

volume of air to be introduced with the upward system is about 25 cfm of air per person at a low velocity, say at 150 fpm (linear), and at a temperature not more than 6 deg below the room temperature. For partial occupancy, higher entering air temperatures can be used with correspondingly less danger from drafts.

VANES

In order to cause the supply air to a room to take a fixed or desired direction when leaving the inlet opening of a flue, stationary vanes may be provided at both the back of the grille and at the grille to direct the air flow. Fig. 11 shows a section through a room inlet opening at the top of a rising flue and indicates the air conditions when no vanes are used. Fig. 12 shows a section through the same room inlet opening when vanes are advantageously placed to direct the flow of air.

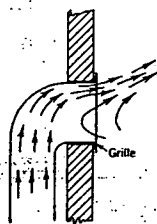


FIG. 11. AIR CONDITIONS AT INLET OPENING AT THE TOP OF A RISING FLUE WHEN NO VANES ARE USED

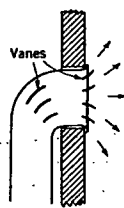


FIG. 12. AIR CONDITIONS AT INLET OPENING AT THE TOP OF A RISING FLUE WHEN DIRECTIONAL VANES ARE USED

In many theater and commercial installations the ejector-like action of high-velocity air emerging from a duct is taken advantage of, and scientifically proportioned nozzles are installed to cause definite recirculation of the room air.

PROBLEMS IN PRACTICE

1 • Is the conventional warm air system, employing floor or baseboard supply registers, suitable for heating and cooling?

Floor or baseboard supply registers are suitable for heating service because the natural tendency of warm air is to rise. They are not suitable for cooling because the natural tendency of cool air is to stay near the floor and gradually work its way to the return registers, thus not cooling the air in the upper part of the room. See Figs. 1 and 2.

2 • What type of air distribution system is suitable for heating and cooling a home?

In order to provide satisfactory cooling without drafts it is necessary to discharge the air at relatively high velocity toward the ceiling from a high point, as shown in Fig. 3. If the register is properly designed and the air capacity is limited to approximately 400 cfm, the cool air will mix with the air in the room before it drops to the occupied zone. However, care must be taken that discharged air does not impinge on beams which would cause the cool air to be deflected downward. This arrangement is also satisfactory for heating.

3 • Why is the conventional low velocity side wall inlet unsatisfactory for cooling purposes?

With the conventional side wall inlet using velocities of 300 to 400 fpm the discharged air quickly loses its velocity and drops, causing drafts in the occupied zone.

4 • What method of side wall introduction is satisfactory for cooling purposes with a 12-ft ceiling height?

The method shown in Fig. 3 can satisfactorily circulate air as much as 10 to 15 F below room temperature, provided (1) each jet is limited to 400 cfm, (2) the outlet velocity is high, (3) the air is directed toward the ceiling, and (4) there are no beams on the ceiling. In order to employ this method in a classroom it is usually necessary to have at least three inlets, but even with three inlets the cooling capacity is limited to that obtained by circulating air at 10 to 15 F below room temperature.

5 • Should unit ventilators be considered as heating units or as cooling units?

Experience has shown that approximately 75 per cent of the time a classroom is occupied the problem is one of cooling rather than one of heating. For this reason unit ventilators should be considered as cooling units.

6 • What method of air distribution is usually employed with unit ventilators?

Most unit ventilators employ a unique method of air distribution in which the air is discharged at a high velocity toward the ceiling. The air stream is usually inclined toward the room.

7 • How should a unit ventilator be located in a room that has ceiling beams?

When there are ceiling beams the unit ventilator should be so located that the beams will be parallel with the direction of the air discharge in order that the beams will not deflect the air downward.

8 • What is the minimum temperature at which unit ventilators can distribute air in a classroom without causing drafts?

Generally speaking, the lowest minimum discharge temperature at which objectionable drafts will not be created is 60 F. Some designers suggest that the discharge temperature can drop as low as 35 F below the room temperature without causing drafts when units are properly installed.

9 • What is the usual method of ventilating school auditoriums and gymnasiums when unit ventilators are used in the classrooms?

If unit ventilators are used in classrooms the usual method of ventilating the auditorium or gymnasium is to use one or more large units located above and on either side of the stage.

10 • What is the maximum amount of air which should be discharged from one point in a school auditorium or gymnasium?

The maximum amount of air which should be discharged from one point is 5000 cfm. This limitation applies whether the air is supplied by units or by a central fan from a distant point.

11 • Are vents required in school classrooms, auditoriums, and gymnasiums?

With both the unit and the central fan systems, vents are usually installed as a certain and positive means of disposing of the vitiated and odoriferous air and also, with the central fan system, for the further purpose of effecting a means of partial recirculation. Natural outward air leakage may take the place of vents, if and when it proves sufficient, but it is usually uncertain, insufficient, and uneconomical. Vents are required by law in some communities. If they are installed, they should be provided with dampers in order that they may be throttled when required and closed at night and during holidays.

12 • What type of system is generally used in large continuously operated theaters?