

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).

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).

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).

Radiant Heat, by A. F. Dufton (*Proceedings of The Institution of Heating and Ventilating Engineers*, London, Vol. 31, 1932).

Chapter 46

WATER SUPPLY PIPING AND WATER HEATING

Maximum Flow, Factor of Usage, Water Pressure, Pipe Material, Allowance for Fittings, Sizing Up-Feed Systems, Sizing Down-Feed Systems, Hot Water Supply, Storage Capacity and Heating Loads, Methods of Heating Water, Computing Grate and Coil Surface Area, Controls, Solar Water Heaters

THIS chapter deals only with problems of providing adequate facilities for delivering cold and heated water for domestic purposes in buildings.

The amount of cold or warm water used in any building is a variable depending on type of building, usage, occupancy and time of day. The problem is to provide the piping and the water heating and storage facilities of sufficient capacity to meet the peak demand without wasteful excess in equipment of cost¹. For example, in two office buildings of similar type the metered water consumption has shown as much as 300 per cent difference per outlet. The rate of use in such buildings also fluctuates tremendously with the hour of day.

Residences present a comparatively easy problem since long established custom has evolved reliable factors for water consumption per installed fixture. Tests have been made repeatedly of the amount of water required by standard fixtures in normal use with water at ordinary pressures so that this information gives a fairly correct basis of design.

For the purpose of this chapter the following terms will be used and should be clearly distinguished from one another:

Maximum Flow: The flow which would occur if the outlets on all fixtures were opened simultaneously. This condition is seldom obtained in actual practice except in cases of gang showers controlled from one common valve.

Probable Flow: The maximum flow which any pipe is likely to carry under the peak conditions. This is the most important amount to be considered in pipe sizing.

Average Flow: The flow likely to be required through the line under normal conditions.

¹See also Methods 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 BMS70, 1941). Water Consumption, Cost and Savings, by G. C. St. Laurent (*American Hotel Association, Hotel Engineering*, Vol. 1, 1940). Laundry, Kitchen and Hospital Equipment, by H. C. Russell (*A.S.H.V.E. TRANSACTIONS*, Vol. 35, 1929, p. 45).