THE HEAT LOSSES CALCULATION METHODOLOGY ACCORDING TO DIN 4701 FROM 1959. AND SRPS EN 12831:2012 ON REQUIRED INSTALLED RADIATORS’ POWER

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The adoption of the new European standard SRPS EN 12831:2012 caused a need to define the differences in methodology of the calculation of heat losses, regarding to the formerly used standard DIN 4701 from 1959.

The observed differences in the results significantly affect the sizing of heating and the choice of the heat sources.

Published papers, mainly in the German-speaking areas, indicate that the difference in the total heat loss is up to 25%.
The building geometry

- For the purposes of the calculation, a family house in Krusevac was considered;
- Longer axis is oriented in the north-south direction;
- It consists of a basement, ground floor and first floor;
- Thermal insulation is mineral wool, 12 cm thick;
- The windows are from PVC, with five-chambered frames, and dual, low-emission glass;
The methodology of calculating heat losses

The paper deals with the comparison of heat losses calculation methodology according to DIN 4701 from 1959 and SRPS EN 12831:2012.

The differences in the calculation methodology of the heat losses according to the mentioned standards are:

1. SRPS EN 12831:2012 prescribes the use of external horizontal dimensions, while DIN 4701 uses the internal dimensions.
The methodology of calculating heat losses

2. Orientation of the observed surface is not taken in methodology of calculation according to the SRPS EN 12831:2012.

3. According to SRPS EN 12831:2012 there are no lump sum additions in heat losses on: cardinal directions of object, addition to the height and addition to the interruption in heating.

4. SRPS EN 12831:2012 prescribes, in a detailed calculation method, the special part of the calculation in which the influence of thermal bridges on joints of different constructions is shown.
The differences in the overall transmission heat losses by comparing the standards are very small, and with lump sum additions, heat losses according to DIN 4701 are higher up to 4%. 

Analysis of the results of heat losses according to DIN 4701 and EN 12831
Analysis of the results of heat losses according to DIN 4701 and EN 12831

- The effect of the lump sum addition in heat losses for the interruption in heating, according to DIN 4701, the total transmission loss is 7-30% depending on the length of the interruption and Kriser values.

- When considering transmission losses without lump sum additions in heat losses, the situation is different: the transmission losses according to SRPS EN 12831:2012 are higher around 13%. 
Analysis of the results of heat losses according to DIN 4701 and EN 12831

- Much larger differences in results occur in the calculation of ventilation losses, where the losses according to DIN 4701 are more than 36% higher.

- When it comes to the calculation of the ventilation heat losses, the difference in the calculation methodology according to the mentioned standards is more prominent.

- The living room is taken as a characteristic room for this consideration.
Analysis of the results of heat losses according to DIN 4701 and EN 12831

The difference in ventilation losses is significant and higher up to 30% according to DIN 4701.
Analysis of the results of heat losses according to DIN 4701 and EN 12831

For the characteristic room (the living room), the results are also compared for heat losses obtained with both detailed and simplified calculation method according to SRPS EN 12831:2012.
Analysis of the results of heat losses according to DIN 4701 and EN 12831

- Detailed calculation includes linear thermal bridges in the construction joints and it is shown that the total losses in this case are 8% higher compared to the simplified calculation.
- By adding the required heating capacity to the ventilation and transmission losses according to SRPS EN 12831:2012, the overall design heat losses of the building are obtained.
- The heat losses highly depend on the proper selection of the heating factor.
Analysis of the results of heat losses according to DIN 4701 and EN 12831

Selection of external design temperature also affects the total heat losses.
Analysis of required heating bodies for various heating regimes and their influence on the price

- The number of necessary columns of heating bodies as well as the price of heating appliances are analysed as a variable depending on temperature regime and heat losses.

- Comparison is performed according to the installed heating appliances, depending on the heat losses calculated according to SRPS EN 12831:2012 and DIN 4701 methodology.
Analysis of required heating bodies for various heating regimes and their influence on the price

Based on the difference in heat losses, it can be concluded that, according to SRPS EN 12831:2012, about 22% more columns will be needed on average, than it would be according to the DIN 4701.
Analysis of required heating bodies for various heating regimes and their influence on the price

If the influence of temperature regime choice on the cost of the installed heating bodies is observed, the price difference is even more prominent.
Conclusion

Comparing the methodologies for the calculation of heat losses according to the standards SRPS EN 12831:2012 and DIN 4701 from 1959, it is concluded that the losses are higher by about 12% when using the SRPS EN 12831 standard.

Selection of heating-up capacity, and respectively, the proper selection of heating factor, affects the total heat losses greatly!!

Based on the difference in heat losses caused by using different calculation methodology, it is concluded that, according to SRPS EN 12831:2012, around 22% more columns for heating bodies will be needed and installed heating bodies will be up to 15% more expensive compared to the DIN 4701.
THANK YOU!