

FEATURES OF HOT WATER SYSTEMS

Advantageous features of forced low temperature hot water systems are:

1. The piping need not be run at a definite level or pitch but may change up and down as required by architectural and structural elements of the building. High points should be vented and low points be provided with drain connections.
2. Heat distribution when warming up is uniform.
3. Hot water systems are readily adaptable to simple approximate control of ca-

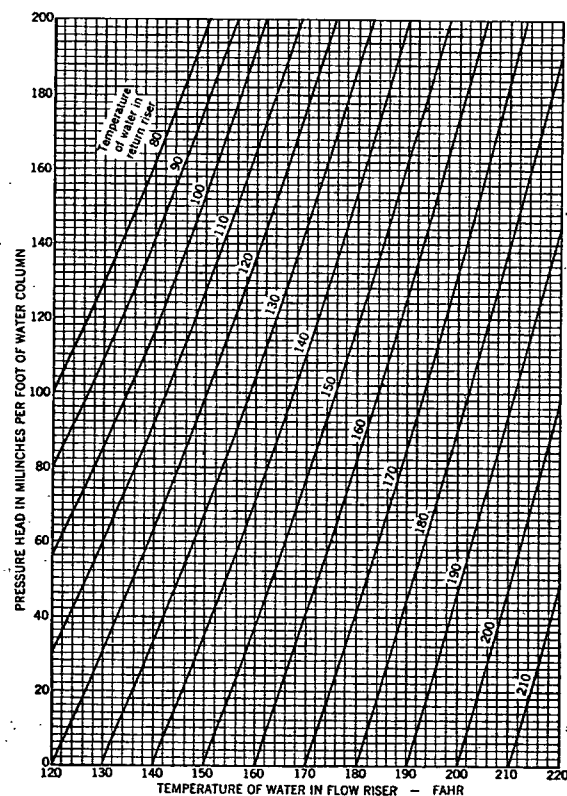


FIG. 1. HEADS RESULTING FROM TEMPERATURE DIFFERENCE (GRAVITY SYSTEMS)

capacity and indoor temperature by instruments sensitive to outdoor temperature changes.

4. The system may generally be designed with a minimum of mechanical specialties thereby favoring economical maintenance.
5. Due to practical elimination of air, corrosion within the system is minimized.
6. Where extended glass exposures occur, the heating elements, which are relatively large because they operate at low temperature, may be well distributed under such exposures, to counteract downdrafts.
7. Quiet operation may be expected in a properly designed and installed system.

In the design and operation of forced circulation systems, it is necessary to take precautions against any condition that would permit the water

temperature to fall below freezing, particularly where coils are used to heat incoming outdoor air or where the heating plant may be shut down for more than 24 hours in cold weather.

If the static pressure in the system is high, it may be necessary to use boilers built for operating pressures above 30 psig unless a steam boiler with heat exchanger is used to heat the water. See discussion in this chapter in section Expansion Tanks and System Pressure Control.

DESIGN OF LOW TEMPERATURE HEATING SYSTEM

The significant factors affecting the design of low temperature hot water heating systems are discussed in the sections that follow.

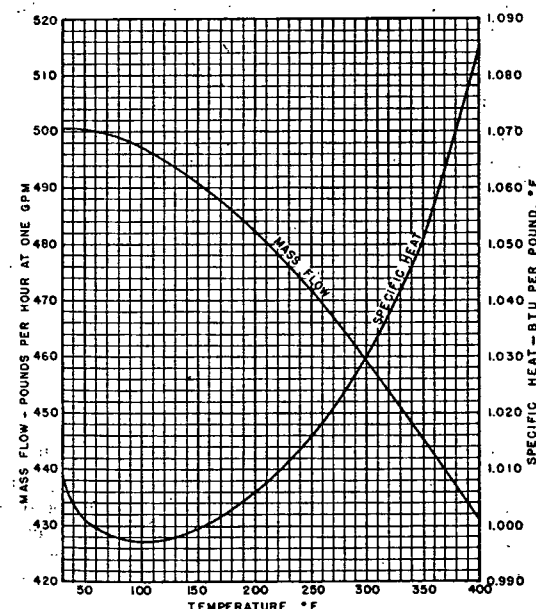


FIG. 2. MASS FLOW AND SPECIFIC HEAT OF WATER

(Specific heat is for pressure at saturated liquid temperature)
(Basic data for calculation and construction of curves from Keenan and Keyes)

Heat Loss Calculations

The adequacy as well as the proper distribution of the heat in a building served by a hot water system depends primarily on the proper calculation of the heat loss for the individual spaces and the accurate sizing of the heating units to offset those heat losses. Heat loss should be determined in accordance with the principles discussed in Chapter 12, Heating Load.

Selection and Location of Heating Units

Information on the types of room heating units available for hot water systems will be found in: Chapter 22, Radiators and Convectors; Chapter 23, Panel Heating; and Chapter 24, Unit Heaters and Unit Ventilators. While the style or type of unit selected for a given space may depend on