FLUID METERS

The perfection of fluid meters has contributed as much to the advancement of district heating as any other one thing. Meters are classified into two groups: *Quantity Meters* and *Rate of Flow Meters*.

Quantity Meters

The one type of quantity meter used is the condensation meter, which may be of the *tilting bucket* or *revolving drum* type.

The condensation meter is a popular type for use on small and medium sized installations, where all the condensate can be brought to a common

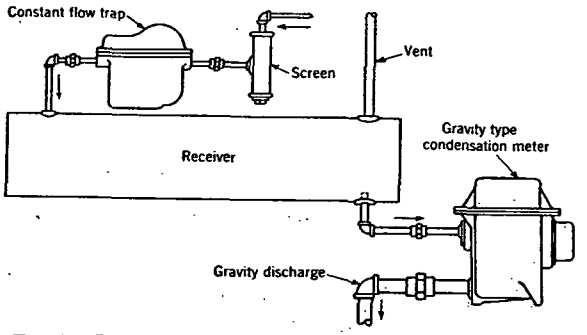


FIG. 6. GRAVITY INSTALLATION FOR CONDENSATION METER USING VENTED RECEIVERS

point for metering purposes. Its simplicity of design, ease in testing, accuracy at all loads, low cost, and adaptability to low pressure distribution has made it standard equipment with many heating companies.

Condensation meters should not be operated under pressure; they are made for either gravity or vacuum installations. Where bucket traps are used, a vented receiver is essential ahead of the meter. Where continuous flow traps are used, a vented receiver is not necessary, but is desirable.

Fig. 6 illustrates a gravity condensation meter installation using a vented receiver.

Rate of Flow or Flow Meters

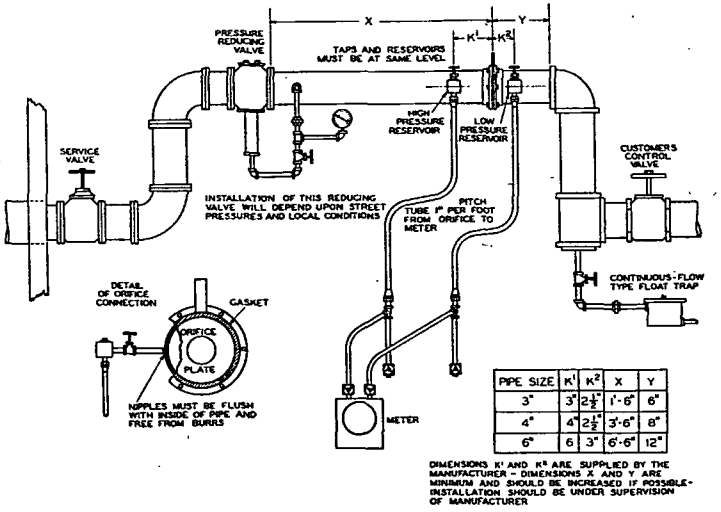
Flow meters used for district heating work are of three types: *Area Meters*, *Head Meters* and *Velocity Meters*.

Area meters are those, in the operation of which, a variation in the cross-section of stream under constant head is used as an indication of the rate of flow. A tapered plug is suspended in an orifice and moves axially with the flow, which is vertically upward. The weight of the plug provides a definite pressure differential and the plug floats at such a height as will provide enough orifice area to pass the flow at the pressure

difference. The position of the plug is transmitted by means of a lever and pencil and records the flow on a graduated strip chart.

Head meters are those in which the stream of fluid creates a difference of pressure, or differential head. This head is created by an orifice, Venturi tube, flow nozzle, or Pitot tube and will depend upon the velocity and density of the fluid.

The secondary element must contain a differential pressure gage, which



PIPE SIZE	K¹	K²	X	Y
3"	3"	2½"	1'-6"	6"
4"	4"	2½"	3'-6"	8"
6"	6	3"	6'-6"	12"

FIG. 7. ORIFICE METER STEAM SUPPLY CONNECTION

will translate the pressure difference into rate of flow or total flow. This mechanism may be either mechanical or electrical. The electric flow meter has the advantage of being able to locate the instruments as some distance from the primary element.

Fig. 7 is a typical example of an orifice-type meter installation. A few general points to be considered in installing a meter of this type are: (1) It is desirable to place the differential medium in a horizontal pipe in preference to a vertical one, where either location is available. (2) Reservoirs should always be on the same level and installed in accordance with the instructions of the meter company. (3) The meter body should be placed at a lower level than that of the pressure differential medium. Special instructions are furnished where the meter body is above. (4) Meter piping should be kept free from leaks. (5) Sludge should not be permitted to collect in the meter body. (6) The meter body and meter piping should be kept above freezing temperatures. (7) It is best not to connect a meter body to more than one service. (8) Special instructions are furnished for metering a turbulent or pulsating flow.

Velocity meters are those in which the primary element is some device that is kept in continual rotation by the linear motion of the stream.