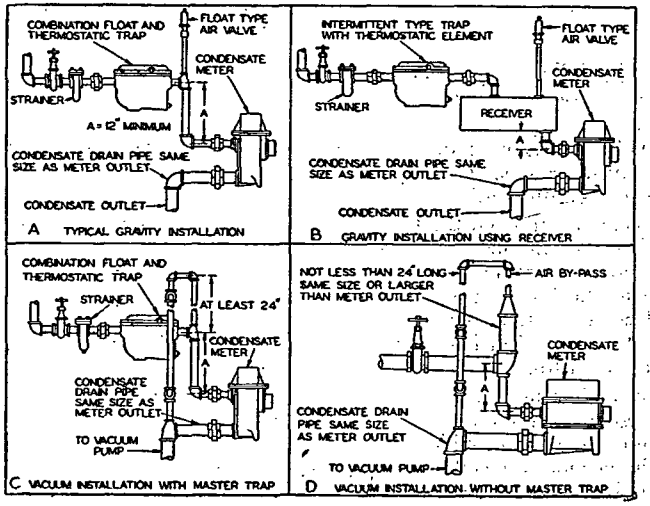
equipped with a thermostatic air vent and the condensate should be permitted to flow by gravity through the economizer and meter.

METERING

The *Condensate Meter* was developed for the district heating industry and is an approved method of measuring condensate where all of it can be brought to a common point for metering purposes. Its simplicity of design, ease in testing, accuracy at all loads, low cost, and adaptability to



Meter Capacity Lb Per Hr	250	500	750	1500	3000	6500	12000
	Dimension A—Inches						
Diagram B	4	4	8	8	8	12	12
Diagram C	12	12	15	15	15	18	18
Diagram D	12	12	15	15	15	18	18

Fig. 6. Condensate Meter Installation Details

either high- or low-pressure distribution have made it standard equipment with most heating companies.

Condensate meters must not be operated under pressure; they are made for either gravity or vacuum installations. Typical meter installations are shown in Fig. 6. In diagram A a continuous-flow type trap is shown installed ahead of the meter, while in diagram B an intermittent type trap is used. In the latter case, a receiving tank must be placed between the trap and meter to prevent intermittent overloading of the meter. When measuring the discharge from a vacuum pump, a vented receiver should always be installed ahead of the meter.

Installations of meters in a vacuum return line are shown in diagrams C and D. In diagram C a master, continuous-flow trap is installed immediately ahead of the meter to prevent steam from entering it in case of

leaking radiator or fixture traps. Where individual traps are reliable, connections may be made as shown in diagram D.

Flow meters are generally used for measuring sendout from plants, high-pressure requirements in buildings, and in installations where all of the condensate cannot be returned to a central point. Further information on flow meters is available from publications of the Fluid Meter committee of the *American Society of Mechanical Engineers* the *District Heating Handbook*,[23] and are described in Chapter 4.

HOT WATER DISTRIBUTION

District heating in the United States is confined almost entirely to the use of steam as the heating medium. Hot water has been used and is being used today, where economic conditions are favorable and good engineering practice dictates.

The use of low-pressure hot water distribution below 200 F has been practically discontinued for district heating in the United States because of practical and economic difficulties. The use of high-pressure, high-temperature water distribution at 275 to 400 F has found favor in Europe, where fuel is scarce and is finding some application in the United States.[24]

High-pressure water distribution has some practical and economic advantages over steam (see Section on High Temperature Water System in Chapter 21). Higher thermal efficiencies, better daily and annual system load factors, lower water treatment costs, smaller pipe sizes, fewer piping accessories, and feasibility of installing pipe to follow contour of ground are given as a few. On the other hand hot water requires a two-pipe distribution system increasing the capital investment in some cases and system maintenance is complicated by the necessity to drain at least a portion of the system when connections are made or leaks repaired.

The advantages of hot water have overcome the disadvantages in some industrial applications and in air force bases in this country. As the cost of fuel increases, additional applications will probably become practicable, especially in new installations serving buildings designed for hot water heating.[1]

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