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Drinking Water Engineering and Science Discussions

Interactive comment on "Non-residential water demand model validated with extensive measurements" *by* E. J. Pieterse-Quirijns et al.

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This paper compares the results of the SIMDEUM end-use model to a few measured consumption patterns of both cold and hot water in certain types of non-residential buildings. It is a really good and innovative study adding practical knowledge on water demands. However, I have a few concerns that I would like to request the authors to address:

1.The main concern I have with the paper is the weight given to the measured peak demands in the development of new design guidelines. The peak demand of a building is a probabilistic value. This means that it is not possible to propose a design value that will never be exceeded - the best that can be done is to propose a design value that has an acceptably low risk of being exceed, for instance 1 in 10 years.

The authors' approach is to model and measure the peak demand of a small number of buildings over a short period of time and then to use this data to show that their model is better than the existing design guidelines. This is claim, as well as the claim that the existing guidelines are too conservative, cannot be verified without quantifying the probabilistic nature of the peak demand and then comparing it to an acceptable risk of being exceeded.

Below are some specific comments related to this point:

a. Page 459, line 24: "The resulting design parameters are defined as the 99-percentile of the 100 values of the different peak demand values." This statement is made without any rationale to why the 99 percentile is chosen. In addition, the impression is given that this value is the 99 percentile for the peak consumption of the users measured, but this cannot be claimed without a proper statistical analysis of the data.

b. Page 462: the data was measured for only a short period of time and for only a very small number of buildings (one or two), making it risky to assign too much importance to the values, especially the values close to the limits of the measurements (i.e. the 99 percentile). In addition, it is important to discuss the potential consequences of an under-designed system and use this information in deciding the desired level of confidence for a new design guideline. The same points are valid for the claim of a 99.7 percentile on page 461, line 3.

c. Page 462, line 9: "The design rules show an improved prediction compared to the existing Dutch guidelines, which overestimate MMFcold with 30–80%." This might be true for a typical peak demand, but there is no statistical proof that the values obtained are representative.

d. Page 462, line 19: the same error is made by taking the average of the peak demand for certain days. Is it acceptable for a design guideline to specify the average peak demand, i.e. about half the peak demands are likely to exceed the design value?

2. Bottom of page 458 and top of page 459. It is not clear at this point what is part of this paper, and what is part of other studies. Two steps of validation are mentioned, and the second is clearly included in the paper. Aspects of the first step are clearly excluded, but it is not clear which parts of the first step are included in this paper. What other papers form part of the verification, and what still needs to be done?

3. The paper doesn't give an overview of the current standards in the Netherlands – only their design values for specific buildings. More information on the scope, methods and rules included in these guidelines are required to understand how the design values for the buildings are obtained.

4. The same is true for the SIMDEUM model. It is acceptable to refer the reader to another paper for details, but this should not be required for the reader to understand the basic assumptions, data requirements and methods used in the model. For instance, was SIMDEUM calibrated in any way on the buildings referred to on the top of page 462?

5. Page 460, line 5+. Clamp-on ultrasonic flow meters can be highly accurate under controlled conditions, but are much less reliable when used in the field. What measures were taken to verify or estimate the accuracy of the clamp-on meters?

6. Page 460, line 9: Categories are referred to, but how and where are these categories defined? How many categories were tested and how many were omitted in this study?

7. Page 463, line 13: The authors claim that the new design guidelines will result in better water quality. However, unlike in a distribution system, it is not clear to me that water stagnation is really the case inside a building. The pipe diameters inside a building may be small enough that the water will be completely replaced even for small withdrawals. This statement should be better motivated.

8. Page 464, line 21. It is not clear how the reduced hot water peak estimate will necessarily lead to 'enormous energy savings". Please explain.

Minor comments

1.The name SIMDEUM is marked with the Registered Trade Mark (R) sign. While this is necessary in commercial documents, the (R) symbol is not necessary in a scientific document that makes it clear that this is the name of a product. The use of this symbol might even be interpreted as advertisement or commercial intent.

2. The term 'hygienic consequences' doesn't sound right in English. Replace with a more generally used term such as 'health risk'.

3. I have never seen the term 'maximum momentary flow' in water supply literature. Perhaps replace this with a more common term such as 'instantaneous peak demand'?

4. Page 457, line 28: the term '(inter)national' is ambiguous and can be read as 'national and international' or 'national or international'. Clarify.

5. Page 458, line 27: It is not clear what the 'dominant variable' refers to. Please expand.

6. Page 460, line 13: rephrase the phrase "were the most encountered problems."

Interactive comment on Drink. Water Eng. Sci. Discuss., 5, 455, 2012.