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Experimental study on mass transfer of contaminants through an enthalpy recovery unit with polymer membrane foils - DTU Orbit (08/11/2017)

Experimental study on mass transfer of contaminants through an enthalpy recovery unit with polymer membrane foils
Laboratory experimental studies were conducted to investigate the mass transfer of contaminants through a total heat recovery unit with polymer membranes foils. The studies were conducted in twin climate chambers which simulated outdoor and indoor thermal climates. One manufacturd total heat recovery unit with polymer membrane foils was used as refeering unit in this study. The experiments were conducted with different outdoor thermal climates e.g. warm-humid and cold-dry climates; isothermal and non isothermal as well as equal humidity and non equal humidity with indoor climate. Three chemical gases were used to simulate air contaminants. The concentrations of dosed contaminants in the supply and exhaust air upstream and downstream of the total heat recovery unit were measured with Multi-Gas Monitor Innova 1316 in real time. Experiment results showed that 5% to 9% of dosed contaminants could transfer from exhaust air to supply air through the enthalpy recovery unit. The mass transfer efficiency of contaminants was independent of the hygro-thermal differences between indoor and outdoor climate conditions. The mass transfer ratio of the chemical contaminants in the total heat recovery unit tested was little to do with their molecule sizes and water solubility. The contaminants transfer of 5-9% in the total heat recovery unit tested is to be investigated further to determine the reasons e.g. due to air leakage in the unit or due to diffusion of the contaminants through the polymer membrane or due to both reasons. The results indicated that polymer membrane foils may be a choice for producing total heat recovering equipment in ventilation systems.

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