

COLD WATER SUPPLY SYSTEM

- Most modern western water systems are directly fed from a municipal water system by a high-pressure pipe, usually located under the road or street.
- Many houses still use a cistern or a well where convenient water supply is not available; a pump and pressure tanks are used to maintain system pressure.
- Older houses (or houses that need gravity fed cold water) may also have a cold water tank.
- In such a case, drinking water (usually the kitchen tap) is usually fed directly from the main water supply due to the risk of contamination in the cold water tank.

- Any external water supply is almost always a cold water supply.
- The Cold water supply system may include filter or water softener appliances and fixtures.
- This cold water is then fed to other fixtures, taps, and appliances that require cold water, such as sinks, water heaters, faucets, bathtubs, showers, toilets, etc.

HOT WATER SUPPLY SYSTEM

- Domestic hot water is provided by means of water heaters, appliances intended to provide a hot water supply by heating a volume of water supplied by the Cold water supply system.
- The hot water from these systems is then piped to the various fixtures, taps, and appliances that require hot water, such as sinks, bathtubs, showers, washing machines, etc.
- In modern hotels and apartment blocks and service apartments, centralized storage and distribution systems are adopted, where other energy sources such as oil, gas, solar panels, etc., may be used for the generation of hot water as these options prove more economical and convenient in heating large volumes of water for storage.

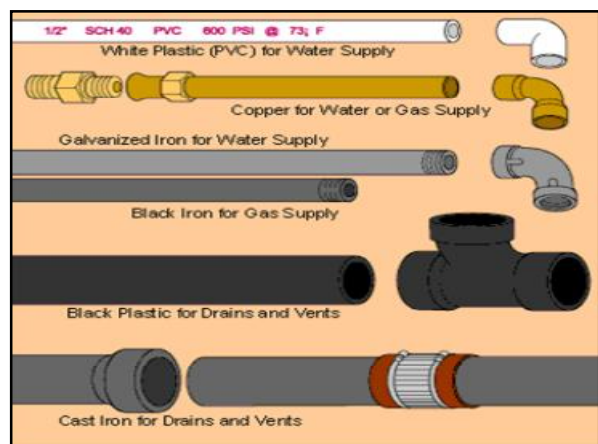
MATERIALS

- In old construction, lead plumbing was common. It was generally eclipsed toward the end of the 1800s by galvanized iron water pipes which were attached with threaded pipe fittings.
- Copper with soldered fittings became popular around 1950, though it had been used as early as 1900. Plastic supply pipes have become increasingly common since about 1970, with a variety of materials and fittings employed.
- Galvanized iron supply pipes are commonly found with interior diameters from 1/2" to 2", though most domestic systems won't require any supply pipes larger than 3/4". (iron is also often used in drain/waste/vent)

- Pipes have NPT ("National Pipe Thread") standard threads, which mate with inside threads on elbows, couplers and other fittings.
- Galvanized iron (often known simply as "galv" or "iron" in the plumbing trade) is relatively expensive, difficult to work with (due to weight and requirement of a pipe threader), and suffers from a tendency to obstruction due to mineral deposits forming on the inside of the pipe.
- It remains common for repair of existing "galv" systems and to satisfy building code non-combustibility requirements typically found in hotels, apartment buildings and other commercial applications. It is also extremely durable.

- Generally, copper tubes are soldered directly into copper or brass fittings, although compression or flare fittings are commonly used by residential plumbers (Note: the annealing quality of the pipe or tube can affect the performance of compression fittings and their ability to "make-up" during installation).
- Formerly, concerns with copper supply tubes included the lead used in the (50%tin-50%lead)solder at joints. Some studies have shown significant "leaching" of the lead into the potable water stream, particularly after long periods of low usage, followed by peak demand periods.
- In hard water applications, shortly after installation, the interior of the pipes will be coated with the deposited minerals, which had been dissolved in the water and therefore the vast majority of exposed lead would be prevented from entering the potable water. Building code requirements often require lead-free solder for copper and brass. Building Codes throughout the U.S. require the use of virtually "lead-free" (<.2% lead) solder or filler metals.

- Plastic pipe is in wide use for domestic water supply, waste or vent pipe, polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), polypropylene (PP)
- PVC/CPVC - rigid plastic pipes similar to PVC drain pipes but with thicker walls to deal with municipal water pressure, introduced around 1970.
- PVC should be used for cold water only, or venting, CPVC should be used for hot and cold. Connections are made with primers and solvent cements, consult pipe and fitting manufacturer for best combination.



Water Pipes and Fittings

- **Plastic pipe** is used in many plumbing applications because it's relatively inexpensive, easy to install and impervious to corrosion. In some locations, plastic pipe is not allowed by codes for supply piping.
- Rigid pipe may be PVC (polyvinyl chloride) for cold water or DWV plumbing, CPVC (chlorinated polyvinyl chloride) for hot and cold water and ABS (acrylonitrile-butadiene-styrene) for DWV piping. Flexible plastic tubing is made from PB (polybutylene) and PE (polyethylene). Plastic pipe is rated for the pressure it can handle; this rating is stamped on the outside of the pipe.

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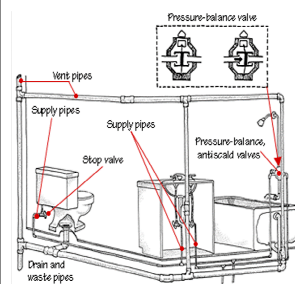
- **Rigid copper pipe** is widely preferred for water supply piping. It's sturdy and durable, resists mineral buildup and can handle both cold and hot water. Hard supply pipe is sold in three thicknesses: M (thin wall), L (medium wall) and K (thick wall). Most above-ground plumbing is Type M.
- **Soft copper supply pipe** is more expensive than hard copper pipe but is flexible enough to be routed without as many fittings. Type L (medium wall) is more commonly used than Type M (thick wall) for above-ground applications. Copper pipe may be **joined** with permanently soldered fittings or flare/compression fittings that can be disassembled.

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- **Galvanized iron pipe** and fittings were standard for water supply plumbing before 1960 and are still common. The galvanized zinc coating on the outside of this pipe resists rust and corrosion but insides of pipes clog up with mineral deposits and corrode over time. Water-tight connections are made with threaded fittings. Larger-diameter galvanized iron pipe is used for vent plumbing in some houses.
- To prevent corrosion from electrolysis that occurs when two dissimilar metals are joined together, a **dielectric union** should be used anywhere copper is connected to an iron pipe.
- **Cast iron pipe** is a strong, durable material used for drain, waste and vent (DWV) plumbing. Two types are common: the older "hub" or "bell-and-spigot" type that is joined together with lead and oakum and newer "no-hub" or "hubless" fittings that are connected with special rubber gaskets and stainless steel band clamps.

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House Plumbing



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- A house actually has several plumbing systems.
- Water supply piping brings water to the house and distributes it to fixtures and appliances, including outdoor sprinklers and irrigation.
- Drain and waste plumbing disposes of used water and waste.
- Vent piping exhausts sewer gasses and provides proper pressure for the drainpipes.
- And some homes even have pipe systems that serve specialty needs—swimming pool plumbing and built-in vacuum piping,

