

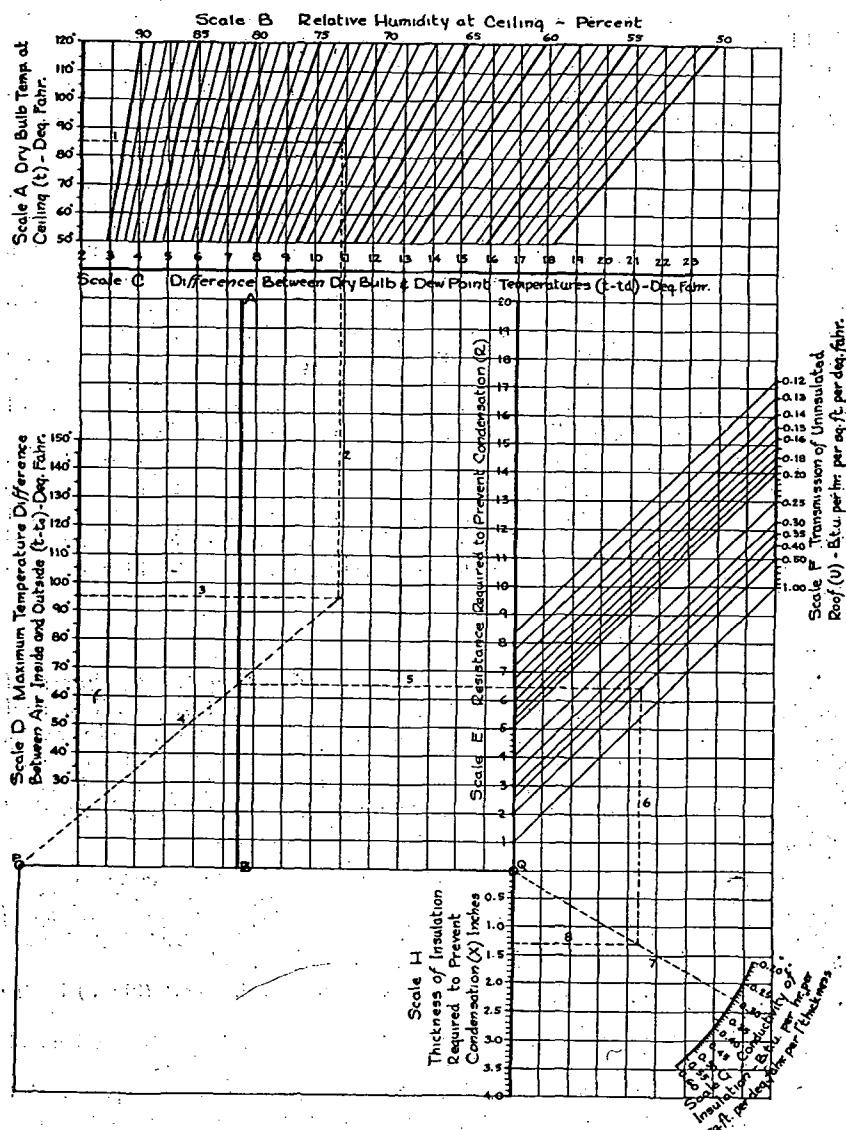


FIG. 3. CHART FOR DETERMINING THICKNESS OF INSULATION REQUIRED TO PREVENT CONDENSATION

5. From the intersection of lines 4 and *AB*, draw a line horizontally until it intersects with the diagonal line corresponding to a coefficient of transmission of the roof of 0.485, located on scale *F*.
6. From the intersection found as per paragraph 5, draw line 6 vertically downward.
7. Locate the conductivity of 0.30 Btu per hour per square foot per degree Fahrenheit of the insulation on scale *G* and draw a line to point *Q*.
8. From the intersection of lines 6 and 7, draw a line horizontally to scale *H*, on which the thickness of insulation of this conductivity is indicated, which is 1.3 in. The nearest commercial thickness above 1.3 in. would, of course, be selected.

SUN EFFECT ON BUILDINGS

The absorption of solar radiation by the surfaces of a building exposed to the sun has an important bearing on the capacity of the refrigerating equipment required for air conditioning. This factor may also have a bearing on the size of heating plant required, but usually is not taken into consideration. These surfaces may be the exterior walls or the roof of the building, or interior surfaces which receive the sun's rays through window glass.

When equilibrium has been established, and the rate of heat flow is therefore constant, the heat transmitted per hour through a wall or roof is equal to the product of the conductance of the structure from the exterior surface to the interior air and the difference between the exterior surface temperature and the interior air temperature. This relation is expressed as follows:

$$H = C_1(t_f - t) \quad (13)$$

where

H = Heat transmitted through wall or roof, Btu per hour per square foot.

C_1 = Conductance of wall or roof between exterior surface and interior air, Btu per hour per square foot, per degree Fahrenheit difference in temperature.

 t_r = Exterior surface temperature, degrees Fahrenheit.

t = Interior air temperature, degrees Fahrenheit.

Under actual conditions, the heat flow due to sun effect is almost never in equilibrium because of the heat capacity of the wall or roof structure. The exterior surface temperature of a wall or roof will usually approach the maximum for the day shortly after midday. On the other hand, the temperature of the interior surfaces of the building will lag, due to the heat capacity of the structure, and consequently the maximum interior surface temperature that would exist, if the heat flow were in equilibrium, may not be reached until some time after the maximum exterior surface temperature has been attained. Since at that time the exterior surface temperature has diminished, the maximum interior surface temperature (based on constant flow, and the maximum exterior surface temperature) will not actually be reached, and consequently the heat to be absorbed will be somewhat less than would be required according to Equation 13.

For materials of low heat capacity, the lag will be small and the error resulting from the use of equation 13 will be small. In any event, the result will be on the safe side. For materials of high heat capacity a correction for the temperature lag of the interior surfaces should be made,