

Because the low static pressures involved are usually less than $\frac{1}{8}$ in. of water, disc or propeller fans are generally used instead of the blower or housed types. The fans should have quiet operating characteristics, and they should be capable of giving about 20 to 30 air changes per hour in northern areas. In the South the usual specification requires one air change per minute which provides appreciable air movement in addition to the cooling effect.

Types

Open attic fans are units in which the fan is installed in a gable or dormer and one or more grilles are provided in the ceilings of the rooms below. Outdoor air, which enters the house through open windows, is drawn into the attic through the grilles, and is discharged out-of-doors by the fan. An attic stairway may be used in place of the grilles. It is essential that the roof and the attic walls be free from air leaks.

Boxed-in fans are units in which the fan is installed within the attic in a box or housing directly over a central ceiling grille, or in a bulkhead enclosing an attic stair. The fan may be connected by a duct system to the grilles in individual rooms. Outdoor air entering through the windows of the rooms below is discharged into the attic space and escapes to the outside through louvers, dormer windows, or screened openings under the eaves.

Location

The locations of the fan, the outlet openings, and the grilles should be selected after consideration of the room and attic arrangement in order to give uniform air distribution in the individual rooms served. If the outlet for the air is not on the side away from the direction of the prevailing wind, openings should be provided on all sides. Kitchens should be separately ventilated because of the fire hazard, and to prevent the spread of cooking odors.

Costs

The capacity of attic fans is from 3,000 to 30,000 cfm with the trend toward units in the range of capacity from 7,000 to 15,000 cfm.

Some typical data on an attic fan installation in an average six room house of frame construction containing 14,000 cu ft and located in the southern part of this country are:

Installed cost.....	\$100 to \$400, average \$200
Fan data.....	12,000 cfm average, 500 watts input
Operating period.....	April 15 to October 15, intermittently as weather conditions demand
Power consumption.....	500 kwhr per year for 8 months' operation

In northern climates the figures would be considerably reduced. A smaller capacity fan can be effectively used and the cost of an installation ranges from \$60.00 upwards.

Chapter 24

COOLING AND DEHUMIDIFICATION METHODS

Air Cooling Processes, Dehumidification Processes, Practical Combination Methods, Compression Systems, Mechanical Refrigeration, Steam Jet System, Condensers, Evaporators, Refrigerant Pipe Sizes, Operating Methods, Adsorption System, Absorption System, Evaporative Cooling, Reverse Cycle, Ice Systems

COOLING and dehumidifying are closely related in most air conditioning work. Usually a reduction in both temperature and humidity is necessary to produce comfort. It should be borne in mind that: (1) there is a reduction in moisture content whenever air is cooled below its dew-point, and (2) there is a rise in temperature whenever moisture is removed from air by either adsorption or absorption. Although each can be accomplished separately, cooling and dehumidification must in most cases be considered together, not as two separate problems.

AIR COOLING PROCESSES

In air conditioning either of two arrangements, or a combination of them, is used to accomplish air cooling. The two arrangements are: (a) surface cooling, where the air is passed across a cold metal surface; and (b) spray cooling, where the air is passed through a cold liquid spray, usually water. In either case the surface or the spray liquid must be at a temperature sufficiently low so that heat may be removed from the air. Suitable temperatures for the purpose are obtained by the proper use of:

1. Refrigeration; or
2. Water from a cold natural source such as a well, from melting ice, or from application of refrigeration; or
3. Evaporative cooling.

The choice of most suitable source of cooling in any specific case will depend on the accompanying circumstances and can be determined only by a thorough analysis made by a competent engineer.