# *Picking the Right Types of Pipe*

MANY MATERIALS are used for plumbing but let's consider only those that are generally acceptable and available. Local plumbing codes determine piping which may be used. The demands of professional plumbers along with wholesale and retail outlets generally dictate the availability of particular materials in a community.

The choice of pipes to use depends upon several decisions you should make. First, is this a do-it-yourself job or will it be turned over to a professional plumber?

In case it's a job for the plumber, you should be interested in the total cost, local code requirements, expected life, freedom from maintenance and failure, friction loss, and corrosion resistance. Other factors are safe working pressure, resistance to deposits in pipe, effect on water flavor, and ease of installing additional fixtures and lines.

If you are a do-it-yourself fan, consider several additional factors. Among these are ease of installation, availability of plumbing tools, time limitations, and availability of pipes, fittings and supplies. Also, some plumbing codes limit the work that can be done by anyone except licensed plumbers.

Pipes generally available for potable water supply and distribution lines include galvanized iron or steel, copper, and plastics. Each has several types and grades.

Galvanized steel has been extensively used for home and out-of-doors distribution lines and in individual water wells. It resists mechanical damage, thus making it the best pipe for installing under roadways or to faucets subject to abuse.

Galvanized steel pipe should last 30 years or more buried in most soils and much longer if no inside corrosion occurs. It will easily withstand the pressures found in most homeowner water systems.

Main drawbacks to galvanized piping are inside deposits from hard water and corrosion due to acid, alkaline or hard water. Because of this the flow is reduced, often requiring the next larger size pipe as compared to copper or plastic. Also, acid water will cause iron staining on bathroom fixtures.

Present cost of steel pipe and fittings is less than copper but considerably more than plastic. However, the cost of installation, if done by a plumber, may make it comparable to copper.

The initial cost of copper pipe is the highest of commonly used plumbing materials. However, several advantages make it a much sought-after potable water distribution material.

Copper is very resistant to corrosion except when carrying water containing free $CO_2$ (carbon dioxide). Acceptable types will withstand burial in most soils for long periods of time. One caution: don't bury it in cinders or soil with high sulfide conditions. Acid water or water containing free $CO_2$ will remove enough copper to cause blue-green stain on fixtures. Some off flavor of water may also occur.

Copper pipe or tubing is generally available in type L (standard), type K (heavy duty), and type M (thin walled). Types L and K come in soft or hard temper while type M is hard temper only. Type K is primarily used for water service or other lines buried underground. Soft temper copper tubing comes in coils, while hard temper pipes come in 12 and 20 foot lengths.

Hard temper copper pipe is difficult to bend and requires fittings where turns in direction are needed. Soft temper tubing bends easily, eliminating the need for many fittings. Its ease in being pulled through wall openings makes it an excellent material for use by the do-

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it-yourself homeowner. Hard temper copper pipe should be used in exposed locations because it makes a much neater installation.

Solder-type copper fittings provide an easy and secure means of making plumbing connections. Few tools are needed by the homeowner in making repairs or additions to copper plumbing.

A word of caution here. Don't connect copper piping directly to steel, as electrolysis may cause corrosion and eventually leakage at the joint. Nonconducting adapters should be used for these connections. Also, nails will penetrate copper pipes, so be careful when nailing into walls containing them.

Plastics are the newcomer to plumbing. Polyethylene (PE) pipe was introduced to the general market shortly after World War II. Since then a whole array of thermoplastics has been developed for handling water and waste. The main problem with plastics has been their loss of strength as temperatures increase.

Recent developments in some plastics have made them usable in hot as well as cold water lines.

Polyethylene (PE) comes in pressure ratings of 80 to 160 pounds per square inch at 73° F. It is used extensively for lawn sprinkler systems, in water wells, and supply lines to homes and outbuildings. PE is not recommended for use where high temperatures occur. Extended exposure to direct sunlight will cause deterioration of PE.

PE's low cost and ease of installation make it a desirable material for the homeowner to install outside. It withstands some freezing but should be buried below the frost line or drained before freezing occurs when used for lawn sprinkling.

The nationally recognized BOCA (Building Officials and Code Administrators International, Inc.) Plumbing Code has included plastic pipe as an acceptable material for cold water plumbing. In 1972, for the first time, the Code included a plastic hot water pipe, CPVC (Chlorinated Polyvinyl Chloride) as being an acceptable water distribution material.

Check your local plumbing code before planning to use plastics.

Plastic pipe and fittings available for cold water distribution include PE, PVC (Polyvinyl Chloride), ABS (Acrylonitrile-Butadiene-Styrene), PB (Polybutalene) and CPVC cold water pipe. PE, PVC and ABS have been on the market for many years. PB and CPVC are relative newcomers.

PVC and ABS are rigid plastic pipes and have been widely used for underground water service lines. Indoors, they are acceptable only for cold water, drain, waste or vent lines. Both are available in different types and pressure ratings. PVC is manufactured in sizes as small as ½ inch.

Both PVC and ABS are relatively inexpensive plumbing materials, although at this writing the cost is climbing rapidly due to the shortage of oil from which they are a derivative.

Rigid plastic pipes are generally connected to fittings by solvent welding. The solvent dissolves portions of the pipe and fitting, allowing them to fuse together as one homogeneous material. An excellent connection results providing the joints are cleaned and the proper solvent is correctly applied. Once joined, only a few seconds are required for the pipe and fitting to fuse together permanently. Therein lies one of the problems with using these pipes. In case of a mistake in measuring the pipe or positioning of a fitting, the pipe must be cut off, new fittings secured, and a new installation made.

Water hammer, the knocking often heard in pipes, is a serious threat to rigid plastic pipe. A remedy can be approved water hammer arrestors installed at critical points in the line. Commonly used metal pipes can withstand more water hammer but they also fail in severe cases.

CPVC hot water pipe as well as the cold water version is now an acceptable plumbing material. It will withstand normal hot water temperatures but should not be exposed to temperatures in excess of 180° F. CPVC cold water pipe is not designed for hot water use, so don't use it interchangeably.

The present cost of CPVC pipe and fittings is two to four times that of other common plastics but remains only about a third of the cost of copper.

Because of its smooth interior and resistance to corrosion, plastic pipe has less friction than other commonly used materials.

All plastic pipe should be clearly marked with the pressure rating, manufacturer's name or trademark, and nSf (National Sanitation Foundation) insignia.

Drain, waste and vent (DWV) pipe must carry solids and chemically active materials, and provide for the free flow of water. Because DWV pipe doesn't function under pressure, it must be larger than water lines.

There is a large choice of materials for DWV piping not installed in the ground. You may use cast iron, galvanized wrought iron or steel, copper, lead, ABS plastic, or PVC plastic pipe.

Drain pipe underground must be cast iron, hard temper copper, or plastic DWV piping. Lines going to sewers or other waste disposal areas and not in the same trench with water lines may be cast iron, concrete, vitrified clay tile, bituminized fiber, plastic, asbestos cement or copper. In case of burial in the same trench with water lines, only cast iron, hard temper copper or plastic (PVC or ABS) are acceptable.

Cast iron (CI) has been used extensively as DWV pipe and is still the premium material. It is in demand for the soil stack, underground drain and soil pipe to the water closet. Conventionally, a hub type joint, which is sealed with oakum and lead or a neoprene ring, has been used. A new development is the hubless CI pipe which uses a sleeve and clamp to connect pipes and fittings. The cost of CI pipe and its installation is greater than plastic but less than copper.

Galvanized iron or steel is used primarily in fixture branch lines and in sizes 3 inch and smaller.

Plastic pipe can be used for the entire DWV plumbing system and is probably the least expensive of the available materials. It is easy to work with, but be careful about positioning fittings when making the solvent weld connection. Plastic pipe is subject to mechanical damage such as puncture.

Copper DWV pipe is very satisfactory but its cost makes it too expensive for most homeowners.

No matter what types of pipe are selected, make sure the size is adequate. Remember that local plumbing codes specify the minimum size as well as the type that may be installed for particular uses.

A local plumbing contractor, plumbing supply outlet, or code enforcement agency can be of much assistance in selecting pipes, fittings and fixtures.

There are several do-it-yourself books and magazines on the market that provide information on selecting and installing plumbing.

FOR FURTHER READING:

U.S. Department of Agriculture. *Plumbing for the Home and Farmstead,* F 2213, for sale by Superintendent of Documents, Washington, D.C. 20402.

Henderson, G. E. *Planning For an Individual Water System,* American Association for Vocational Instructional Materials, Agricultural Engineering Center, Athens, Ga. 30602, $6.95.