

Panel Warming, by L. J. Fowler (A.S.H.V.E. TRANSACTIONS, Vol. 36, 1930, p. 287).

Panel Heating in the British Embassy, by Alfred L. Jaros, Jr. and Richard A. Wolff (*Heating and Ventilating*, May and June, 1930).

Radiant Heat, by A. F. Dufton (*Proceedings of The Institution of Heating and Ventilating Engineers*, London, Vol. 30, 1931).

Panel Heating, by C. M. Oates (*Proceedings of The Institution of Heating and Ventilating Engineers*, London, Vol. 30, 1931).

Principles of Calculation of Low Temperature Radiant Heating, by A. H. Barker (*Proceedings of The Institution of Heating and Ventilating Engineers*, London, Vol. 30, 1931).

Notes on the Theory of Radiant Heating, by C. G. Heys Hallett (*Proceedings of The Institution of Heating and Ventilating Engineers*, London, Vol. 29, 1930).

Notes on Electric Warming with Special Reference to Low Temperature Panel Systems, by R. Grierson (*Proceedings of The Institution of Heating and Ventilating Engineers*, London, Vol. 28, 1929).

CHAPTER 46

Hot Water Supply

Hot Water Supply Piping, Storage Capacity and Heating Loads, Methods of Heating Water, Computing Grate and Coil Surface Area, Controls, Solar Water Heaters

IN computing the total heating load for a building, it is important to allow ample boiler capacity for heating the hot water supply. The amount of warm water used in any large building is variable, depending on the type of structure, usage, occupancy and time of day. It is necessary to provide the piping, water heating and storage facilities of sufficient capacity to meet the peak demand without wasteful excess in equipment cost.

The determination of the amount of water used in residences has been well established over a period of time and as a result, reliable factors for water consumption are available. Tests have been made of the amount of water required by standard fixtures in normal use with water at ordinary pressures so that this information permits a fairly correct basis of design.

HOT WATER SUPPLY PIPING

As a result of investigations conducted at the *National Bureau of Standards*, basic design principles have been outlined for the design of the hot and cold water supply piping requirements in a plumbing system¹.

It is common practice to provide circulating piping in all hot water supply systems in which it is desirable to have hot water available continuously at the fixtures. In average sized and small residences and systems, in which the piping from the heater to the fixtures is short, return circulating piping is generally omitted in order to reduce installation cost and to reduce heat loss from the piping, particularly during periods of no water demand.

¹Methods of Estimating Loads in Plumbing Systems, by R. B. Hunter (*National Bureau of Standards, Report BMS65, 1940*). Plumbing Manual, Report of the Subcommittee on Plumbing, Central Housing Committee on Research, Design and Construction (*National Bureau of Standards, Report BMS66, 1940*). Water-Distributing Systems for Buildings, by R. B. Hunter (*National Bureau of Standards, Report BMS79, 1941*).