(Refer to Chapter 35 for coil selection and efficiency.)

From note under Equation 19 the dry-bulb range will be $(80 - 54.6) \times 0.85 = 21.6$ deg, and the dry-bulb temperature of air leaving the coil will be $80 - 21.6 = 58.4$ F. The dry-bulb temperature leaving the fan (including the heat supplied by the fan motor), or delivered into the room, will be (from Equation 21):

$$t_s = 80 - \frac{184{,}415 - 19{,}100}{1.08 \times 7900} = 80 - 19.4 = 60.6\text{ F.}$$

With good distribution and diffusion, this temperature should not produce objectionable drafts.

EXAMPLE 18: SUMMARY

| | | | |
|---|---|---|---|
| Outdoor Conditions | 95 DB | 78 WB | 0.0169 Humidity Ratio |
| Space Conditions | 80 DB | 65 WB | 0.0098 Humidity Ratio |
| DIFFERENCE | 15 | | 0.0071 |

| | Btu/Hr | |
|---|---|---|
| SENSIBLE LOAD | | |
| *Transmission* | | |
| Roof 4000 sq ft × 53° × 0.34 = | 72,000 | |
| S. Wall 405 sq ft × 6° × 0.41 = | 995 | |
| E. Wall 765 sq ft × 11° × 0.52 = | 4,380 | |
| N. Wall Ex. 170 sq ft × 3° × 0.52 = | 265 | |
| N. & W. Party Wall 1065 sq ft × 2° × 0.26 = | 550 | |
| Floor None | | |
| Door 35 sq ft × 15 × 0.59 = | 310 | |
| All Glass and Rest of Doors = | 3,020 | |
| *Solar Radiation* | | |
| S. Glass 60 sq ft × 14 = | 840 | |
| S. Glass (Doors) 35 sq ft × 42 = | 1,470 | |
| E. Glass (Doors) 18 sq ft × 14 = | 250 | |
| N. Glass 30 sq ft × 15 = | 450 | |
| *Internal Load* | | |
| Infiltration 67 cfm × 1.08 × 15° = | 1,085 | |
| Lights (12,000 × 1.20 + 4000) 3.41 = | 62,700 | |
| People 85 × 200 = | 17,000 | |
| Motor, Fan 7.5 hp × 2544 = | 19,100 | |
| TOTAL SENSIBLE SPACE LOAD | | 184,415 |
| LATENT LOAD | | |
| Infiltration 67 cfm × 4840 × 0.0071 = | 2,300 | |
| People 85 × 250 = | 21,250 | |
| TOTAL LATENT SPACE LOAD | | 23,550 |
| VENTILATION AIR | | |
| Sensible 1275 cfm × 1.08 × 15° = | | 20,700 |
| Latent 1275 cfm × 4840 × 0.0071 = | | 43,800 |
| GRAND TOTAL LOAD | | 272,465 |

## LETTER SYMBOLS USED IN CHAPTER 12

$\alpha$ = fraction of incident solar radiation absorbed, dimensionless; subscripts D, d, t refer to direct, diffuse and total, respectively.
$\beta$ = solar altitude, degrees.
$\gamma$ = wall solar azimuth, degrees.
$\epsilon$ = emissivity, dimensionless.
$\theta$ = incident angle, degrees.
$\lambda$ = amplitude decrement factor, dimensionless.
$\mu$ = permeability to moisture transmission, grains per (square foot) (hour) (inch mercury).



$\tau$ = fraction of incident solar radiation transmitted, dimensionless. Subscripts D, d, t refer to direct, diffuse and total, respectively.
$\phi$ = solar azimuth, degrees.
$\psi$ = wall azimuth, degrees.
$A$ = area across which heat is being transferred, square feet.
$f$ = 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).
$L$ = thickness of building material, inches.
$l$ = height of window, feet.
$Q$ = rate of entry of outdoor air, cubic feet per minute.
$Q_m$ = 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.
$q_m$ = latent heat load due to moisture transmission through materials, Btu per (hr) (sq ft).
$q_s$ = instantaneous sensible heat load, Btu per hour.
$q_t = q_e + q_s$, Btu per hour.
$R_a$ = low temperature radiant energy received from outdoor surroundings (does not include solar radiation), Btu per (hr)(sq ft of receiving surface).
$R$ = radiant energy emitted by a black body, Btu per (hr) (sq ft). Subscripts go and L refer to outdoor surfaces of glass and building, respectively.
$S$ = rate of heat storage within a glass section, Btu per (hr)(sq ft).
$t_o$ = sol-air temperature, Fahrenheit degrees.
$t_o^*$ = 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 degrees.
$t_{gi}$ = temperature of indoor glass surface, Fahrenheit degrees.
$t_{go}$ = temperature of outdoor glass surface, Fahrenheit degrees.
$t_i$ = indoor air temperature, Fahrenheit degrees.
$t_L$ = temperature of outer surface of building, Fahrenheit degrees.
$t_m$ = 24-hr cyclic average sol-air temperature, Fahrenheit degrees.
$t_o$ = outdoor air temperature, Fahrenheit degrees.
$t_p = t_m + (t_o^* - t_m)$, *net* equivalent outdoor temperature for combined periodic and mean heat flow, Fahrenheit degrees.
$t_s$ = room supply air dry-bulb temperature, Fahrenheit degrees.
$U$ = 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.