Effect of supply air temperature on air distribution in a room with radiant heating and mechanical ventilation - DTU Orbit (08/12/2018)

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The present study focused on the effect of supply air temperature on air distribution in a room with floor heating (FH) or ceiling heating (CH) and mixing ventilation (MV) or displacement ventilation (DV). The vertical distribution of air temperature and velocity in the occupied zone and the horizontal distribution of containment concentration in the breathing zone were measured as the supply air temperature ranged from 15.0°C (59°F) to 19.0°C (66.2°F). The results showed that the vertical air temperature differences were less than 0.3°C (32.5°F) with FH+MV or CH+MV and between 1.9°C (35.4°F) and 4.2°C (39.6°F) with FH+DV or CH+DV. The turbulence intensity varied from 12.5% to 15.5% with FH+MV or CH+MV and from 6.0% to 10.8% with FH+DV or CH+DV. The air-distribution effectiveness was close to 1.0 with FH+MV or CH+MV and between 1.06 and 1.16 with FH+DV or CH+DV. The results in this paper are relevant to the design and control of the hybrid systems with radiant heating systems and mechanical ventilation systems.

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