

In artificially cooled theaters, department stores, restaurants, and other public buildings where the period of occupancy is short, the contrast between outdoor and indoor air conditions becomes the deciding factor in regard to the temperature and humidity to be maintained. The object of cooling such places in the summer is not to reduce the temperature to the optimum degree, but to maintain therein a temperature which is temporarily comfortable to the patrons who thus avoid sensations of chill and intense heat on entering and leaving the building. The relative humidity should be low enough (about 50 per cent or less) to give a sense of comfort without chill and to induce a rate of evaporation which will keep clothing and skin dry. For exposures less than 3 hours, desirable indoor conditions in summer corresponding to various outdoor temperatures are given in Table 2.

It should be kept in mind that southern people, with their more sluggish heat production and lack of adaptability, will demand a comfort zone several degrees higher than those given here for the more active people of

TABLE 2. DESIRABLE INDOOR AIR CONDITIONS IN SUMMER CORRESPONDING TO OUTDOOR TEMPERATURES

Applicable to Exposures Less Than 3 Hours

OUTDOOR TEMPERATURE (DEG FAHR)	INDOOR AIR CONDITIONS WITH DEW POINT CONSTANT AT 57 F		
	DRY-BULB	WET-BULB	EFFECTIVE TEMP
95	80.0	65.0	73
90	78.0	64.5	72
85	76.5	64.0	71
80	75.0	63.5	70
75	73.5	63.0	69
70	72.0	62.5	68

northern climates. Instead of the summer comfort line standing at 71 deg as here given, it was found to be much higher for foreigners in Shanghai where climatic conditions are similar to those of our gulf states. This difference in basic metabolic level of people forms a very real problem for air conditioning engineers, which they must recognize in their efforts to give proper conditions of comfort. Cooling of theaters, restaurants, and other public buildings in southern climates cannot be based on northern standards without considerable modification.

A.S.H.V.E. VENTILATION STANDARDS²³

It is the intent of the Committee in presenting this report to confine itself to a statement of those requirements which, based on present day knowledge, will provide adequate ventilation for spaces intended for human occupancy. The following standards shall apply to all spaces occupied by human beings in all buildings for which ventilation regulations are to be established.

²³Report of A.S.H.V.E. Committee on Ventilation Standards consisting of W. H. Driscoll, Chairman, J. J. Aeberly, F. Paul Anderson, L. A. Harding, D. D. Kimball, J. R. McColl, C. L. Riley, W. A. Rowe, Perry West and A. C. Willard, presented at the Semi-Annual Meeting of the Society, Milwaukee, Wis., June, 1932, and adopted by the Society in August, 1932.

SECTION I—AIR TEMPERATURE AND HUMIDITY

The temperature and humidity of the air in such occupied spaces, and in which the only source of contamination is the occupant, shall be maintained at all times during occupancy at an *Effective Temperature*, as hereinafter stated.

The relative humidity shall be not less than 30 per cent, nor more than 60 per cent in any case. The Effective Temperature shall range between 64 deg and 69 deg when heating or humidification is required, and between 69 deg and 73 deg when cooling or dehumidification is required.

These Effective Temperatures shall be maintained at a level of 36 in. above the floor. (See Appendix, Tables A and B).

SECTION II—AIR QUALITY

The air in such occupied spaces shall at all times be free from toxic, unhealthful or disagreeable gases and fumes and shall be relatively free from odors and dust.

In every space coming within the provisions of these requirements and in which the quality of the air is below the standards prescribed by good medical and engineering practices, due to toxic substances, bacteria, dust, excessive temperature, excessive humidity, objectionable odors, or other similar causes, means for ventilating shall be provided so that the quality of the air shall be raised to these standards.

SECTION III—AIR MOTION

The air in such occupied spaces shall at all times be in constant motion sufficient to maintain a reasonable uniformity of temperature and humidity, but not such as to cause objectionable drafts in any occupied portion of such spaces.

The air motion in such occupied spaces, and in which the only source of contamination is the occupant, shall have a velocity of not more than 50 feet per minute, measured at a height of 36 in. above the floor.

SECTION IV—AIR DISTRIBUTION

The air in all rooms and enclosed spaces shall, under the provisions of these requirements, be distributed with reasonable uniformity, and the variation in the carbon dioxide content of the air shall be taken as a measure of such distribution.

The air in a space ventilated in accordance with these requirements, and in which the only source of contamination is the occupant, shall be distributed and circulated so that the variation in the concentration of carbon dioxide, when measured at a height of 36 in. above the floor, shall not exceed one part in 10,000.

SECTION V—AIR QUANTITY

The quantity of air used to ventilate the given space during occupancy shall always be sufficient to maintain the standards of air temperature, air quality, air motion and air distribution as herein required. Not less than 10 cubic feet per minute per occupant of the total air circulated to meet these requirements shall be taken from an outdoor source.

APPENDIX

Definitions

For the purposes of these standards the terms used shall be defined as follows:—

Ventilation: The process of supplying or removing air by natural or mechanical means, to or from any space. Such air may or may not have been conditioned. (See *Air Conditioning*).

Air Conditioning: The simultaneous control of all or at least the first three of those factors affecting both the physical and chemical conditions of the atmosphere within any structure. These factors include temperature, humidity, motion, distribution, dust, bacteria, odors, toxic gases, and ionization, most of which affect in greater or lesser degree human health or comfort.

Dry-Bulb Temperature: The temperature of the air which is indicated by any type of thermometer which is not affected by the water vapor content or relative humidity of the air.

Dust: Solid material in a finely divided state, the particles of which are large and heavy enough to fall with increasing velocity, due to gravity in still air. For instance, particles of fine sand or grit, such as are blown on a windy day, the average diameter of which is approximately 0.01 centimeter, may be called dust.

Effective Temperature: An arbitrary index of the degree of warmth or cold felt by the human body in response to temperature, humidity, and movement of the air. Effective temperature is a composite