8 ● Why should all boiler steam supply tappings be used full size?

In order to operate at low steam velocities so the water in suspension can separate from the steam and remain in the boiler.

9 ● What is the Underwriters Loop or the Hartford Connection?

An arrangement of piping on the returns to low pressure boilers wherein the return line is raised up nearly to the water line of the boiler and is then dropped back and connected to the boiler return inlet; the high point is connected by a balanced pipe to the steam runout from the boiler on the boiler side of all stop valves. With this loop no check valve is required on gravity systems, and water cannot be backed out of the boiler and into the return at a point lower than the invert of the pipe at the top of the loop.

10 ● What are the important factors in making radiator connections?

Connections to radiators should be made as direct as possible, of proper size, with ample pitch of piping and allowance for expansion.

11 ● Why should careful attention be given to proper dripping and drainage of steam piping?

The steam mains and risers must be quickly drained of condensate and where necessary vented of air in order to obtain a sufficient supply of steam to the radiators. Proper drainage is also necessary to insure a noiseless heating system.

12 ● What is the limit of pressure drop usually recommended in a vacuum system?

Not over ⅛ lb (2 oz) per 100 ft of equivalent run, and not over 1 lb total drop.

13 ● When steam and condensation are flowing in the same direction, what is the maximum total pressure drop which should be used?

The maximum total pressure drop should not exceed one half of the initial steam pressure.

14 ● What does a proper installation of a pressure reducing valve include?

A strainer in front of the pressure reducing valve; a gate valve in front of the strainer; a gate valve after the reducing valve; a by-pass around the two gate valves, strainer, and pressure reducing valve; and a globe valve in the by-pass. Sometimes a safety valve on the low pressure side and pressure gages on both sides are installed. The high pressure line should be dripped just before the high pressure steam enters the pressure reducing valve assembly.

15 ● Will a pressure reducing valve which is reducing the steam pressure from 100 lb gage to 50 lb gage pass more or less steam than the same valve when reducing the steam pressure from 100 lb gage to 5 lb gage?

The valve will pass practically the same volume of steam in each case as the velocity of steam flowing through an orifice shows no material increase after the reduced absolute pressure has fallen to 58 per cent of the initial absolute pressure. Because of its greater density, the weight of steam passed will be greater in the case of the reduction to 50 lb gage.

Chapter 17

HOT WATER HEATING SYSTEMS AND PIPING

One- and Two-Pipe Systems, Mechanical Circulation, Circulators, Iron Pipe and Copper Tube Sizes, Gravity Circulation, Expansion Tanks, Relief Valves, Installation Details

THE various forms of hot water heating may be fundamentally classified according to motive force, namely, forced circulation or gravity flow. Forced circulation is accomplished by the use of centrifugal or propeller type pumps which are especially designed for this particular type of application. Gravity flow is maintained by the difference in weight of the water in the flow and return mains.

These systems may be further classified as to high or low operating water temperatures. Higher water temperatures permit a reduction in radiator size. A large temperature differential between the flow and return results in smaller pipe sizes as also does the use of forced circulation. Light wall copper tubing has recently been introduced to supplement the customary black iron piping which has been used for these systems in the past.

Low temperature water(150 to 180 F) is generally that which provides a heat emission per square foot of radiation of from 150 to 165 Btu while a high temperature water (200 to 220 F) will deliver from 200 to 240 Btu.

The use of high temperature water in a heating system is desirable as the maximum outside temperature for which the system is designed will occur for a relatively short time during the average season. The increased use of automatic heating equipment with more accurate controls, makes it possible to use higher temperatures and smaller heating units without sacrificing good design.

The unit, a square foot of equivalent direct radiation, EDR, has been used for many years for rating purposes in both steam and hot water systems, but its use, especially in hot water systems, has always resulted in complications and confusion. It is the plan of THE GUIDE *to eventually eliminate this empirical expression and to substitute a logical unit based on the Btu. The* Mb, *the equivalent of 1000 Btu and the* Mbh, *the equivalent of 1000 Btu per hour, which have been approved by the* A.S.H.V.E. *are used in this chapter on hot water systems to replace the square foot of radiation formerly used.*