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The Data Sets for the Empirical Validation of Double Skin Façade Modeling

During the recent years the attention to the double skin facade (DSF) concept has greatly increased. Nevertheless, the application of the concept depends on whether a reliable model for simulation of the DSF performance will be developed or pointed out. This is, however, not possible to do, until the model is empirically validated and its' limitations for the DSF modeling are identified. Correspondingly, the existence and availability of the experimental data is very essential.

Three sets of accurate empirical data for validation of DSF modeling with building simulation software were produced within the International Energy Agency (IEA) Task 34 Annex 43. This paper describes the full-scale outdoor experimental test facility 'the Cube', where the experiments were conducted, the experimental set-up and the measurements procedure for the data sets. The empirical data is composed for the key-functioning modes of a double skin facade: 1. External air curtain mode, it is the naturally ventilated DSF cavity with the top and bottom openings open to the outdoor; 2. Thermal insulation mode, when all of the DSF openings closed; 3. Preheating mode, with the bottom DSF openings open to the outdoor and top openings open to the indoor.

Available data sets consist of two groups of parameters, which were measured simultaneously. These are the parameters of boundary conditions and the parameters that reflect the DSF performance. The boundary conditions include the climate data, wind profile, outdoor concentration of carbon dioxide etc. Parameters of the DSF performance discussed in the paper are: the temperature gradients in the DSF cavity, mass flow rate in the naturally ventilated cavity, surface temperatures, etc.

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