

A device for the ventilation of the wet-bulb thermometer

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Abstract

This is the translated and edited version of the paper “Ein Apparat zur Ventilation des feuchten Thermometers” by R. ASSMANN, which originally appeared in 1891 in the *Meteorologische Zeitschrift*.

Superscript numbers indicate editorial endnotes (at the end of the article), square brackets[] indicate editorial comments in the text.

In his work “Beitrag zur Geschichte und Theorie des Psychrometers” [“Contribution to the history and the theory of the psychrometer”] (*Meteorol. Z.*, 1889, p. 121 and 164)^{E1} GROSSMANN says on page 176:

6. “It is absolutely necessary to ensure a constant ventilation of the psychrometer and to determine factor A for the selected set-up of the psychrometer by comparison with dew point instruments. For small velocities, the constant has to be determined for every psychrometer and if possible under the same conditions as the later observations.” This requirement as well as my efforts to make the aspiration psychrometer usable encouraged me to construct a simple device for simplifying the psychrometric observation method and for ensuring its results.

My colleague Dr. SPRUNG^{E2} provisionally determined the value of constant A in REGNAULT’s psychrometric formula^{E3} for the aspiration psychrometer by means of comparison with ALLUARD’s dew point hygrometer^{E4} as well as the absorption method. According to him, one would be close to the truth if it is assumed that $A = 0.5$ (instead of 0.603).

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Out of this, the necessity emerged to calculate the values of the conventional humidity measures, i.e., of vapour pressure and relative humidity, directly from the most simple psychrometric equation rather than from WILD-JELINEK’s psychrometric chart^{E5}:

$$f = f' - \frac{1}{2} (t - t') \frac{b}{755} \quad [\text{E6}]$$

The coincidence that A could be assumed to equal 0.5 simplifies the method considerably: In all cases in which the barometric pressure does not deviate by more than 15 mm from 755, the vapour pressure f can be found by taking the saturation pressure at the temperature of the wet-bulb thermometer from a vapour pressure table, and by subtracting half of the psychrometric difference.

The method described becomes more complicated if barometric pressure deviates more strongly from 755 mm. Apart from that, it seems more recommendable to use a generally applicable psychrometric table instead of perpetuating an, albeit simple, calculation.

For aspiration psychrometers, the airflow velocity is between 2.1 and 2.4 m per second. This velocity should not be much lower due to the influence of radiation. I