Big humidity data from smart ventilation systems

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SUMMARY

A smart ventilation system is generally equipped with a range of sensors. The data – or data derived from it - collected by these sensors can be used by both building owners, occupants and managers. A new generation of IoT enabled residential ventilation systems allows collecting and analysing this data at scale to get a better view on typical IAQ conditions in dwellings. In this paper, the results from such an analysis on the first 900 installed devices of a new model with respect to moisture in relatively new Belgian dwellings is presented.

KEYWORDS

Smart Ventilation, Moisture, Humidity, Residential, Big Data

1 CASE STUDY

The case study is based on the initial roll-out of new smart ventilation model by Renson, Healthbox 3.0, in Belgium. It is a centralised exhaust-only DCV system, a demand-controlled system with mechanical extraction of polluted air and natural supply of fresh air. Natural supply of the fresh air occurs by window mounted trickle vents in dry rooms. At the end of each extraction duct, sensors measure several parameters (temperature, humidity, CO2 and VOC). The ventilation rate is adjusted based on the measured air quality for each roomThe basic configuration of the unit can connect up to seven rooms and can be extended to eleven rooms via the use of up to two valve collectors.
The (anonimised) monitoring data related to moisture of 900 of the first installed units was analysed and is presented below. The sample mostly includes recent (EPB compliant) construction.

2 RESULTS

From the observed temperature and humidity conditions, we can conclude that the systems, sized according to the Belgian standard NBN D 50-001 effectively protects the indoor environment against excessive moisture levels, as assessed by the mould growth risk in accordance with the VTT isopleth model proposed by Hukka & Viitanen (1999). The results for bathrooms and laundry rooms are shown in figure 1. In total, only 1.15%, 0.63%, 1.14%, 0.52%, 2.39% of the processed datapoints were above the risk threshold for bedrooms, kitchens, bathrooms, laundry rooms and toilets respectively.

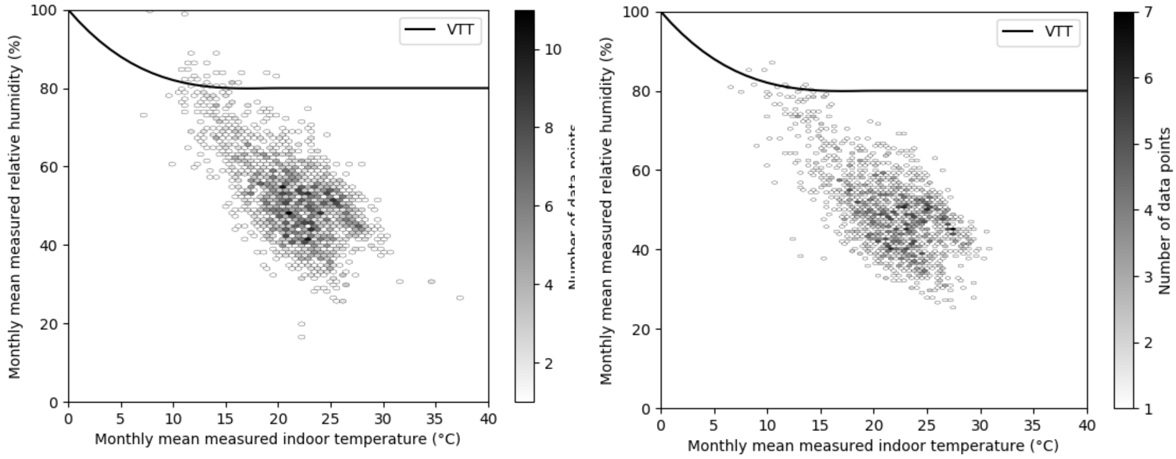

Figure 1: Mould growth risk based on the Hukka and Viitanen isopleth in the bathrooms (left) and laundry rooms (right) in the case study sample

Based on the available data and the weather data for Brussels provided by the Royal Meteorological Institute, the moisture load with respect to the indoor climate classes as defined by Hens (1992) were assessed. This shows that the dependency of moisture loads on outdoor temperature has decreased over the last 25 years.

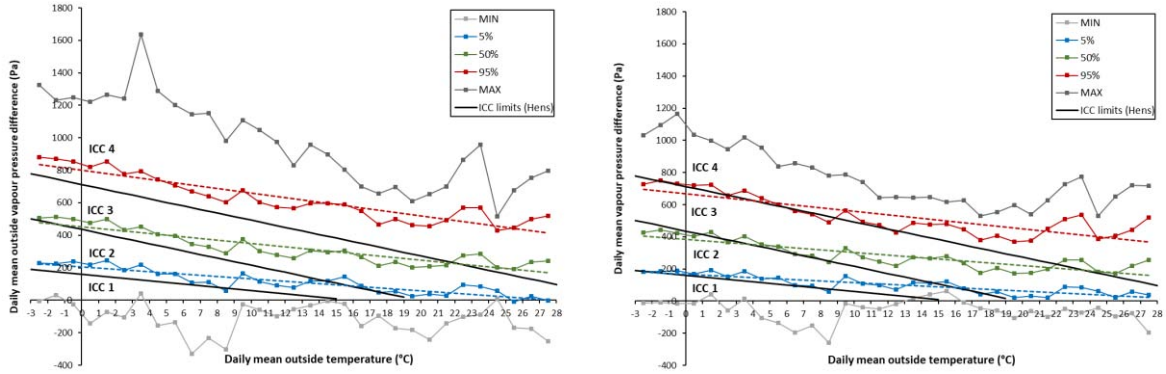

Figure 2: Moisture load based on the Hens indoor climate classes in the bathrooms (left) and laundry rooms (right) in the case study sample

3 REFERENCES

A. Hukka and H. A. Viitanen (1999) "*A mathematical model of mould growth on wooden material*," Wood Science and Technology, vol. 33, no. 6, pp. 475–485, https://doi.org/10.1007/s002260050131

Hens, S.L.C. (1992) Indoor Climate Classes, Intern Rapport IEA-Annex 24 T2-B_92/02 International Energy Agency; Heat, Air and Moisture Transfer through new and retrofitted Insulated Envelope parts (HAMTIE).