

TABLE 22. APPLICATION OF PIPE, TUBE AND FITTINGS FOR HEATING AND AIR CONDITIONING

APPLICATION	MATERIALS COMMONLY USED
Chilled Water	Type K or L hard copper or black steel, Schedule 40
Cooling Tower	Type K or L hard copper, wrought iron or black steel, Schedule 40
Underground Water 2-in. and smaller 2½-in. and larger	Type K, soft copper or galvanized steel, Schedule 40 (for corrosive soils, a coated steel pipe should be used) Type K, soft copper, cast iron, Class 150 or galvanized steel, Schedule 40 (for corrosive soils, a coated steel pipe should be used)
City Water—Inside Building	Type K or L, hard copper or galvanized steel, Schedule 40
Underground Rain Water Conductors Small Installations Under paved areas Large Installations 8-in. and smaller 10 to 24-in. 30-in. and larger 5 feet outside bldg. and under paving	Vitrified clay or cast iron soil Cast iron soil Cast iron soil XH or vitrified clay Vitrified clay or concrete Concrete Cast iron soil XH
Interior Rain Water Conductors Small Installations Large Installations	Black or galvanized wrought iron or steel, Schedule 40 Cast iron soil XH, black or galvanized wrought iron or steel, Schedule 40
Panel Heating ^a	Type K or L soft copper. Black steel or wrought iron, Schedule 40
Hot Water Heating ^b	Type K, hard copper or black steel, Schedule 40
Refrigerant ^c	Type K or L hard copper or black steel, Schedule 40
Steam Heating Supply 90 psi and less 100 psi and over Return Pipe All sizes	Black steel, Schedule 40, standard fittings Black steel, Schedule 80. XH fittings Black wrought iron or steel, Schedule 40. Standard fittings
Receiver Vent All sizes	Galvanized wrought iron or steel, Schedule 40. Standard fittings
Sanitary ^d Small Installations Waste: 1½-in. and smaller 2-in. and larger Vents: 2½-in. and smaller 3-in. and larger	Galvanized wrought iron or steel, Schedule 40 Cast iron Galvanized wrought iron or steel, Schedule 40 Cast iron

TABLE 22. APPLICATION OF PIPE, TUBE AND FITTINGS FOR HEATING AND AIR CONDITIONING (Concluded)

APPLICATION	MATERIALS COMMONLY USED
Sanitary ^d (Continued) Large Installations Waste: 2-in. and larger Vents: 2-in. and larger Gas (All kinds) All sizes	Cast iron Cast iron Black steel, Schedule 40. Malleable iron fittings

^a Panel heating copper fittings should be soldered with 95-5 solder. Steel fittings should be welded.
^b All underground feed and return lines buried in slab, should be equipped with fittings as outlined for panel heating.
^c Refrigerant fittings on copper pipe must be wrought copper. All welded fittings should be long turn.
^d House sewer to main should be cast iron XH.

There is also the bending moment that may be caused by the flexure of the pipe. For this chapter however, the flexure loading will not be treated for the reason of complexity, as previously stated for the problem of expansion.

Since hangers should always be designed to take the bending moment (including buckling) from the pipe, it is necessary to design the hangers or supports for the maximum bending stress. Even with perfect support spacing there will be some sagging; therefore, the supports should be on a gradient if it is necessary to prevent pockets. Such a condition arises for condensate piping.

Typical bending and deflection equations are given in Table 21 in order that supports can be properly sized, and if necessary, pitched. These equations are typical beam equations. If more complex loadings exist, proper beam equations can be applied. Such equations are found in standard texts on mechanics of materials.

By application of the equations given in this section and the section of expansion and flexibility, it is possible to determine the proper location and type of support for straight lines. The types are anchors and hangers.

Anchors are used to guide the expansion (sliding anchors) or to fix the pipe. They are needed to take the stress out of the line and translate the stresses to the foundations. In that way all stress can be taken out of the line before it can be transferred to such equipment as boilers or pumps. By means of solid anchors, the anchors can be used to divide the piping into isolated sections that cannot transmit the stresses to other sections.

Hangers are used to support the piping and to take out the bending stresses. They are of the spring, roller, or rod type. Such types generally allow the free movement of the pipe and yet maintain full support.

The *Code for Pressure Piping*, ASA B31.1, has strict requirements for the materials used in hangers and supports. The structural properties have a safety factor of five, and consequently there is little chance of failure due to a sudden change of load.

There is a type of support for almost every conceivable requirement. Complete information can best be obtained from a hanger manufacturer.

APPLICATION OF PIPE, TUBE AND FITTINGS

In the application of pipe, tube and fittings it is necessary to comply with regulations contained in local codes and ordinances. Table 22 is