

EXHAUST SYSTEMS, GENERAL & COMFORT VENTILATION

ture from the body is slow, and a warmer feeling is experienced than would be expected from the temperature indicated by the thermometer. In general, the most desirable relative humidity range seems to be between 30 and 50 per cent.

Relative humidity may be determined either by a hygrometer which reads directly in percentage of relative humidity, or by dry- and wet-bulb thermometers from which the readings are taken simultaneously in a current of air and the humidity calculated on a psychrometric chart (Fig. 28-20). A wet-bulb thermometer is one on which a little sock has been slipped. This is moistened and as it moves about in the air, water evaporates if the air is not 100 per cent saturated. The evaporation produces a cooling effect which in turn registers as a lower temperature on the wet-bulb thermometer.

Common methods of ventilation

Natural ventilation Wind, aided by air currents created by heating devices and higher indoor temperatures, provides a certain amount of ventilation even though doors and windows are closed. Air enters and leaves through the pores of building materials as well as through cracks and crevices. However, spontaneous ventilation should never be relied upon to give satisfactory results under all conditions.

Heating devices, such as ovens, cause the air to expand and rise, and if suitable openings are provided in the roof or near the ceiling, the rising air currents will pass to the outside. Then, if there are suitable openings near the floor, outside air will come in to replace what is lost.

Skylights and louvers satisfactorily control the escape of air in some cases, but they must be adjusted when changes of weather and wind occur, and it is sometimes difficult to prevent downdrafts.

Vertical stacks through roofs usually have tops to exclude rain and snow. The amount of air discharged by a vertical stack and roof ventilator depends on wind veloci-

ty, temperature differences, and the type of ventilator used. The stationary types are usually least effective and the wind-actuated rotary ones most effective, but a great deal depends upon the design of the individual unit. Manufacturers can supply tables showing the effectiveness of each design.

Stack or chimney action is the force that produces air flow due to a temperature differential. This action is identical to the induced draft of a furnace. Air will flow out of a building if the temperature of the indoor air is higher than that of the outdoor air, and the converse is likewise true. At one point, the effect could be neutralized.

Design guides Some of the more important guides to realizing the maximum benefits of natural ventilation are the following:

- 1 Inlet openings in the building should be well distributed on the windward side near the bottom, outlet openings should be located on the leeward side near the top. Outside air will then be supplied to the zone to be ventilated.
- 2 Inlet openings should not be obstructed by buildings, trees, signboards, etc., outside nor by partitions inside.
- 3 Greatest flow per square foot of total opening is obtained when inlet and outlet openings have nearly equal areas.
- 4 In order that the force of temperature difference may operate to maximum advantage, the vertical distance between inlet and outlet openings should be as great as possible.
- 5 Windows on the windward side of monitors should usually be kept closed, since, if they are open, the inflow tendency of the wind counteracts the outflow tendency of temperature difference. Openings on the leeward side of the monitor result in cooperation of wind and temperature difference.
- 6 Furnaces that give off heat and fumes should be located in the end of the building exposed to the prevailing wind. The strong suction effect of the wind at the roof near the windward end will then cooperate with the temperature difference, to provide the most active and satisfactory removal of the heat and the gas-laden air.
- 7 The vacuum produced by the wind is

◀Fig. 28-20 Psychrometric chart shows characteristics of water vapor and air as temperature varies