

temperature of 83 F would be cold. In general, other conditions being equal, for the range of temperatures normally encountered in living quarters on cooling installations, the permissible deviation from average room temperature varies from approximately 1 F at the low end of the range to about 3 F at the high end of the range. In this matter, it is important to consider the particular problem in the light of the type of occupancy. For instance, greater deviations from room temperature and higher velocities may be permitted in a garage or a hotel hallway than would be permissible in an office or living room. The velocity which may be considered the permissible maximum differs with the temperature deviation for a given installation, but an absolute maximum under any conditions might be considered that which would produce a mechanical

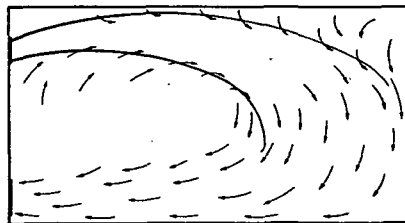


FIG. 5. ELEVATION VIEW CORRECTLY LOCATED RETURN OUTLET



FIG. 6. ELEVATION VIEW OF IMPROPERLY LOCATED RETURN OUTLET

disturbance, such as the movement of a person's hair or disturbance of papers on a desk. Humidity is an important consideration in the determination of one's feeling of comfort; however, if the room generally is assumed to be at a satisfactory value of relative humidity, the designer is justified in neglecting this factor when considering permissible fluctuations in temperature and velocity in the occupancy zone. This is true because the maximum allowable temperature fluctuation results in an unnoticeable humidity change.

The standards that might be set up for maximum allowable room temperature deviation and air velocity would not be the same for both heating and cooling installations. In the former case, any appreciable temperature deviation is likely to be above rather than below the average room temperature, whereas the reverse is most likely to be true on a cooling installation. Further, because air movement has a cooling effect in itself, the feeling of warmth due to temperatures above room tem-

perature is counteracted to a certain extent so that an individual may be subjected to higher velocities of warm air without the feeling of discomfort occasioned by the same velocities of cool air. In every case, it should be the purpose of the designing engineer to keep the conditions within the zone of occupancy as nearly uniform as possible, securing minimum temperature deviations and low velocities. The air velocity at all points in the room should be at least 25 fpm for good results.

It is impractical to measure momentary temperature differences with any degree of accuracy in the field, but in checking a given installation it will generally be found satisfactory to measure velocity only, since on cooling installations high velocities normally occur with low temperatures, and on heating installations high velocities occur with high temperatures. That is, in the former case, the chilled supply air loses its velocity and undergoes an increase in temperature as it settles into the occupancy zone, whereas in the latter case the heated supply air loses its velocity and undergoes a decrease in temperature during this process. Therefore, if the

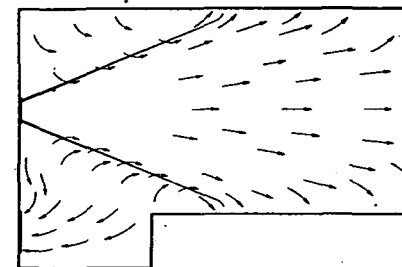


FIG. 7. PLAN VIEW CORRECTLY LOCATED RETURN OUTLET ELIMINATING STAGNANT SPACE

average velocities within the occupancy zone are not excessive, one is fairly safe in assuming that the temperature difference is also within permissible limits.

The subject of sound control is covered in Chapter 30 and it is recommended for detailed review before consideration of the problem of air outlet noise. An understanding of the relation between sound intensity and loudness level in decibels, as well as the effect of the presence of sound absorbent materials in the room, is particularly necessary. A more detailed discussion of the nature of this problem appears later; whereas the following comments refer to what constitutes a satisfactory noise condition.

Obviously, the nature of the conditioned space is important when considering the allowable outlet noise. In factories, press rooms, and similar spaces where the noise level is 65 db or higher, no complaints of grille noise are likely to be made. On the other hand, some homes, offices, hospitals, and, most of all, radio broadcasting and movie sound studios present a real problem which must be intelligently attacked if a satisfactory installation is to be made. In this chapter the noise of the air outlets (and returns) only is considered, it being assumed that the noise or sound level of the room without the outlet noise includes that which may