

## Accepted Manuscript

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PII: S1359-4311(17)34897-4  
DOI: <https://doi.org/10.1016/j.applthermaleng.2017.09.139>  
Reference: ATE 11196

To appear in: *Applied Thermal Engineering*

Received Date: 25 July 2017  
Revised Date: 27 September 2017  
Accepted Date: 29 September 2017

Please cite this article as: J. Nie, S. Yuan, L. Fang, Q. Zhang, D. Li, Experimental study on an innovative enthalpy recovery technology based on indirect flash evaporative cooling, *Applied Thermal Engineering* (2017), doi: <https://doi.org/10.1016/j.applthermaleng.2017.09.139>

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## Experimental study on an innovative enthalpy recovery technology based on indirect flash evaporative cooling

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Abstracts:

An indirect flash evaporative cooling enthalpy recovery technology used for building ventilation was proposed based on counter flow plate heat exchanger combing with ultrasonic atomizer. The technology is aimed at enhancing enthalpy recover efficiency and preventing contaminant transfer of heat recovery unit. The principle of the technology is to over saturate indoor exhaust air by ultrasonic atomizing humidification. The evaporation of ultrafine mists cools down indoor exhaust air to its wet-bulb temperature and makes not only sensible heat transfer but also moisture condensed in outdoor supply air to realize total heat recovery. Compared with conventional indirect evaporative cooling, the application of ultrasonic atomizing enhances cooling effect through increasing water mists evaporation area and decreasing heat transfer resistance between exhaust air and supply air. No mass permeation, carrying-over or sorption occurs in this heat exchange process which guarantees no contaminant transfer from exhaust air to supply air. A prototype unit of the proposed technology was developed and tested in climate chambers. Temperatures and humidity ratios at inlets and outlets of the heat recovery unit were measured to investigate and analyze its energy recover efficiencies. The results showed that in hot and humid climate, up to 71% of total heat recover efficiency could be achieved by the prototype unit, and more than 50% of the enthalpy recovered was contributed by moisture condensation in the outdoor supply air.

Keywords: Building ventilation; Enthalpy recovery; Indirect evaporative cooling; Flash evaporation; Atomizing humidification.

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