pressure; they are made for either gravity or vacuum installation. Continuous flow traps are necessary ahead of the meter if a vented receiver is not used. Where bucket traps are used, a vented receiver before the meter is essential. If desirable a receiver may be used with a continuous flow trap, but this is not necessary.

Steam flow meters are available in many types and combinations, as indicated in the sub-division covering fluid meters on page 774.

The *orifice and plug* meter is one in which the steam flow varies directly as the area of the orifice. The vertical lift of the plug, which is proportional to the flow, is transmitted by means of a lever to an indicator and to a

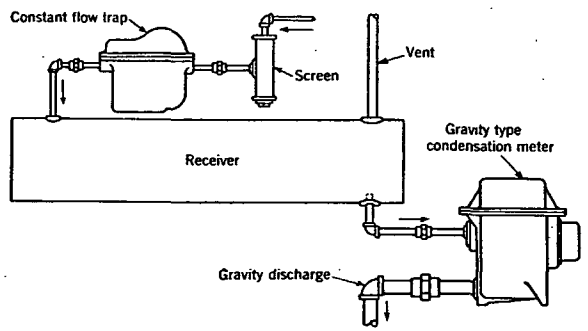


FIG. 8. GRAVITY INSTALLATION FOR CONDENSATION METER USING VENTED RECEIVERS

pencil arm which records the flow on a strip chart. The total flow over a given period is obtained by measuring the area by using a planimeter on the chart and applying the meter constant.

Fig. 7 shows a typical orifice type meter connection and indicates typical requirements in the installation of this type of meter. Fig. 8 illustrates a gravity installation using a vented receiver ahead of the meter, while Fig. 9 shows a vacuum installation without a master trap.

Flow meters using an orifice, Venturi tube, flow nozzle, or Pitot tube as the primary device are made by a number of manufacturers and can be obtained in either the mechanically or electrically operated type. The electric flow meter makes it possible to locate the instruments at some distance from the primary element.

Flow meters employing the orifice, Venturi tube, flow nozzle or Pitot tube should be so selected as to keep the lower operating range of the load above 20 per cent of the capacity of the meter. This is desirable for accuracy as the differential pressure at light loads is too small to properly actuate the meter. 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.

STEAM CONSUMPTION

The following factors are used in New York City for the different classes of buildings listed. The factors are based on maintaining an inside tem-

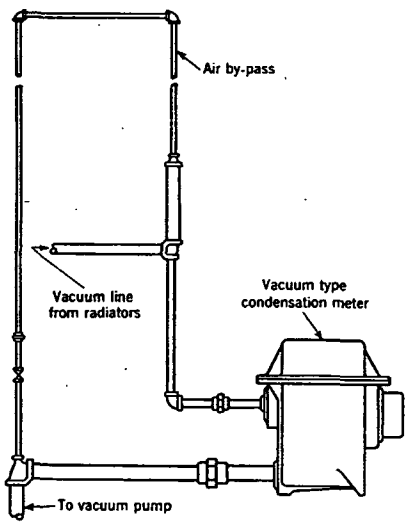


FIG. 9. VACUUM CONDENSATION METER INSTALLATION WITHOUT MASTER TRAP

perature of 70 F for certain hours, with a minimum outside temperature of 0 F and an average of 43 F for the heating season of eight months (October 1 to June 1). In this group are six types of buildings:

Manufacturing or commercial loft type where steam is used to heat the premises during the day hours to maintain 65 to 68 F from 9 a.m. to 5 p.m. No Sunday or holiday use and no night use. *Factor:* 325 lb per square foot of heating surface per season.

Office buildings using steam during daylight hours to maintain 70 F from 9 a.m. to 6 p.m. for approximately 240 days (heating season). No night use. *Factor:* 400 lb per square foot of heating surface per season.

Office buildings using steam during day hours and at night when required to 7, 8 and 9 p.m. (customary where there are stock brokers or banking offices), 240 days. *Factor:* 500 lb per square foot of heating surface per season.

Residences of the block type (not detached) where high-class heating service is required; somewhat similar to apartment buildings. *Factor:* 550 lb per square foot of heating surface per season.