

teristic can be taken when considering the number and output of the boilers. The output of the central boiler plant can be greatly reduced and the initial cost of the system lowered accordingly if the thermal storage of the system is taken into account.

Storage

High temperature water systems offer the opportunity of storing heat to even out the peak loads and low loads within the 24-hour cycles. Storage is usually accomplished by means of by-passing water from the flow to the return mains and thereby storing heat in the return main for future use, or by accumulators. Systems which experience normal peaks can obtain as much as 15 percent added capacity through this heat storage. Where peaks are more severe, this storage or thermal flywheel will allow even greater savings.

Distribution

The conventional conduit or tunnel distribution systems are employed with similar techniques used for installation except that grading of the piping is not important. The mains may be run at different elevations at will, although the high points should be vented by the use of air collectors and the low points should be drained.

REFERENCES

¹ Friction Heads in One-Inch Standard Cast-Iron Tees, by F. E. Giesecke and W. H. Badgett (A.S.H.V.E. TRANSACTIONS, Vol. 37, 1931, p. 395).

² Supplementary Friction Heads in One-Inch Cast-Iron Tees, by F. E. Giesecke and W. H. Badgett (A.S.H.V.E. TRANSACTIONS, Vol. 38, 1932, p. 111).

³ *Heating and Air Conditioning of Buildings*, by Oscar Faber and J. R. Kell (Architectural Press, London).

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Hot Water Heating, Radiant Heating and Radiant Cooling, by F. E. Giesecke (Technical Book Co., P. O. Box 62, Austin, Tex. 1947).

CHAPTER 23

RADIATORS, CONVECTORS, BASEBOARD AND FINNED-TUBE UNITS

Definitions, Heat Emission, Radiators, Convectors, Baseboard Radiation, Finned-Tube Radiation, Ratings, Heating Effect, Effect of Operating Conditions, Effect of Paint, Enclosed Radiators, Heating the Radiator and Convector

RADIATORS, convectors, baseboard, and finned-tube are the common types of heat-distributing units used in steam and hot water heating systems. They are used to supply heat to a room by radiation and convection. The function of these devices is to maintain occupancy comfort through the control of the mean radiant and air temperatures in the area. Since heat losses through the various parts of the structure constantly tend to lower these temperatures below the comfort point, the room-heating unit should be so placed and regulated that its output will replace the losses when and where they occur. If 80 percent of the room heat loss occurs through a cold wall or window area, then 80 percent of the input should be introduced in or directed toward that area.

The term *radiator* is generally confined to sectional cast-iron radiation. They emit a large part of their heat by radiation. Cast-iron radiator types may be column, large-tube, small-tube or wall.

The term *convector* refers to a heat-distributing unit which operates with gravity recirculated room air, is surrounded on all sides by an enclosure having an air-inlet opening at its bottom end and an air-outlet opening at its top, and is installed inside the heated room or is recessed in the wall.

The terms *baseboard* and *baseboard radiation* refer to steam- or water-type heat-distributing units designed for installation along the bottom of the walls of rooms, replacing the conventional baseboard. They operate with gravity-recirculated room air, and have a substantial portion of their frontal face surface directly exposed to the room.

The term *finned-tube* refers to steam-, or water-type heat-distributing units composed of a finned-tube element fabricated from metallic tubing which has a plurality of metallic fins bonded to the tube. These heaters are designed for installation without enclosure, or with open-type grilles, covers, or enclosures having top, front, or inclined outlets.

HEAT EMISSION

Steam-, and water-type heat-distributing units emit heat by radiation and convection. These heat-transfer processes and the factors that affect them are discussed in detail in Chapter 5. In general, those units having a large portion of their heated surface exposed directly to the room emit a larger proportion of heat by radiation than do units which have the heating surface completely or partly concealed from view.

The output of a heat-distributing unit can be measured only by the heat