distribution energy losses and to the plant management and maintenance are divided on the basis of millesimal tables based on the energy needs $Q_{H,nd}$ of single housing units. Different calculation methods of the heat transfer via unconditioned spaces can lead to a different distribution of costs. It is important to distinguish between the apartments located on the first and the last floors and those located on the intermediate floors.

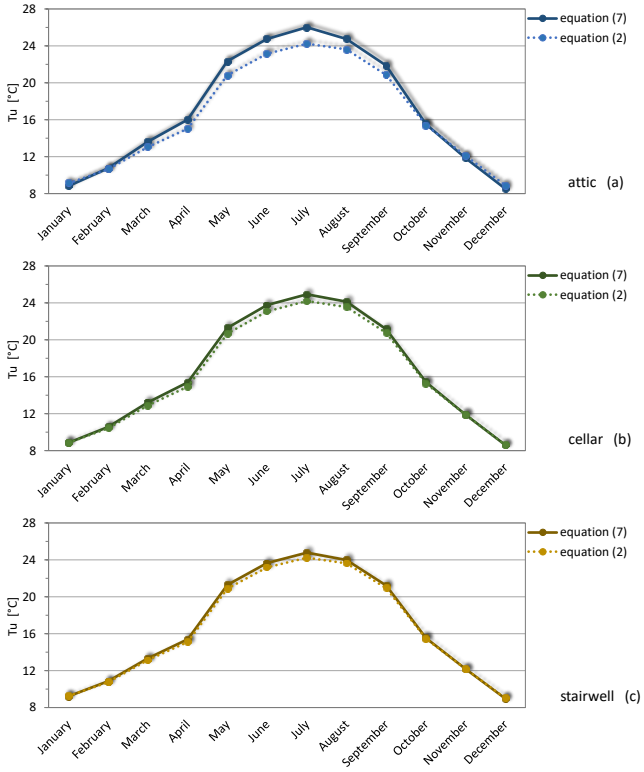

Figure 7. Effect of heat flux Φ on mean temperature of unconditioned spaces: attics (a), cellars (b) and stairwell (c)

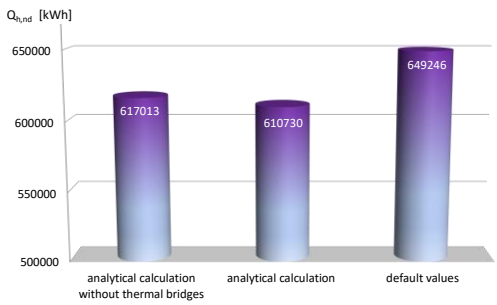

Figure 8. Comparison on $Q_{H,nd}$ values of entire building

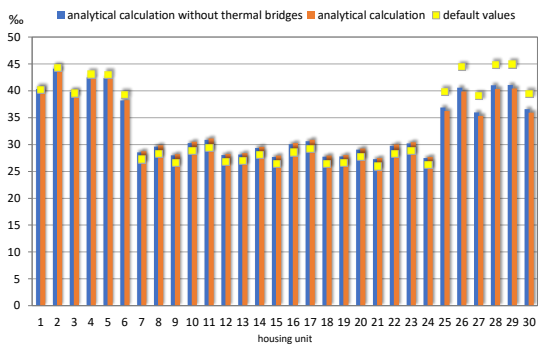

Figure 9. Comparison on condominium millesimal table

It results that the overestimation of the thermal exchanges, obtained by the default calculation procedure for attics and cellars, significantly penalizes the apartments on the top floor and, although to a lesser extent, those on the ground floor; the apartments on the intermediate floors have instead benefited. The thousandths of heating calculated with the default method can exceed even 10 % those calculated with the analytical method in the case of top floor apartments.

5. CONCLUSIONS

Three different calculation procedures for the heat transfer via unconditioned spaces in energy performance of buildings have been compared. The following conclusions can be drawn.

(1). default values of $b_{tr,U}$ lead to an overestimation of the heat exchange via unconditioned rooms respect to analytical calculation, in particular for attics and cellars;

(2). default calculation leads to overestimate the building energy need $Q_{H,nd}$ by over 6% respect to analytical calculation;

(3). the contribution of thermal bridges in H_{ue} coefficient is negligible; it follows that a future revision of the standard could make it possible to disregard the contribution of thermal bridges between unconditioned spaces and external environment and ground;

(4). different calculation procedures for heat transfer via unconditioned spaces can significantly influence the millesimal tables of heating in buildings equipped with centralized systems and thermal control and heat metering devices.

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NOMENCLATURE

A	area, m^2
b	adjustment factor
c	specific heat, $J.kg^{-1}.K^{-1}$
H	heat transfer coefficient, $W.K^{-1}$
L	length, m
n	air renewal rate, h^{-1}
P	perimeter, m
Q	thermal energy, J
T	temperature, K
U	transmittance, $W.m^{-2}.K^{-1}$
V	volume, m^3

Greek symbols

ρ	density, $kg.m^{-3}$
Φ	heat flux, W
ψ	linear transmittance, $W.m^{-1}.K^{-1}$

Subscripts

e	external
f	floor
g	ground
H	heating
i	internal
nd	needed
tr	transmission
U,u	unconditioned
ve	ventilation
w	wall