Effect of Arrangement and Number of Water Mist Spray Nozzles on Air Humidity

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Abstract Water spray technique is used in many applications like cooling, humidifying, and firefighting applications. The performances of 1, 4, and 9 number of nozzles under horizontal parallel, counter, and vertical flow arrangement have been experimentally analyzed for air volume flow rate from 0.34 to 2.15 m^3/s, room temperature from 28.5 to 30.2 °C, and relative humidity between 59 and 78%. The data show clear trend between relative humidity and number of nozzles. 9.5, 10.5, and 20% higher humidification by percentage achieved for the highest number of nozzles than lower number of nozzles in vertical, parallel, and counter flow arrangement, respectively. However, flow evaporation is greatly affected than mist evaporation performance under parallel flow placement at single-nozzle arrangement. Vertical arrangement with 9 nozzles showed 20.3% higher relative humidity than 1 nozzle under counter flow arrangement.