

marked, was accompanied by a low dry bulb temperature and a very high relative humidity. With the higher outside dry bulb temperatures, the moisture content of the air is invariably lower, so that higher wet bulb temperatures are to be expected, for example, at 85 deg. than at 95 or 100 deg. outside temperature.

In humidifying with an efficient central station system the air is taken from outside and cooled to the wet bulb temperature by evaporation, using recirculated water. When saturated air is heated,

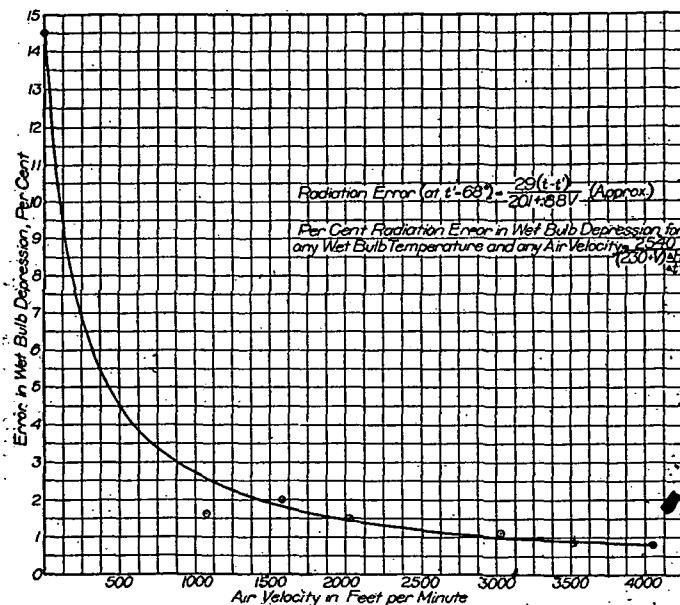


FIG. 1. ERROR IN WET BULB DEPRESSION

Variation of radiation with Variation of this Velocity over the Wet Bulb. (at $t_1 = 68$ deg. Fahr.) from experiment

as for instance, by introduction into a warmer room, the relative humidity is lowered without change of moisture content and there is an increase in the wet bulb temperature corresponding to the increase in the total heat. Thus, the temperature in a room humidified by a central station system to a definite per cent of relative humidity always bears a fixed relation to the outside wet bulb temperature.

The mathematical relation of the above physical facts involving the wet bulb depression and the weight of moisture in the air has been given and discussed by the writer in the paper presented before

The American Society of Mechanical Engineers in 1911, previously referred to. This for wet bulb temperatures above 32 deg. is as follows:

$$W = \frac{r' + C_{pa} (t - t')}{r'W' - C_{pa} (t - t')}$$

where W = the weight of moisture actually associated with one pound of dry air;

W' = the weight of moisture which would be associated with one pound of dry air in a saturated mixture at the true wet bulb temperature;

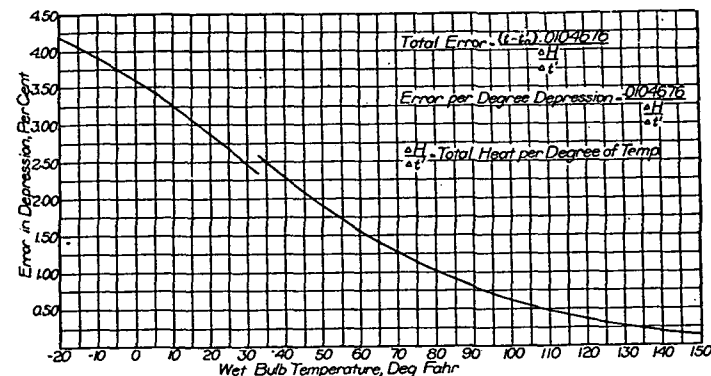


FIG. 2. AVERAGE RADIATION ERROR IN OBSERVED WET BULB DEPRESSION, IN PER CENT OF TOTAL WET BULB DEPRESSION, FOR DIFFERENT WET BULB TEMPERATURES

- t = the dry bulb temperature;
- t' = the true wet bulb temperature of evaporation;
- r' = the latent heat per pound of water vapor corresponding to the wet bulb temperature t' ;
- C_{pa} = the mean specific heat of air between the temperatures t and t' ;
- C_{ps} = the mean specific heat of water vapor between the temperatures t and t' .

The numerical values of these physical units are given in Appendix.

It has previously been shown by the writer that the observed reading of the wet bulb on the ordinary sling psychrometer is always slightly higher than the true temperature of evaporation. However, the observed wet bulb depression approaches within 1.6 per cent at 2000 air velocity and within 1 per cent of 3000 air velocity