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IMPROVED PERFORMANCE LEVELS FOR NEW AND REFURBISHED BUILDINGS

BY

ADRIAN RADU, MARICICA VASILACHE* and IRINA BARAN

“Gheorghe Asachi” Technical University of Iași
Faculty of Civil Engineering and Building Services

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Abstract. Residential buildings are long time goods, in many cases they are used more than 50 years. During this time, refurbishment works are necessary because of finishing works ageing and also because of earthquakes consequences which affect the constructive structure.

Today we are witnesses to a very dynamic technological progress in every domain and also the inhabitants' expectations are increasing. So that the performances requirements specific for residential buildings are changing.

The paper presents the new approaches concerning the today concept of comfort in residential buildings and the new performance requirements involved.

Key words: performance requirement; inhabitants' needs.

1. Introduction

In the era of “technological civilization”, mankind is experiencing a period of important improvements that are possible by the application of the results in various fields of science. So, many goods, which at a moment, were considered having very good performance, become morally exceeded, though not physically, they must be replaced with new ones, more efficient and, in this

*Corresponding author: *e-mail*: vasilachemaricica@gmail.com

way, they may become waste. Examples are many, in all fields: transportation and communication, household or industrial equipment, medicines, crops, etc.

It is a real revolution, in the way that nothing can stand. However, especially the buildings, which have always been designed to withstand for an indefinite time, are generally an exception to this general rule. Some of them become historical monuments which are kept as true objects of museum, very valuable. Ordinary residential buildings considered definitive, which are basically designed to be used on average more than 50 years, often end up being useful even after a century and finishing works, fittings and furniture after 20...30 years.

Always it is necessary the adaptation to a higher level of performance for new or restored buildings, as is done now, in order to reduce the specific consumption of energy obtained by burning fossil fuels which release pollutants and to be adapted to various actions. Consolidation of buildings is part of the construction modernization in order to cope with predictable earthquakes and material ageing.

In this respect the progress made in structural dynamics are applied, and it is appreciated if some buildings need to be demolished. In what follows we focused only on a few cases of this kind which cover some essential requirements for the performance of civil buildings (provided by Law No. 10 on construction quality) taken into account that they have to be adapted to users' needs and environmental conditions that may change over time. The law no.10/1995, including its amendment from 2007, establishes a list of six essential requirements of performance:

- a) mechanical resistance and stability;
- b) fire safety;
- c) hygiene, health and environment;
- d) safety in operation;
- e) protection against noise;
- f) energy saving and thermal insulation,

but does not set performance levels required, it is the role of technical regulations. Now impose their application to ensure sustainable development.

2. Thermal Rehabilitation

The choice of this name which become classic, taken from the juridical vocabulary, does not meet the target and would probably be better to adopt the term "energy efficiency" in order to include the use of various new resources, clean, instead of fossil fuels. In this domain revolutionary innovations are possible that would radically change the targets of energy modernization of buildings.

In the future, the generalization of passive houses or active houses involve the use of excessive thickness of the closing elements and of the energy-intensive insulation materials such as expanded polystyrene, mineral wool and polyurethane foam, for production of which are consumed huge amounts of conventional energy.

New opportunities appear on the horizon that would change the meaning of the current situation. Various proposals are based on the existence of carbon dioxide into the atmosphere and hydrogen in water. But hydrocarbons are composed of hydrogen and carbon. So, it must be found a way to combine carbon from the air and hydrogen from water which can be obtained by electrolysis, the necessary electricity being provided by clean resources. In this way, two favourable effects could appear: the decreasing of CO₂ concentration in the atmosphere and a more convenient source of hydrocarbons. If we think, is what plants made every day: they absorb air with carbon dioxide, sunlight and water from the ground, producing fuel mass.

The creation of such systems could change the buildings position in the energy efficiency domain and more. For now, in the struggle between energy get from fossil sources and new ones from the sun and wind, the costs are in favour of the first, and the EU is in a unfavourable situation. However, supplementation of thermal protection level to all buildings, remains necessary. We should pay attention to the German commendation stating that a positive energy building should not consume more than 120 kWh.ep/m².year (primary energy per square meter and year), of which 15 kWh.ep/m² is for the heating and the rest for appliances, lighting, elevator, etc. In comparison, the French rule requires for the rehabilitated buildings, the objective of 50 kWh/m². year.

3. The Access into Buildings

With few exceptions, the access and exit from civil buildings, especially blocks of flats with less than P + 4 levels, is made only by stairs, and recently it has been approved the addition and implementation of attics, so the real number of levels increased with one or two. At the same time, it should be considered that changes intervened in the population structure. Now, there are more and more disabled, victims of car accidents or other causes and elders over a certain age which cannot go alone on the stairs, especially if the stairs are with dancing steps and if there are no handrail or balusters on both sides. The descent is difficult and the carriage is not useful. So many people are trapped, doomed for life to not be able to leave home.

Difficulties meet also mothers with small children or grandparents living with their grandchildren.

Very useful would be the achievement of access ramps into the building, but still do not solve the problem. Only the installation of an elevator

next to each staircase may be sufficient. In France appeared modern types, light elevators that can be added to the staircases and supported by a steel structure attached to the building. They become now necessary to us, to help people which are otherwise definitively convicted to reclusion. The stairs are still good for muscle training and in cases when the elevator is out of order.

4. The Kitchen

This is very much influenced by changing of the living time and of new appliances in the kitchen that are needed. In place of the old refrigerator Fram, now a large refrigerator is required having two compartments, each of 150...180 L, because families go weekly to supermarket located at outskirts of the city, because they have no time to go more often to the market and they want to buy at low prices. The kitchen table is necessary only to have breakfast and dinner. In addition to the stove, there are necessary a dishwasher, a toaster, a microwave and even a tv-set. All these involve adequate space, so it often becomes an open kitchen connected to the living room. In our tradition, next to the kitchen there is an unheated pantry, for food that does not require refrigerator storage (jams, juices, wine, etc.) and they should be reintroduced for comfort and energy savings.

5. The Floors

It is noticed that it is a new habit to replace the old wooden or mosaic floors with aesthetic floors in kitchens, bathrooms and hallways. It is a mistake if they are shiny, because they can cause household accidents. It must be mentioned also the error to cover the entire floor with a moquette and rarely on an entire storey, because in this way a serious risk of fire spreading is created.

Taking into account that climate changes are increasing, all buildings must have the floor of the ground floor at least 60 cm above the sidewalk elevation. In floodplains, this height must be exceeded and a floodable area can be get where water can drain freely.

7. Curtains and Shutters

The windows have very important functions for the quality of the inhabited space. For this reason and for aesthetics reasons, architecture uses large glass surfaces. But the windows have a thermal resistance (even if they have the frame and sash with multiple rooms including thermo-reflective double glazing) much smaller than the opaque walls. Therefore, for comfort and energy savings, it is necessary to be additionally coated with extra clothing that can be put:

a) on the outside, as traditional shutters that can be protected by 1...2 cm of expanded polystyrene or plastic or wooden blinds that are wrapped around an horizontal axis;

b) on the inside, as curtains formed by two types, the first thin and transparent and the second opaque and thick.

The thermal resistance is ensured by two layers of air between the window and curtains, but especially by the thick curtain. In winter, it must cover the window at nightfall. In summer, it can prevent sunlight from morning hours when inhabitants are still sleeping. It should be noted that both curtains must not exceed the heating elements placed below the window. The best is that the curtains lie between the wall and radiator, limiting the convection. The windows have the highest heat loss through the frames and therefore is good for curtains to cover the side and part of the wall. It should be considered that there are safety issues for persons who come to clean the windows by hand washing.

Another useful measure is the disposing between the wall and the heating elements of a heat reflective insulation boards that can be removed to be cleaned periodically. This decreases the reflective thermal capacity of the surface.

7. The Bathroom

It is important for family comfort; it must include the sink, tub, toilet, bidet, washing and dryer machine. In addition it is required a separate room for a shower, sink and toilet because spouses must be able to simultaneously prepare to go to work. If there are children, this is even more useful. From a certain age, the elderly, the sick, the disabled, and so on, I cannot use the bathtub and they need a shower cabin.

8. The Fire Safety

In current conditions, taking into account the increasing number of levels, the addition of attics and the achievement of parking spaces for cars in the basement of buildings, specific rules must be strictly obeyed and sometimes complemented on the basis of numerical simulation of the fire in that building, which can have particular conditions.

9. The Basement

Boxes built in the basement for storage, represent a destination that now is no longer needed, so they can be replaced according to the willingness and ability of owners, but also in relation to existing technical and economic possibilities.

There it could be a sport room, another for the office administration and even medical office.

In the new projects, the basement must be equipped with a car parking.

10. The Natural Ventilation

Ensuring the indoor comfort with low energy consumption must be considered together with the requirement of hygiene, health and environment. Natural ventilation ensures fresh air needed for breathing and removing water vapour and pollutants resulting from the use of habited space. Refreshing indoor air becomes a restrictive and sometimes deficient operation when the carpentry has sealing gaskets and few glass panes. The solutions with ventilation flap, or other devices with adjustable or constant flow ventilation and triple opening of the mobile glass panes are rarely applied due to high costs. Condensation situations or diseases are very common due to insufficient ventilation.

For reasons of hygiene, comfort, safety, etc., the ventilation solution of an apartment located in a condominium should be established completely separated from any other apartments and from the staircase.

Spaces for kitchen, bathroom and shower should have windows to one of the façades of the building, otherwise they require the use of electrically powered ventilation.

The ventilation vertical channel in habited spaces could be an old chimney or a PVC tube with 15 cm in diameter, embedded in the wall or attached tangent to it. The natural circulation is ensured during all the winter season, because inside the building is warmer than outside. In the warm season this circulation takes place only during the night till the sunrise. A single vertical tube can be enough for a 2 or 3 rooms apartment. Interior doors should be some distance from the floor. Windows, even with PVC frames and double glazing, have yet each a little permeability. In summer time, the natural ventilation is provided anyway by windows opening.

11. Conclusions

Buildings are long time goods, but the population development and the technical progress require significant changes of the current levels of performance requirement concerning the buildings quality. This creates additional costs that cannot be neglected. The mentioned issues are not related to the transition to a luxury level, but only to meet the new needs that become more important now for the middle class.

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NIVELURI DE PERFORMANȚĂ ÎMBUNĂTĂȚITE PENTRU CLĂDIRILE NOI SAU RENOVATE

(Rezumat)

Locuințele colective sunt bunuri cu durată tehnică de viață importantă; în majoritatea cazurilor acestea sunt utilizate mai mult de 50 de ani. În această perioadă sunt necesare lucrări de reparații curente sau capitale pentru refacerea finisajelor sau reducerea efectelor cutremurelor asupra structurii de rezistență.

Astăzi suntem martorii unui progres tehnologic foarte dinamic în toate domeniile. În același timp, exigențele utilizatorilor s-au modificat astfel încât performanțele specifice pentru clădiri rezidențiale sunt în schimbare.

Lucrarea prezintă o serie de abordări noi privind conceptul actual de confort în clădiri rezidențiale și noile cerințe de performanță implicate.

