

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

**Miloš Č. Milijašević, M.Sc. Mech. Eng.**

MPP Jedinstvo AD, Omladinsko Šetalište 12a, 11000 Belgrade

[milosmilijasevic@yahoo.com](mailto:milosmilijasevic@yahoo.com)

**Tamara S. Bajc, M.Sc. Mech. Eng.**

Faculty of Mechanical Engineering University of Belgrade, Kraljice Marije 16, 11120 Belgrade

[tbajc@mas.bg.ac.rs](mailto:tbajc@mas.bg.ac.rs)

**Maja N. Todorović, Prof.Dr.**

Faculty of Mechanical Engineering University of Belgrade, Kraljice Marije 16, 11120 Belgrade

[mtodorovic@mas.bg.ac.rs](mailto:mtodorovic@mas.bg.ac.rs)

# Contents

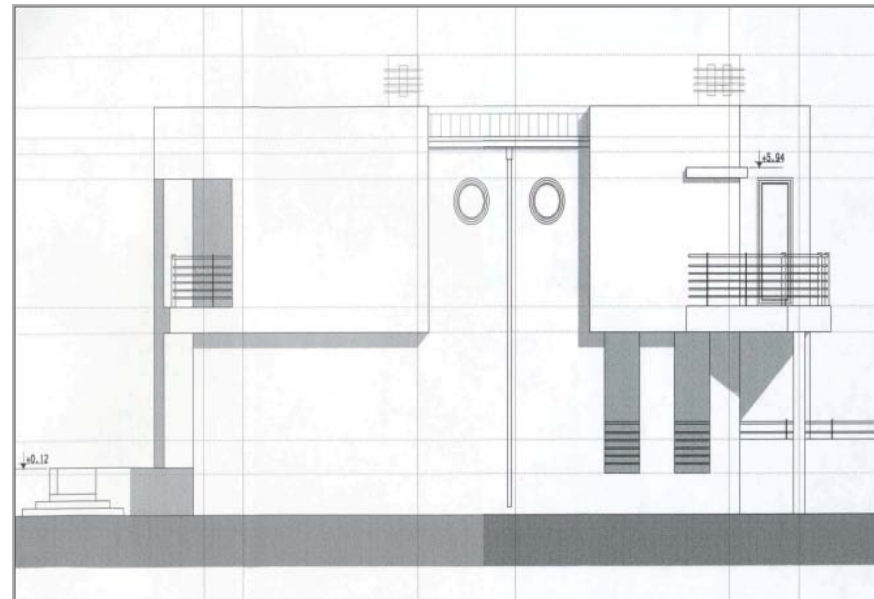
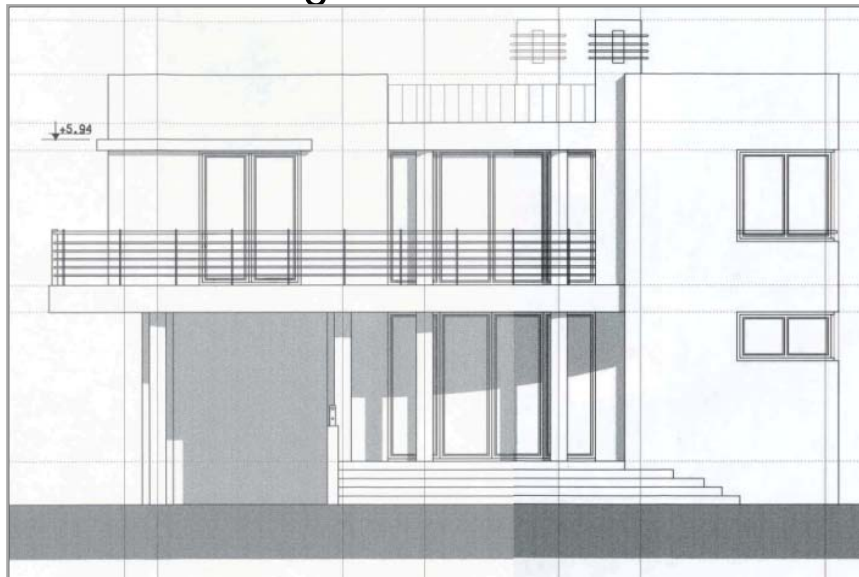
- ▶ Introduction
- ▶ The geometry of the building
- ▶ The methodology of calculating the heat losses
- ▶ Analysis of the results of the heat losses according to DIN 4701 and SRPS EN 12831:2012
- ▶ Analysis of the required heating bodies area for various heating regimes and their influence on the price
- ▶ Conclusions

# Introduction

- ▶ 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%.

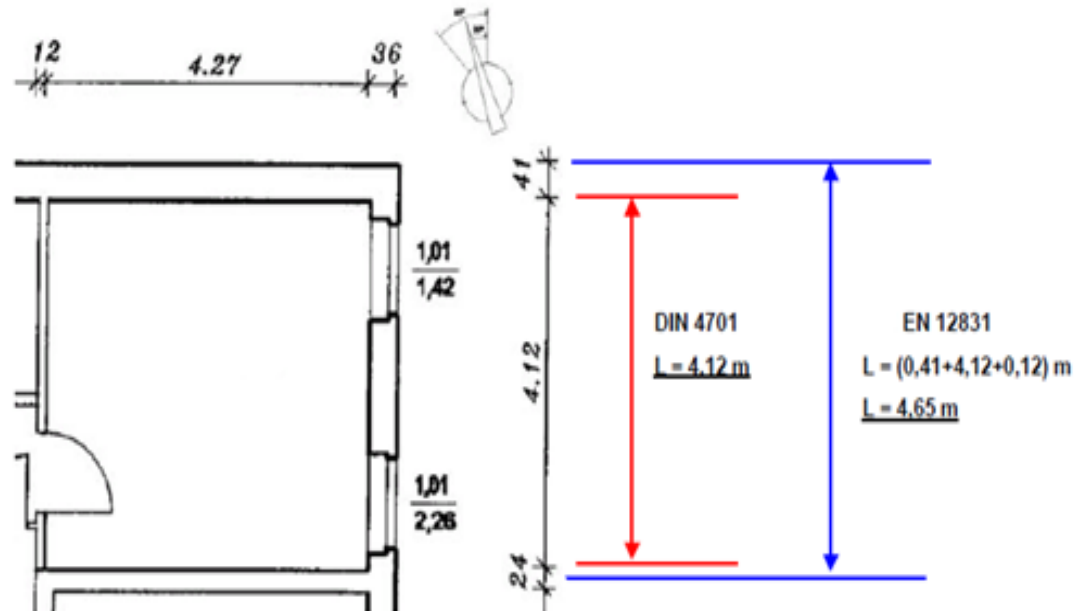
# The building geometry

- ▶ 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.

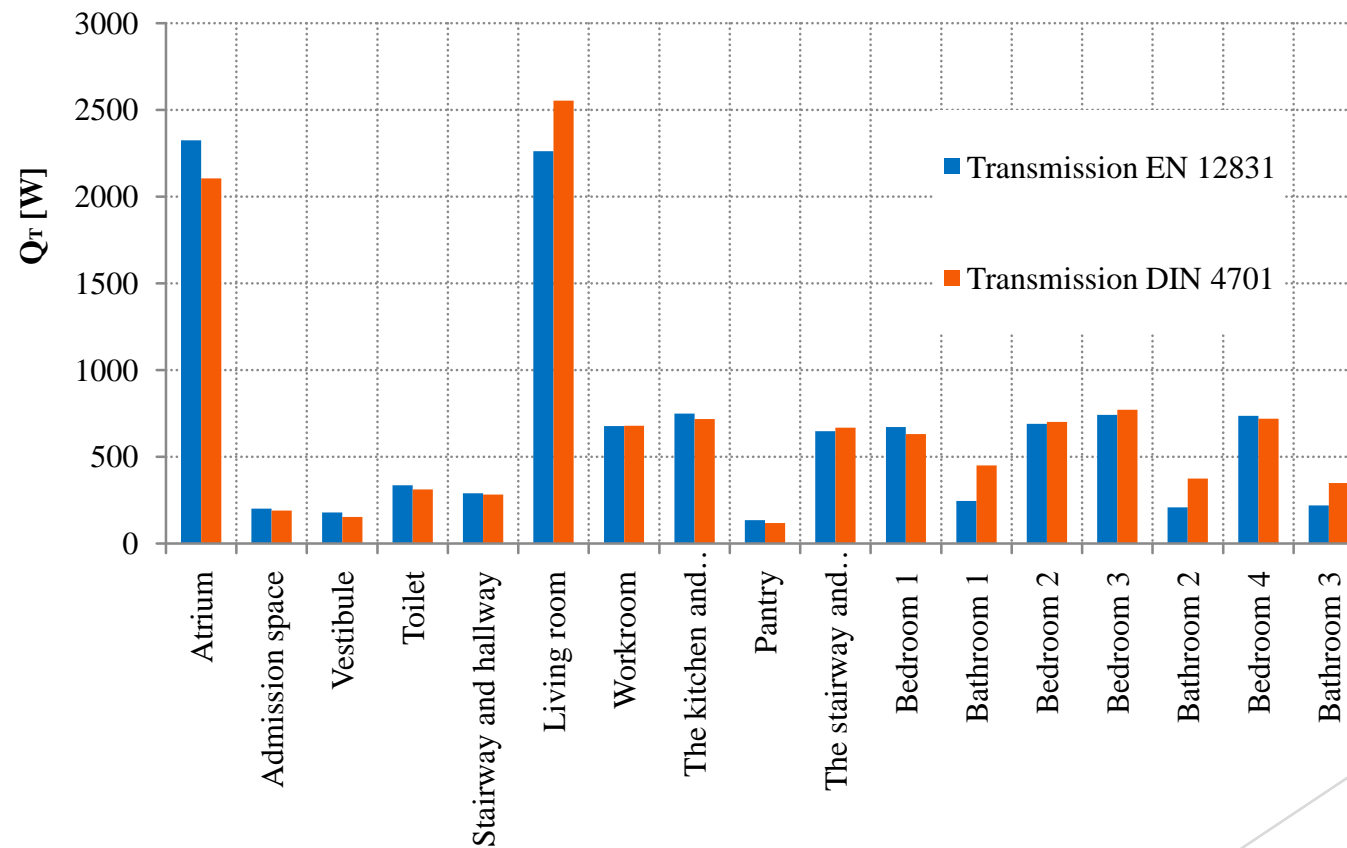


# The methodology of calculating heat losses

- ▶ 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.

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

- ▶ 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

- ▶ 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 K<sub>riser</sub> 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%.

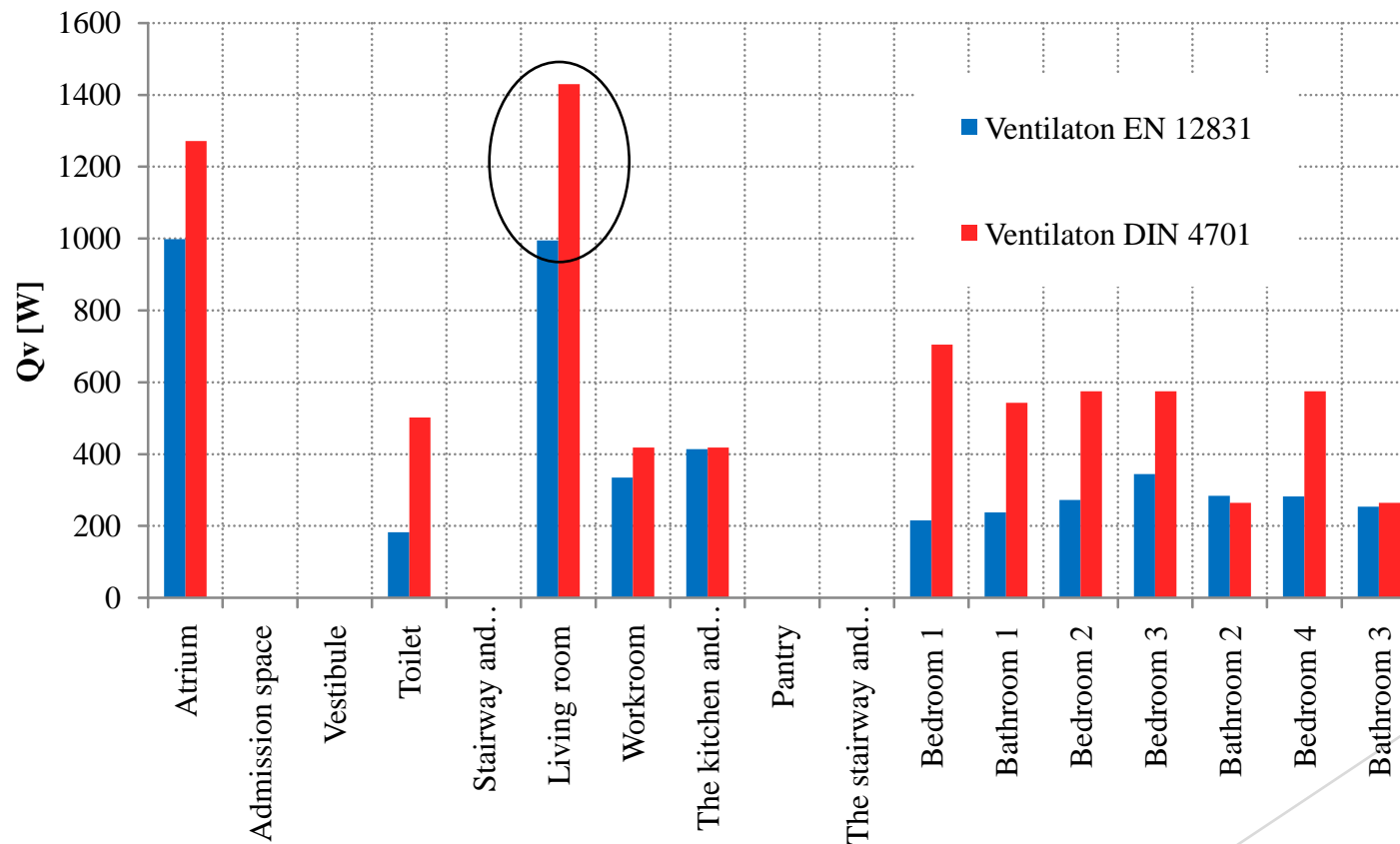


# Analysis of the results of heat losses according to DIN 4701 and EN 12831

- ▶ 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.

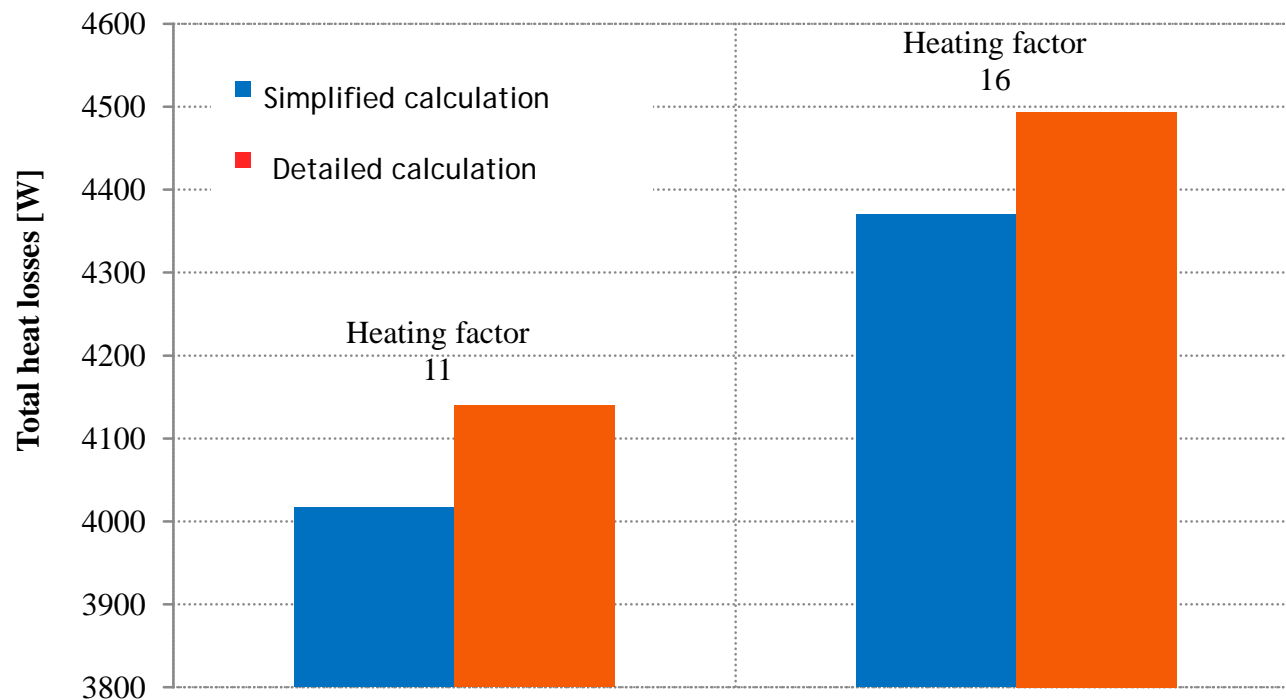
# Analysis of the results of heat losses according to DIN 4701 and EN 12831

- ▶ 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.

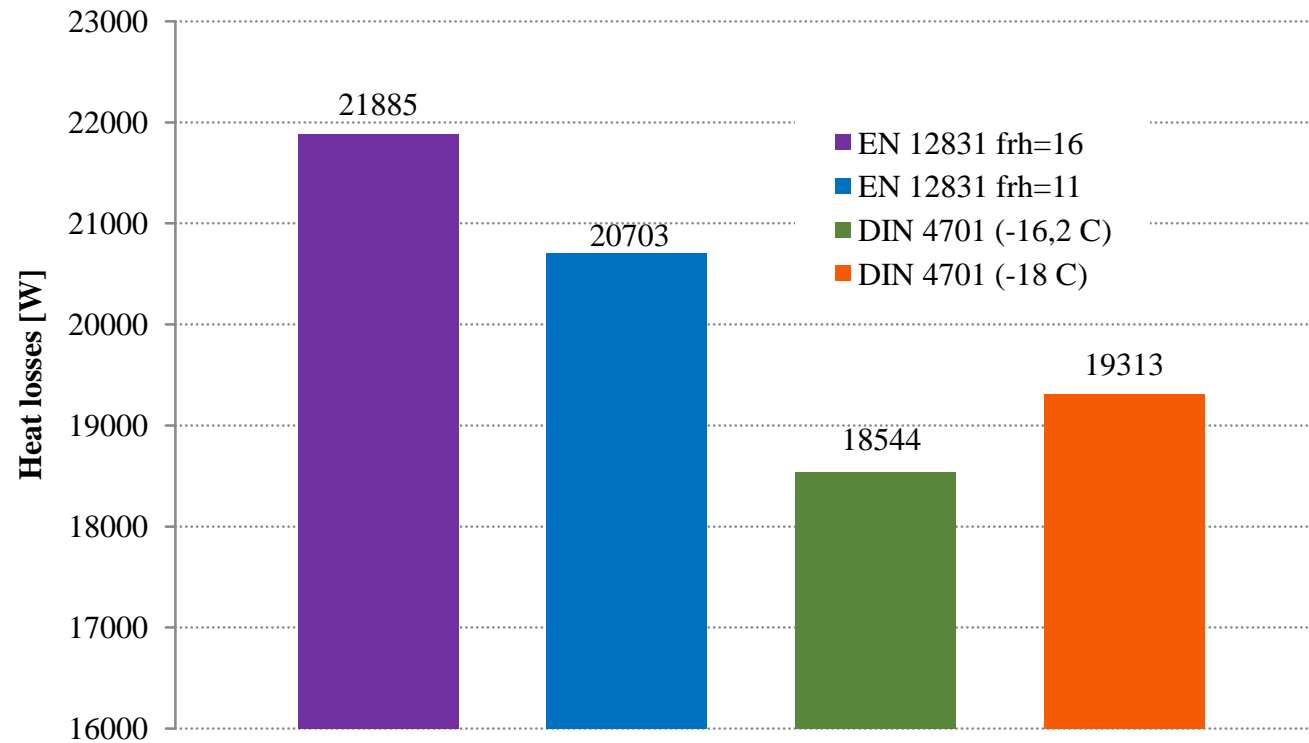


# Analysis of the results of heat losses according to DIN 4701 and EN 12831

- ▶ 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.

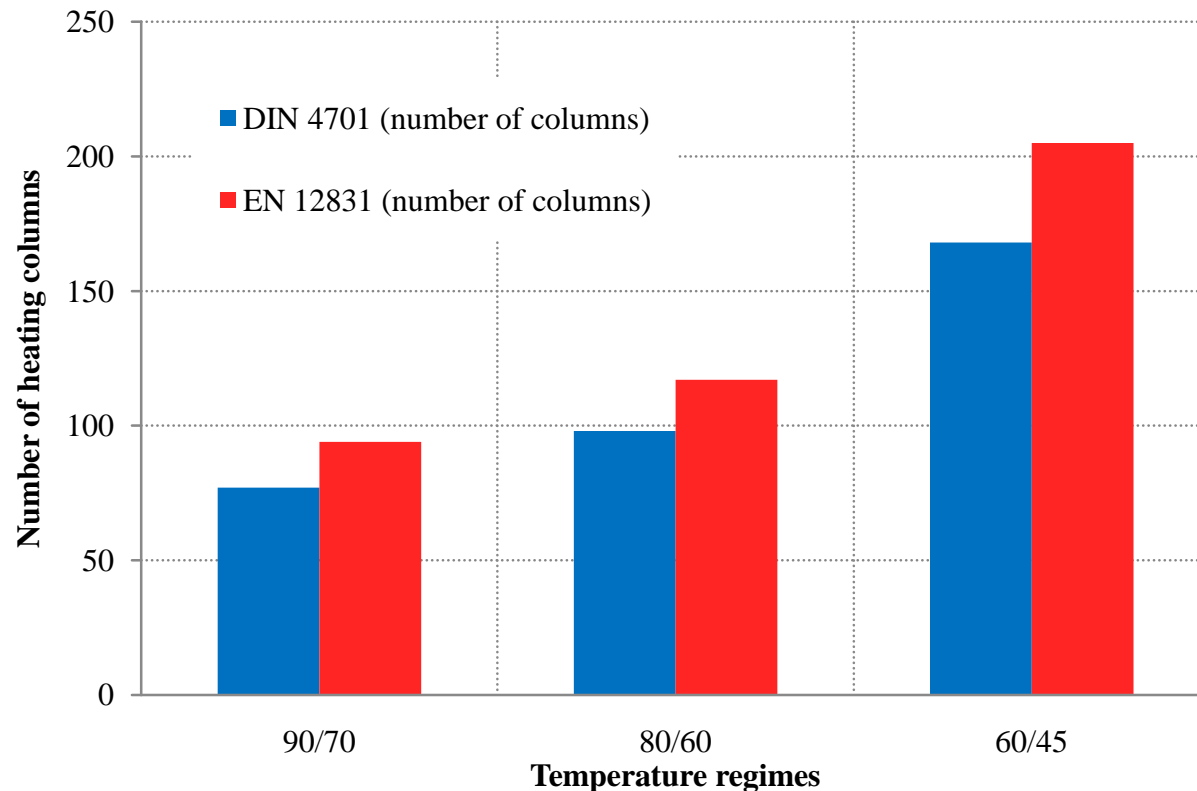


# Analysis of required heating bodies for various heating regimes and their influence on the price

- ▶ 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 .

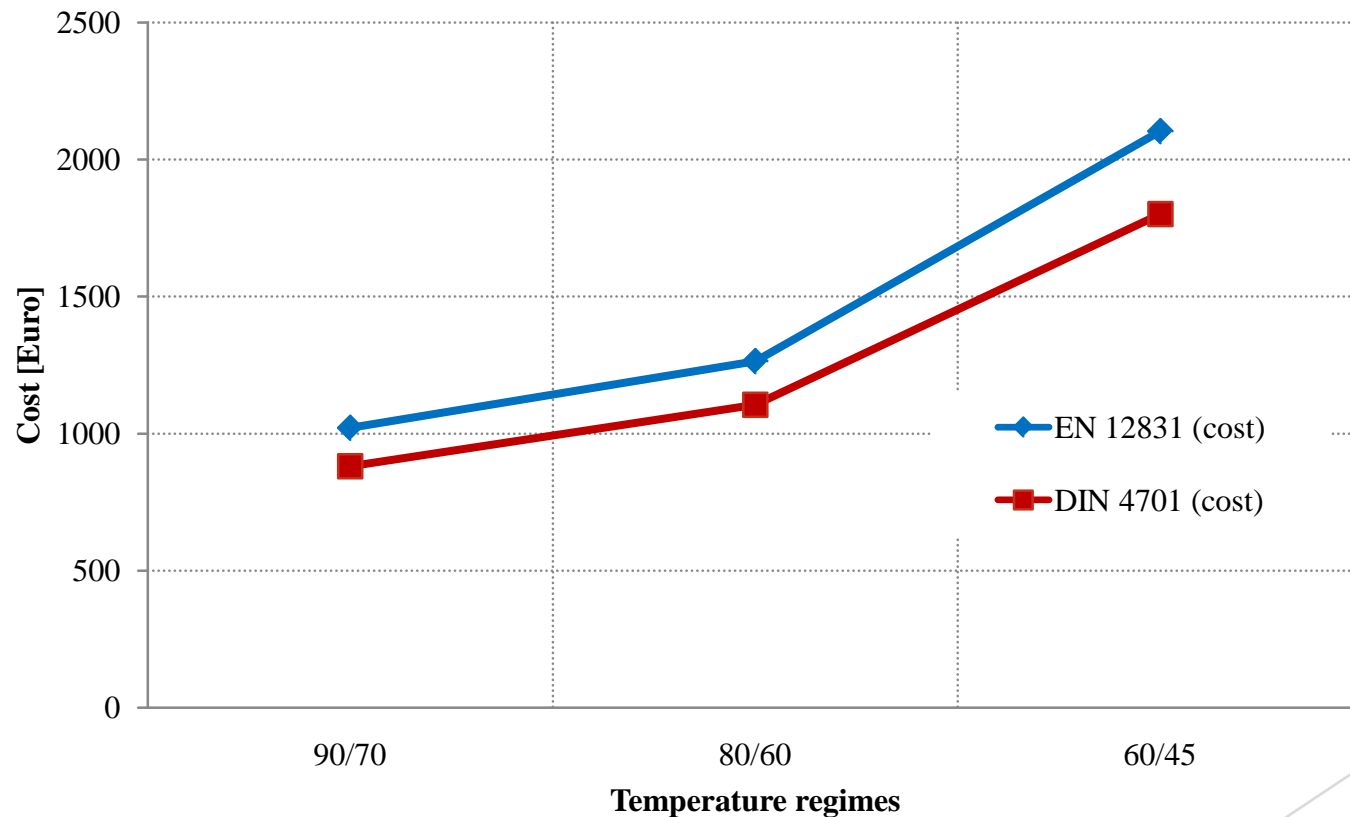
# Analysis of required heating bodies for various heating regimes and their influence on the price

- ▶ 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!**