
MARKET OPPORTUNITIES FOR ADVANCED VENTILATION TECHNOLOGY

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Overview of key aspects in the proposed Energy Performance Regulation for the Flemish Region in Belgium

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1. Introduction

It is expected that there will be in 2003 an energy performance regulation for the Flemish Region. In the framework of the VLIET-EPIGOON project, a proposal for such legislation is under preparation.

This paper describes the global context for the envisaged regulation. Moreover, a number of specific issues are briefly presented.

2. Global context for the envisaged Flemish regulation

• Description of present situation

Since 1992, new dwellings have to meet a minimum performance in relation to the thermal insulation of the building envelope. Moreover, there are minimum requirements for the U-value of individual building components. For existing dwellings, there are only thermal insulation requirements at component level.

There are no requirements for other buildings. Moreover, there are no requirements on other energy related aspects.

As far as indoor climate is concerned, there are no minimum requirements concerning ventilation.

• Energy Performance approach

The envisaged regulation aims to impose a maximum allowable primary energy use of dwellings, schools and office buildings under well defined boundary conditions. See §3.1.

- **Specific attention for indoor climate**

It is the intention that the envisaged regulation combines requirements concerning energy efficiency with minimum requirements concerning the ventilation performances. Moreover, it is foreseen to pay attention to thermal comfort in summer.

- **Correct application of regulations**

In the framework of the VLIET-SENVIVV, the performances of 200 dwellings (most of them constructed in the beginning of the nineties) in the Flemish Region were analysed (BBRI, 2000). The outcome of this study has clearly shown that the majority of new Flemish dwellings are not in line with the legal requirements concerning the thermal insulation. See figure 1 and table 1.

Given the fact that the required insulation levels are cost effective and in principle not a source of technical problems, it is evident that specific efforts are needed for a better implementation in daily practice. Apparently, the notion of quality by the decision makers is not at all similar to good performances.

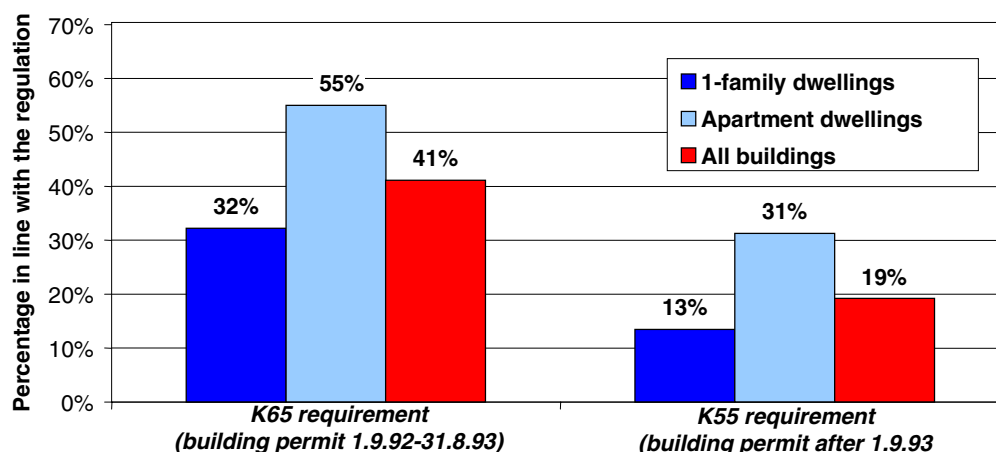


figure 1 : Percentage of new Flemish dwellings in line with thermal regulation
Source : BBRI(2000)

Requirement (date building permit)	Individual dwellings		Apartment dwellings	
	Average K-level	Number	Average K-level	Number
No requirement (before 1.9.92)	75	33	67	17
K65 requirement (1.9.92 – 31.8.93)	76	31	67	20
K55 requirement (after 1.9.93)	75	67	65	32
Global	75	131	66	69

table 1 : Average K-levels (according to NBN B62-301) found in VLIET-SENVIVV dwellings
Source : BBRI(2000)

Based on these findings and on discussions with mainly Belgian stakeholders, it is believed that a substantial improvement is only possible if a number of additional measures are taken. The following elements are considered as essential for the creation of a good framework for compliance with regulations in the Flemish Region :

1. Availability of a set of clear procedures and requirements (§2.1);

2. Framework allowing dossier as built (§2.2);
3. Clear and coherent task descriptions for the different actors (§2.3).
4. Effective implementation of coherent control procedures

These aspects are further developed in the next paragraphs.

2.1 Quality assurance : Development of clear procedures and requirements is essential

If there is confusion about the application and interpretation of the requirements, there is a very weak basis for carrying out a coherent control procedure. Preferably, the procedures should be optimal from the beginning. In case existing procedures have a lack of clarity, it may be appropriate to adjust the procedures.

Such adjustment procedure has been applied for the existing regulations in Belgium concerning the thermal insulation of buildings. A brief description of some key elements is given :

- Control of the regulations is taken place in the Flemish and Walloon Region since 1996. The people in charge of the control were confronted with several unclear situations.
- In order to improve the situation, a working group was created in the middle of 1997. It consisted originally of representatives of the 3 Regions and BBRI, later on also representatives from the architects, building contractors and material producers have been involved.
- The key objective was to identify all existing problems and to work out pragmatic solutions. Examples of such problems are:
 - Lack of clarity concerning λ -values to be used for thermal insulation materials;
 - Difficulties for identifying the central U-value of glazing units;
 - Heavy discussions concerning the thermal conductivity of e.g. cellular concrete.
- The outcome of the work were agreed procedures for the present regulation and the setting up of a website (address : <http://www.bbri.be/webcontrole>) which describes these procedures and which has links to databases with applicable product data.

2.2 Quality assurance : Framework allowing dossier as built

Appropriate control schemes are often crucial for achieving quality. It was felt that it is essential that a new regulation is based on a dossier as built.

The motivations for considering such approach include the following elements :

- Control of the building regulations with regard to the thermal insulation of buildings is carried out in the Flemish Region since several years. There are control actions at the moment that the building permit is requested as well as on site during the construction process.
- The majority of these controls is done at the moment of the building permit and this procedure is fully based on documents delivered by the building owner (often prepared by the architect). In principle, this procedure allows to check if the proposal is in line with the building regulations.

- For many Belgian individual dwelling projects, no detailed execution plans are made and, if done, rather important differences are sometimes found between the plans and the real execution. The reasons for such differences vary: limited attention for having correct plans, modifications during the construction phase because of unforeseen events, voluntary performance reductions which are not longer in line with the requirements,...
- Therefore, it is evident that it is not sufficient to have only a control at the moment of the building permit. On site control by governmental officials is a useful further step. However, such control cannot solve all potential problems :
 - The required efforts and costs of such control is very substantial. It is not possible to control the majority of new buildings.
 - It is not possible to control all relevant aspects : hidden parts, thermal bridges,...

For the Belgian context, the preferential framework for maximising in a pragmatic way the achievement of the building regulations seems to be the concept of a 'dossier as built'. Since the beginning of 1997, this concept in combination with pragmatic control procedures has been promoted since it seems to have many advantages :

- The motivated architects are in a stronger position to impose the required minimal performance;
- The motivated builders know quite well the composition of their building. They will have the possibility of checking the conformity between the dossier 'as built' and the reality;
- The material producers and building contractors are in a stronger position for applying the required materials;
- As a result, the governmental officials will not longer be the only controllers, since motivated building owners, suppliers (architects, material producers, building contractors,...) and possible buyers of the building are becoming able to carry out control;
- The risk of non-compliance with the regulations strongly reduces and it will lead to more energy efficient buildings and a better environmental performance of the Belgian building stock;
- Finally, a dossier 'as built' is at the same time an ideal document for energy certification.

2.3 Quality assurance : Clear and coherent task descriptions for the different actors

The implementation of control procedures involves various actors: building owners, architects, material producers, building contractors, administrations at various levels (community, regional,...),...

If there is confusion in the task description of the different actors, there is a large probability of poor results and/or many conflicts.

As an example of such lack of clarity in the task descriptions, the role of the architect in the Belgian control procedure can be taken. There clearly is a ambiguity with respect to the role of the architect in the building process and the application of the building regulations :

- The law of 1939 (Official Journal, 1939), which regulates the construction of buildings in Belgium, imposes the involvement of an architect in the design of a building and/or in

cases of major retrofitting activities. However, it does not impose that the building owner must make use of the architect with respect to the fulfilment of the regulations.

- The National Association of Architects, who legally (Official Journal, 1963) is mandated to organise the profession of architects in Belgium, requires from each architect that he respects the existing legislation. Non compliance can result in a sanction by the Association.
- As far as the government is concerned, it is the owner who has to prove compliance with the local regulation.
- In practice, the building owner must respect the legislation (thermal insulation, ventilation, environmental impact, security on the construction side, avoidance of illegal workmanship,...) and he is at present not obliged to involve the architect in this process.
- Finally, there has not been agreed procedures with respect to the remuneration of the architect for these additional tasks.

It is a fact that these boundary conditions are not contributing to a strong interest on the part of the architectural society. Therefore, an important aspect of the envisaged revision of the regulation is to create correct and stimulating conditions for the various actors.

3. Presentation of proposed Flemish regulation on energy performance

3.1 General

The main features of the proposed regulation are :

- There is a general requirement on the maximum allowable primary energy use of the building under well defined boundary conditions. Such requirement will be imposed for dwellings, schools and office buildings. The calculation of the primary energy use takes in to account :
 - Thermal characteristics of the building envelope, including thermal bridges;
 - Solar gains
 - Energy use due to heating/cooling of ventilation air, air infiltration, fan energy, heat recovery,...;
 - Characteristics of systems for space heating and hot water;
 - Availability of renewable energy sources;
 - Energy use for cooling;
 - Energy use for lighting (only schools and office buildings);
 - A correction term in relation to summer comfort
 - Energy vector: fuel, gas, electricity,...
- Additionally, there are for all buildings minimum requirements concerning thermal insulation;
- Moreover, there are requirements concerning minimum ventilation provisions in all buildings.
- For certain performances, execution relation aspects are taken into account.

3.2 Overview of ventilation related aspects

The envisaged new regulation takes the following ventilation related aspects into account :

- Building airtightness
- Ductwork airtightness
- Correctness of air flow rates
- Energy use for fans
- Heat recovery systems

In the case of offices and schools, there is a possibility to use higher air flow rates than the minimum values required by the legislation. In such case, the allowable primary energy use is higher than the allowable primary energy use when using the minimum air flow rates.

3.3 Control of regulation

3.3.1 In general

Whereas for the present regulation, a written proof of compliance is only required at the moment of the building permit, the new regulation will put the emphasis of the proof of compliance after the finalisation of the works. It is called the EP declaration.

As a result, uncertainties in the technologies to be applied, changes in design after the moment of introducing the request for building permit,... are not longer an issue of concern. The person in charge of the EP declaration has to describe the measures which are effectively applied.

3.3.2 Dossier as built : EP declaration

The EP declaration is an essential element in the envisaged new regulation. All observed non-compliances between the declared performances and the real performances can lead to a financial penalty. Such non-compliance has to be made by the administration of the Flemish Region. However, also owners, renters and other persons with a specific link to the building have access to the EP declaration and can identify shortcomings. Up to 5 years after the EP declaration has been submitted, anomalies can be penalised.

Moreover, whereas the present regulation requires the decision of a judge, the proposed new regulation allows the administration to decide on the penalty.

3.4 Execution related aspects

It is well known that execution related aspects can substantially influence the performances of certain technologies. In the framework of the envisaged regulation and given the fact that there will be a dossier as built, it is planned to take into account the following execution related aspects :

- Building airtightness
- Ductwork airtightness
- Air flow rate control

Other aspects, e.g. a correct placement of thermal insulation, are also important. However, it is felt that it is not possible to have an unambiguous control scheme and therefore these aspects are not included.

3.5 Collection of input data

As already discussed in §2.1, it is important that there are clear procedures for the determination of the input data to be used in the calculations.

This will surely be the case when using an EP procedure.

It will require to have unambiguous data concerning e.g. fan power, efficiency of heat exchangers, efficiency of boilers,... Therefore, it is necessary to develop for each of them clear procedures for performance determination. Of course, the CEN standards will be used as much as possible.

Also for execution related performances (e.g. building and ductwork airtightness,...), it is very important to have very clear descriptions about the measurement procedures.

3.6 Handling of innovative systems – principle of equivalence

An energy performance standardisation and regulation cannot include procedures for all kind of innovative and complex systems.

However, it is crucial that new and innovative systems can be evaluated in the framework of such regulation. If not, the regulation would be a major barrier for the application of such technologies.

Therefore, it is foreseen to have a framework for the assessment of innovative systems. In principle, such evaluation will be done at national or regional level. The practical implementation of these procedures still have to be developed.

4. Conclusions

It is expected that the envisaged Flemish Regulation on energy performance will contribute to better performances of the building stock in the Flemish Region. As indicated in the paper, the lessons learned from the (poor) application of the existing regulation result in specific attention to a correct application of the requirements.

As far as opportunities for advanced ventilation technology are concerned, the proposed legislation pays attention to a wide range of ventilation related issues. Moreover, the principle of equivalence in principle allows to handle other innovative ventilation systems.

5. Acknowledgments

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6. References

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