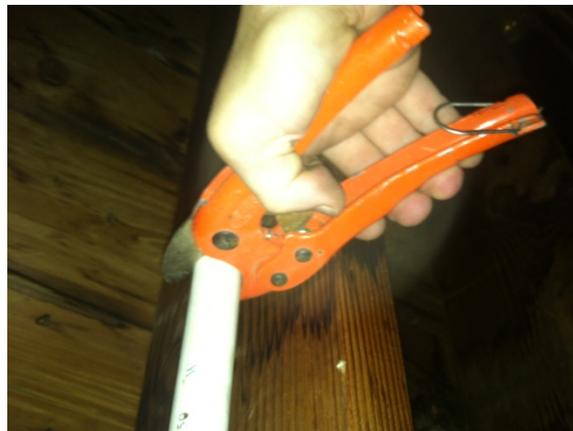
- One, you will need to use PVC threaded joint sealant rather than Teflon or pipe dope
- Two, you will need to tighten to hand tight then one turn with a wrench, or two turns if the joint leaks after only one turn

When replacing sections of damaged pipe, the damaged section should be cleanly cut and removed.

- To ensure clean cuts, use a pipe cutting tool. Limited space may require use of a hacksaw on PVC pipes.
- Polyethylene may be cut with a hacksaw or a special tool designed for cutting polyethylene pipe.
- Once the pipe has been cut, the ends should be deburred to ensure free flow of water through the joint.
- When cutting a length of replacement pipe, the length should be carefully calculated to allow both clearance for coupling fittings and proper engagement of fittings.
- Replacement lengths of pipe should generally be of the same type and material as the original, though it is acceptable to use PVC as a replacement for older iron and steel pipes.



Cutting copper pipe

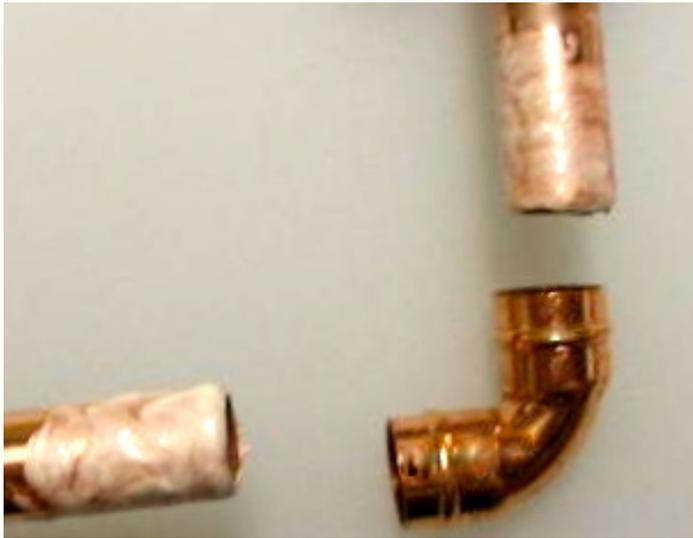


Cutting PVC or Poly Pipe

When replacing copper pipe, you will be soldering or "sweating" the new section into place. While the task of soldering pipe joints may sound

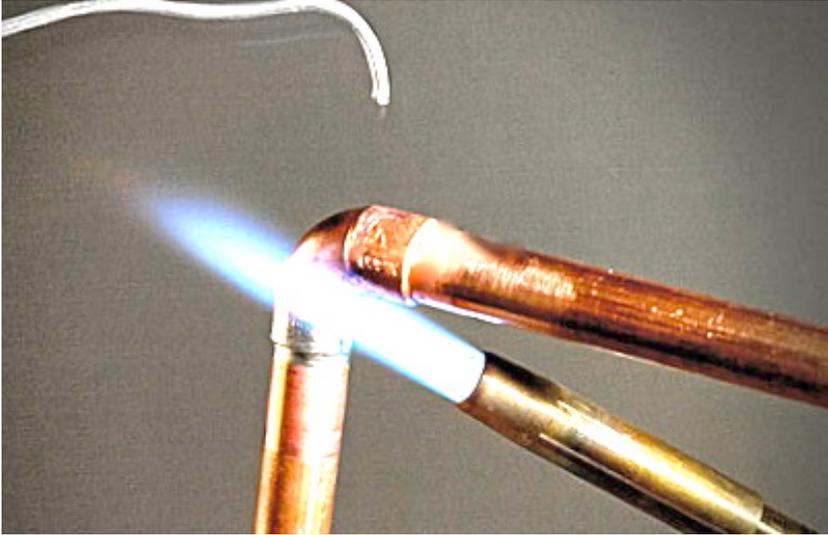
daunting at first, with the proper preparation and some practice you can become proficient.

- The key to soldering is to properly polish and clean the pipe and fittings and to make sure there is no water present.
- Your soldering kit should include emery cloth and special wire brushes designed for polishing the ends of pipe and inside of fittings. Use the emery cloth and wire brushes to completely polish the surfaces that will be soldered, then wipe them clean with a rag.
- Fully seat the pipe in the fitting to ensure that you have polished adequate surface area.
- If the section of plumbing that you are repairing is wet, you can stuff some bread into the ends of the pipe prior to installing the fittings. The bread will absorb the water and will dissolve later.
- When the fittings and pipe are ready, apply soldering flux paste using a fine brush. When heated, the paste will draw solder into the joint. Flux paste applied to copper pipe ensures adhesion of the solder.



- Any flammable materials should be protected from flame before heating the fitting.
- Heat the fitting itself from the bottom if possible, using the approximate midpoint of the flame, and ensure that both sides of the fitting are hot enough to melt the solder before removing the flame.

- Apply solder from the top of the joint and ensure that molten solder is drawn into the full circumference of the joint.



If the fittings leak when the water pressure is restored you will need to heat and pull the joint apart, clean and polish again and start over. Use only approved lead free solder for soldering copper pipes.

For replacing sections of PVC or PEX, there are special slip fit coupler fittings that can be used without the need for glue or PVC solvent weld compound.

- The pressure rating for threaded PVC pipe fittings is not as high as solvent welded fittings, but they are more than adequate for temporary fixes or lower pressure systems.

- For a permanent, high quality PVC seal an appropriate solvent weld should be used.

- Solvent welded fittings for PVC are similar to sweat fittings for copper, but the connections are sealed with a primer and glue.

- Check with your local hardware store to find out what type of solvent weld you will need for your system.



Solvent welding a PVC fitting

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