LETTER SYMBOLS USED IN CHAPTER 13

α = fraction of incident solar radiation absorbed, dimensionless; subscripts D, d, and t refer to direct, diffuse and total, respectively.
β = solar altitude, degrees.
γ = wall solar azimuth, degrees.
ϵ = emissivity, dimensionless.
θ = incident angle, degrees.
λ = amplitude decrement factor, dimensionless.
τ = fraction of incident solar radiation transmitted, dimensionless. Subscripts D, d and t refer to direct, diffuse and total, respectively.
ϕ = solar azimuth, degrees.
ψ = wall azimuth, degrees.
A = area across which heat is being transferred, square feet.
b = fraction of air passing through coil which does not contact surfaces, coil by-pass factor.
f = unit surface conductance, Btu per (hour) (square foot) (Fahrenheit degree). Subscripts c, r, o, and i refer to convection, radiation, outdoor, and indoor, respectively.
G_f = fraction of total window area receiving direct solar radiation when shaded by window reveal, dimensionless.
h = enthalpy of air per pound of dry air, Btu per pound. Subscripts i, o, and s refer to indoor, outdoor, and supply air, respectively.
I = incident solar radiation, Btu per (hour) (square foot). Subscripts D, d, Dn, and t refer to direct, diffuse, direct normal and total solar radiation, respectively.
K = cosine of angle of incidence for direct solar radiation striking a surface, dimensionless.
k = thermal conductivity of building material, Btu per (square foot) (hour) (Fahrenheit degree per inch).
l = height of window, feet.
M = the permeance of the specimen in *perms* or grains per (square foot) (hour) (inch of mercury vapor pressure difference).
Q = rate of entry of outdoor air, cubic feet per minute.
Q_{ra} = required air quantity through conditioning equipment, cubic feet per minute.
q = instantaneous rate of heat transfer, Btu per hour.
q_e = instantaneous latent heat load, Btu per hour.
q_{ei} = instantaneous space latent ventilation load, Btu per hour.
q_{ex} = instantaneous latent ventilation load which does not become a part of space load, Btuh.
q_m = latent heat load due to moisture transmission through materials, Btu per (hour) (square foot).
q_s = instantaneous sensible heat load, Btu per hour.
q_{si} = instantaneous space sensible ventilation load, Btu per hour.
q_{sx} = instantaneous sensible ventilation load which does not become a part of space load, Btu per hour.
q_t = $q_e + q_s$, also $q_{si} + q_{sx} + q_{ei} + q_{ex}$, Btu per hour.
R_s = low temperature radiant energy received from outdoor surroundings (does not include solar radiation), Btu per (hour) (square foot of receiving surface).
R = radiant energy emitted by a black body, Btu per (hour) (square foot). Subscripts go and L refer to outdoor surfaces of glass and building, respectively.
S = rate of heat storage within a glass section, Btu per (hour) (square foot).
t_e = sol-air temperature, Fahrenheit.

t_e^* = sol-air temperature at a time earlier than the time for which heat gain is being found by an amount that is equal to the time lag of the wall or roof, Fahrenheit.
t_{gi} = temperature of indoor glass surface, Fahrenheit.
t_{go} = temperature of outdoor glass surface, Fahrenheit.
t_i = indoor air temperature, Fahrenheit.
t_m = 24-hr cyclic average sol-air temperature, Fahrenheit.
t_o = outdoor air temperature, Fahrenheit.
t_s = room supply air dry-bulb temperature, Fahrenheit.
U = overall coefficient of heat transfer of a structural section, Btu per (square foot) (hour) (Fahrenheit degree).
v_o = volume of outdoor air per pound of dry air, cubic feet.
w = width of window, feet.
W = humidity ratio, pounds moisture per pound of dry air. Subscripts i, o, and s refer to indoor, outdoor, and supply air, respectively.

REFERENCES

[1] Application Engineering Standards for Air Conditioning for Comfort (*Air Conditioning and Refrigerating Machinery Association, Inc.*, 1947, pp. 4–7).

[2] Minimal Replenishment Air Required for Living Spaces, by W. V. Consolazio and L. J. Pecora (A.S.H.V.E. TRANSACTIONS, Vol. 53, 1947, p. 127).

[3] Recommended Safe Practice of the NBFU for Hospital Operating Rooms, Pamphlet No. 56, *National Board of Fire Underwriters*.

[4] Proposed Standard Solar Radiation Curves for Engineering Use, by P. Moon (*Journal of the Franklin Institute*, November 1940, Vol. 230, No. 5, pp. 583–617).

[5] A.S.H.V.E. RESEARCH REPORT No. 1268—Summer Weather Data and Sol-Air Temperature—Study of Data for Lincoln, Nebr., by C. O. Mackey (A.S.H.V.E. TRANSACTIONS, Vol. 51, 1945, p. 93).

[6] Summer Weather Data and Sol-Air Temperature—Study of Data for New York City, by C. O. Mackey and E. B. Watson (A.S.H.V.E. TRANSACTIONS, Vol. 51, 1945, p. 75).

[7] Summer Cooling for Comfort as Affected by Solar Radiation, by G. A. Hendrikson and J. H. Walker (*Heating and Ventilating*, Vol. 29, No. 11, November 1932, pp. 14–21).

[8] Tables of Computed Altitude and Azimuth (U. S. Navy Dept. Hydrographic Office Bulletin No. 214' Vols. 1–9, Washington, D. C., 1940).

[9] The American Nautical Almanac (U. S. Naval Observatory, Washington, D. C., annual).

[10] A.S.H.V.E. RESEARCH REPORT No. 923—Heat Transmission as Influenced by Heat Capacity and Solar Radiation, by F. C. Houghten, J. L. Blackshaw, E. M. Pugh and Paul McDermott (A.S.H.V.E. TRANSACTIONS, Vol. 38, 1932, p. 231). Effect of Heat Storage and Variation in Outdoor Temperature and Solar Intensity on Heat Transfer Through Walls, by J. S. Alford, J. E. Ryan and F. O. Urban (A.S.H.V.E. TRANSACTIONS, Vol. 45, 1939, p. 369). Periodic Heat Flow in Building Walls Determined by Electrical Analogy Method, by Victor Paschkis (A.S H.V E. TRANSACTIONS, Vol. 48, 1942, p. 75).—Periodic Heat Flow—Homogeneous Walls or Roofs, by C. O. Mackey and L. T. Wright, Jr. (A.S.H.V.E. TRANSACTIONS, Vol. 50, 1944, p. 293). Periodic Heat Flow—Composite Walls or Roofs, by C. O. Mackey and L. T. Wright, Jr. (A.S.H.V.E. TRANSACTIONS, Vol. 52, 1946, p. 283). Periodic Heat Transfer at the Inner Surface of a Homogeneous Wall, by H. A. Johnson (A.S.H.V.E TRANSACTIONS, Vol. 54, 1948, p. 143).

[11] The Effect of Solar Radiation on the Heat Transmission Through Walls, by F. C. Houghten, Carl Gutberlet and A. A. Rosenburg (American Society of Testing Materials Symposium on Thermal Insulating Materials, Philadelphia, 1939).

[12] A.S.H.V.E. RESEARCH REPORT No. 1157—Summer Cooling Load as Affected by Heat Gain Through Dry, Sprinkled and Water Covered Roofs, by F. C. Houghten, H. T. Olson and Carl Gutberlet (A.S.H.V.E. TRANSACTIONS, Vol. 46, 1940, p. 237).

[13] A.S.H.V.E RESEARCH REPORT No. 1002—Cooling Requirements of Single Rooms in a Modern Office Building, by F. C. Houghten, Carl Gutberlet, and Albert J. Wahl (A.S.H.V.E. TRANSACTIONS, Vol. 41, 1935, p. 53).

[14] Study of Actual vs. Predicted Cooling Load on An Air Conditioning System, by James N. Livermore (A.S.H.V.E. TRANSACTIONS, Vol. 49, 1943, p. 287).

[15] A.S.H.V.E. RESEARCH REPORT No. 1195—Heat Gain Through Walls and Roofs as Affected by Solar Radiation, by F. C. Houghten, E. C. Hach, S. I. Taimuty and Carl Gutberlet (A.S.H.V.E. TRANSACTIONS Vol. 48, 1942, p. 91).