

Vortex Separator for More Accurate Air Dry-Bulb Temperature Measurement

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Abstract : Fog systems application for cooling and humidification is still limited, although these systems require less initial cost compared with that of other cooling systems such as pad-and-fan systems. The undesirable relative humidity and air temperature inside the space which have been cooled or humidified are the main reasons for its limited use, which results from the poor control of fog systems. Any accurate control system essentially needs air dry bulb temperature as an input parameter. Therefore, the air dry-bulb temperature in the space needs to be measured accurately. The Scope of the present work is the separation of the fog droplets from the air in a fogged space to measure the air dry bulb temperature accurately. The separation is to be done in a small device inside which the sensor of the temperature measuring instrument is positioned. Vortex separator will be designed and used. Another reference device will be used for measuring the air temperature without separation. A comparative study will be performed to reach at the best device which leads to the most accurate measurement of air dry bulb temperature. The results showed that the proposed devices improved the measured air dry bulb temperature toward the correct direction over that of the free junction. Vortex device was the best. It respectively increased the temperature measured by the free junction in the range from around 2 to around 6°C for different fog on-off duration.

Keywords : fog systems, measuring air dry bulb temperature, temperature measurement, vortex separator

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