TABLE 1. AMOUNT OF NEW AIR TO BE SUPPLIED PER PERSON WITH AND WITHOUT AIR CONDITIONING

	Cubic Feet per Minute			Number of Air Changes per Hour
	Without Humidification or Recirculation	With Humidification and Dehumidification but Without Recirculation	With Humidification, Dehumidification and Recirculation	
SCHOOLS—				
Class Rooms	30	20	5 to 10	......
Assembly Rooms	15 to 25	10 to 15	5 to 10	......
Gymnasiums	30	25	15 to 20	......
Toilets	......	......	......	10 to 20
Locker Rooms	......	......	......	5 to 10
Kitchens	......	......	......	20 to 60
Lunch Rooms	......	......	......	10 to 20
THEATRES—				
Seating Space	30 to 50	20 to 30	10 to 15	......
HOSPITALS—				
Wards	40 to 60	30 to 40	......	......
Kitchens	......	......	......	20 to 60
Dining Rooms	......	......	......	10 to 20
Toilets	......	......	......	10 to 20
HOTELS—				
Dining Rooms	......	......	......	10 to 20
Kitchens	......	......	......	20 to 60
Ball Rooms	20 to 30	15 to 20	10 to 15	5 to 10
Work Space	......	......	......	5 to 10
Assembly Rooms	20 to 30	15 to 20	10 to 15	......

and 50 per cent relative humidity give a high quality product. In some cases, humidity must be supplied, in others, dehumidifying is necessary.

In some cases such as with textile manufacture, the condition of relative humidities of the surrounding air must be sufficiently high to provide for moisture absorption by the materials in process. In other cases the materials in process require air conditioning that will be conducive to a reduction in weight of materials by evaporation. For this reason, it is quite impractical here to give the exact temperature and humidity conditions best suited for the infinite numbers of materials or varying processes. The best suited conditions are quite generally known and understood by those who have studied the effects of moisture conditions in relation to any particular process or product.

Air has certain definite properties and obeys certain well known laws. Therefore, to properly handle problems of air conditioning and cooling, the relation between the wet and dry bulb temperatures, relative humidity and the dew-point should be thoroughly understood.

Dew-point is the temperature of the air at which saturation occurs for a given amount of water vapor. With air at the dew-point the wet and dry bulb temperatures are the same. At ordinary temperatures, the absorption of 1 grain of moisture per cu. ft. reduces the dry bulb temperature 8½ deg.

Relative humidity of air is the weight of moisture actually contained

by the air at a given temperature expressed in per cent of the amount of air it would hold if it were saturated at the same temperature.

The maximum moisture which the air can hold at various temperatures is given by the saturation, or 100 per cent relative humidity curve of the psychrometric chart. Relative humidities between 0 and 100 per cent of saturation are shown by a series of oblique curved lines similar to the saturation curve.

The wet bulb temperatures are given by a series of nearly parallel oblique lines and the numerical values of these wet bulb temperatures are given by the dry bulb temperatures at their intersection with the saturation curve.

Example.—If air is at a temperature of 70 deg. and its moisture content is 4 grains per cubic foot the relative humidity is approximately 50 per cent, since 4 grains of moisture per cubic foot is very nearly 50 per cent of 7.98 grains, the maximum moisture carrying capacity of the air at 70 deg.

Therefore, to provide a final room condition of 70 deg. temperature and 50 per cent relative humidity the air should first be saturated at a temperature corresponding to 4 grains of moisture per cubic foot which has already been referred to as a dew-point of 50 deg.

This condition is easily obtained during the heating season, since during this time of the year steam may be used for varying the spray water temperature through which the air being conditioned is passed, and thus the moisture carrying capacity of the air is raised to the desired point. The problem, however, is reversed in summer. Instead of humidifying, or increasing the moisture content of the air, it must be reduced from some higher level down to a 50 deg. dew-point.

Humidifying is the process of adding moisture to air.

Dehumidifying is the process of removing moisture from the air.

It may be necessary for the example cited, to cool below 50 deg. depending upon infiltration, air liquidage, as well as liberation of moisture from material to the air in the room which is desired.

The necessary dew-point correction value to be considered will, of course, vary with building or room construction. It is also dependent upon dry bulb temperature as well as moisture content differences between inside and outside air conditions. Compensation in dew-point temperature correction should also be considered from a standpoint of moisture liberated by occupants of the room as well as moisture given off by material in process of manufacture.

In air conditioning, the amount of air to be handled by the fan equipment is not covered by any air change or cubical content rule; it should be based and is dependent upon a correct heat balance, handling the required amount of air which when absorbing all sources of heat within a room, will not raise above the predetermined temperature desired for the room.

Example, desired—70 deg. temperature and 50 per cent relative humidity. This corresponds to 50 deg. dew-point. The difference between 50 deg. dew-point and 70 deg. final room temperature is 20 deg. Assume the total value in heat units to be absorbed in maintaining 70 deg. as 20,000 B.t.u. then the air capacity of the equipment is