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RESEARCH CONCERNINIG THERMICAL LOSS CALCULATION

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Keyword: *thermical point, heat transfer, thermical bridge, thermical resistance.*
Abstract: *In order to fiind the correct solutions from a thermical point of view, we must take into account the following: the insulation of the walls, of the roofs, or terraces; the presence of thermical bridges; the types of windows and window frames; ventilation; the system of producing heat and hot water; the construction site.*

INTRODUCTION

The objects of the heat transfer research are obtaining a coherent quality balance for a building's structure because any wall assembly must have a covenient, suitable insulation and establishing a conventional energy consomption value for a building as a **C** coefficient (kilowatore primarly energy / year – Kwh/year) equal to the total of different forms of consumption (heating, warm water, ventilation, climatisation, auxiliary equipments, lighting, etc.),

Anual,energetic balance of a building shows that a dwelling has, by its very conception to:

- be well insulated, to minimize the energy loss in winter and to avoid climatization in summer;.
- have well oriented surfaces in order to optimize solar heating in winter and avoid excessive heat in summer

Exigences related to the summer confort reffer to the inner temperature that caaot be higher than a certain value (25- 26ºC), windows closed. This temperature depends on:

- the nature of the walls, opaque surfaces, transparent ones, especially, their orientation and inclination
- climate region
- building thermical inertia

solar protection: volets, stores, etc.

The building can be decomposed in various surfaces (walls) that can be also decomposed in various elements:

- the surfaces of the opaque or transparent walls:
  - exterior walls
  - terraces
  - panels (towards the garage, attics, etc.)
  - windows and doors (gates)
- a jonction line between panels and walls

The coefficent $K_{referință}$ [W/m^2·K] , represents a medium coefficent of loss through the walls, being a global heat shift coefficent $K_{ref.} = 1/R_p$ where , R_p ,represents the thermical resistence of the wall. The conductive thermical resistence of a wall depends on the wall's thickness (δ) and on the material's conductiveness coefficent (λ): $R_p = \frac{\delta}{\lambda}$

In what the insulation of different elements is concerned, the materials have a great importance. Their resistance must be higher than the minimum one depending on the destination and on the type of wall.

By thermical bridge we understand a region where the thermical insulation is interrupted and by which there is a heat loss to the exterior. These thermical bridges can damage the insulation. The more significant thermical bridges occur at the connections between:

- walls and superior panels
- walls and intermediary panels
- walls and inferior panels
- separating walls and inferior panels
- separating walls and exterior panels
- separating walls and intermediary panels
- separating walls and superior panels

Windows and window frames have different thermical qualities, depending on the materials that have been used (glass, wood, plastic, metal). They must have a global thermical resistance following reglementations or calculations of minimum thermical loss.

The ventilation (natural or through controlled ventilation systems) must not exceed a loss level of about 50W.

The system of heating and obtaing hot water (using an external or local primary energy source) reffers usually to a boiler or to a thermical micro-central (local source), associated to heaters or warmed panels.

The construction site means the altitude and its dependance of the average exterior temperature, a important element for the calculation.

A calculation of the economical rentability of an (energetical)investment based on the calculation of the financial benefits obtained is hard to do, because, especially of the fluctuation of the conventional combustible.

In order to avoid this dificulty, a method of duration of the investment recovery calculation has been suggested. This method is based on the determination of the energy contained in all the component parts of the instalation and on the conventional combustible economy obtained through the application of the investment.

In order to calculate the duration of the energetic recovery of an investment in the energetic field, we need to determin:

- the annual net economy of conventional combustible, E_c, in kg c.c. / year (or kWh/year);
- the consumption of the energy included in the products that constitute the instalation, C_e, in kg c.c. (or kWh).

$$D_{re}=C_e/E_c \quad \text{(years)}$$

CONCLUSION

The values needed for the thermic resistances will be calculated depending on the climate of the region where the building will be placed and the constructive solution will be adapted following these calculations in depending on The local climate will always determine the membrane types and their instalation procedure. The exterior thin sheet blocks the occurence of air currents through the wall, fact that would diminish considerably its insulating properties. The external thin-sheet is waterproof, but allows water vapours to

pass, so that the wall can “breathe”.

The membrane that blocks the passing of the water vapours is also very important, defining the inner humidity. It is wrong, although it is a frequent procedure in our country as well, to mount a polyethylene thin-sheet on the inner side of the wall, indifferently of the climate and of the destination of the house.

The polyethylene is practicly a barrier for the water vapours and its inner position is justified only by very cold climates in the long priods of the year.

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