

# Indoor temperatures for calculating room heat loss and heating capacity of radiant heating systems combined with mechanical ventilation systems - DTU Orbit (09/11/2017)

## Indoor temperatures for calculating room heat loss and heating capacity of radiant heating systems combined with mechanical ventilation systems

In this study, a typical office room with a radiant heating system and a mechanical ventilation system was selected as the research subject. Indoor temperature formulas for calculating the room heat loss (including transmission heat loss and ventilation heat loss) and heating capacity of the hybrid system were determined according to the principle of heat transfer. A model to predict indoor temperatures in the room was proposed, and it was determined that the predicted indoor temperatures agreed well with the measured data. Qualitative analyses of the effects of heated surface temperature and air change rates on the indoor temperatures were performed using the proposed model. When heated surface temperatures and air change rates were from 21.0 to 29.0 degrees C and from 0.5 to 4.0 h<sup>-1</sup>, the indoor temperatures for calculating the transmission heat loss and ventilation heat loss were between 20.0 and 20.3 degrees C and between 19.6 and 20.5 degrees C, respectively, and the indoor temperature for calculating the heating capacity of the hybrid system was between 18.2 and 19.8 degrees C. Accordingly, the relative calculation errors were between 0.3% and 0.5% and between -10.2% and 11.8% for calculating the transmission heat loss and ventilation heat loss, respectively, and between 16.0% and 17.4% for calculating the heating capacity of the hybrid system. Due to large relative calculation errors, it is necessary to consider the effect of heated surface and cool supply air on indoor temperatures for calculating ventilation heat loss and heating capacity of radiant heating systems combined with mechanical ventilation systems. (C) 2015 Elsevier B.V. All rights reserved.

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