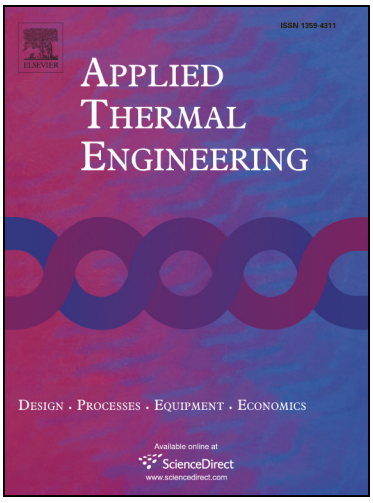

Research Paper

Performance and Energy consumptions of split type air conditioning units for different arrangements of outdoor units in confined building shafts

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Performance and Energy consumptions of split type air conditioning units for different arrangements of outdoor units in confined building shafts

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Abstract

Architectural constraints always recommend placing the outdoor units of split type air-conditioning (AC) systems in building shafts. This leads to high on-coil temperature, high electric consumption of and low performance of the units. In the present study, a CFD simulations of this problem are conducted for different installation arrangements of the outdoor units in two different situations of building shafts: the shaft is closed from the bottom by a basement slab, and the shaft is open from the bottom on the basement floor. The study aims to put installation guidelines for optimum arrangements of the outdoor units in building shafts. The results show that i) the performance of the AC units dramatically getting bad when the building shaft is closed from the bottom, (ii) for open-bottom shaft, the performance of the units decreases as the installation floor level of the unit increases, (iii) for open-bottom shafts, it is preferable to install all outdoor units at one wall except for upper floors units where it preferred to be installed on two adjacent walls, (iv) for closed bottom shafts, it is not recommended to install outdoor units in lower levels of the shafts but can be installed at upper levels.

Keywords

Split type Air-conditioning units, Thermal Performance, Building shafts, outdoor units arrangements.

Nomenclature

AC	Air Conditioning
COP	Coefficient of performance
DX	Direct Expansion
u, *v*, *w*	Flow velocity components in x, y, and z-direction
P	Pressure, Pa
T	Temperature, °C