Full scale laboratory experiment on the cooling capacity of a radiant floor system - DTU Orbit (05/12/2018)

Full scale laboratory experiment on the cooling capacity of a radiant floor system

Direct solar radiation on a cooled radiant floor increases its cooling capacity. There is limited measured evidence of this phenomenon reported in the literature. We assessed the effect of solar radiation, increased air movement, and carpet on the cooling capacity of the radiant floor in a laboratory exposed to the outside environment. We performed experiments for different chilled water supply temperature. The cooling capacity of the chilled radiant floor was measured to increase from 32 up to 110 W/m² under direct solar radiation. The surface temperature region exposed to solar radiation reached a peak temperature of 26°C while the unexposed areas were between 20 and 21°C. Increasing the chilled water supply temperature from 12 to 18°C caused a decrease in cooling capacity from ~110 to ~95 W/m². Higher air speeds along the floor created by ceiling fans increased the radiant slab cooling capacity by ~12 % (from 32 to 36 W/m²) when the operative temperature was 24°C and, up to ~19 % (40 W/m²) when it is increased to 26°C. The presence of thin carpet tiles reduced the radiant floor cooling capacity for ~5 % compared to an exposed floor slab.

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