

PROJECT DOCUMENT

Status: PUBLIC

Enquiry Analysis of the CEN-standards on Ventilation and Air Conditioning. Recommendations

Hicham LAHMIDI

CSTB Energy Environment Development and Prospective
Email: Hicham.lahmidi@cstb.fr

CENSE_WP5.3_N01

May 4, 2010

IEE-CENSE

*Leading the CEN Standards on Energy performance of buildings to practice
Towards effective support of the EPBD implementation and acceleration
in the EU Member States*

Supported by

Intelligent Energy  Europe

Contract EIE/07/069/SI2.466698

<back side of front page; save trees and money by printing double-sided>

Contents

1	The CENSE Project	5
2	Aim of the report	7
3	Software enquiry (Brussels, 29 th of June 2009)	7
3.1	Introduction	7
3.2	Software enquiry	7
3.2.1	Software tools for non EPBD purposes	7
3.2.2	CEN standards and software	8
4	Short Questionnaires about EN 15241 – EN 15242 – EN 13779	9
5	Feedback on inspection standards, other feedback	10
5.1	Feedback on inspection standards	10
5.2	Other feedback	11
6	Conclusions and Recommendations	12
	Annex A – CENSE Software workshop enquiry (Brussels June 29, 2009)	13
	Annex B – Three Short Questionnaires about EN 15241 – EN 15242 – EN 13779	14

Disclaimer:

CENSE has received funding from the Community's Intelligent Energy Europe programme under the contract EIE/07/069/SI2.466698.

The content of this document reflects the authors view. The author(s) and the European Commission are not liable for any use that may be made of the information contained therein.

1 The CENSE Project

The aim of the CENSE project is to support the EU Member States and other target groups in gaining awareness and achieving effective use of the European (CEN) standards that are related to the EPBD.

These standards were successively published in the years 2007-2008 and are currently either already being implemented or will soon be implemented in many EU Member States.

The European Commission, DG TREN and DG Enterprise, gave Mandate 343 to CEN. It ordered CEN to develop a methodology for calculating the integrated energy performance of buildings in accordance with the terms set forth in Directive 2002/91/EC (Energy Performance of Buildings Directive-EPBD).

Access to this methodology in the form of European Standards makes it possible to coordinate the various measures for improving the energy efficiency in buildings that are used in the Member States. It will increase the accessibility, transparency and objectivity of energy performance assessment in the Member States (as mentioned in recital (10) of the EPBD).

The role of the EPBD-CEN standards is to provide a common European concept and common methods for preparing energy performance certification and energy inspections of buildings. However, the implementation of these CEN standards in the EU Member States is far from trivial: the standards cover a wide variety of levels and a wide range of interlaced topics from different areas of expertise. They comprise different levels of complexity and allow differentiation and national choices at various levels for different applications.

One of the main activities in the CENSE project is *"to communicate the role, status and content of these standards as widely as possible and to provide guidance on their implementation"*. To fulfil this task many so called Information Papers have been published with background and practical information related to the CEN standards developed in the framework of the EPBD. The Information Papers of each work field in the energy building sector are compiled in a Booklet.

In each booklet, the Information Papers are clustered to the specific appliances, systems, calculation methods,..etc. Additional to each Information Paper a Power Point Presentation is at disposal for dissemination and training purposes. All these documents and more information, like a database with frequently asked questions, are separately available on the CENSE website: <http://www.iee-cense.eu/>

A second major activity in the CENSE project is *"to collect comments and good practice examples from EU Member States aiming to remove obstacles and to collect and secure results from relevant SAVE and FP6 projects"*. This feedback should lead to recommendations to CEN for a "second generation" of CEN standards on the energy performance of buildings. Several reports from questionnaires and workshops, draft recommendations, etc. are gradually made available on the CENSE website: <http://www.iee-cense.eu/>.

The final products from the project will be available before the end of March 2010.

The consortium of the project consists of thirteen partners (from nine different countries) who are all experts and active in CEN-EPBD. They combine this expertise with knowledge and experience of implementation at the national level.

TNO (coordinator)	The Netherlands	www.tno.nl
CSTB	France	www.cstb.fr
ISSO	The Netherlands	www.isso.nl
Fraunhofer - IBP	Germany	www.ibp.fraunhofer.de
DTU	Denmark	www.ie.dtu.dk
ESD	United Kingdom	www.esd.co.uk
FAMBSI	Finland	www.fambsi.fi
EDC	Italy	www.edilclima.it
HTA Luzern	Switzerland	www.hslu.ch
BRE	United Kingdom	www.bre.co.uk
Viessmann	Germany	www.viessmann.de
Roulet	Switzerland	www.epfl.ch
JRC (IES)	Eur.Commission	ies.jrc.ec.europa.eu

Also collaboration has been established with a number of European umbrella (mainly branch) organizations (see website for details).

2 Aim of the report

As described below, one of the major activity in the CENSE project is "*to collect comments and good practice examples from EU Member States aiming to remove obstacles and to collect and secure results from relevant SAVE and FP6 projects*". This feedback should lead to recommendations to CEN for a "second generation" of CEN standards on the energy performance of buildings.

Two questionnaires have been sent to Members States:

- one specific enquiry before the workshop in Brussels (June 29th, 2009) (see annex A),
- a short questionnaire to Denmark, France, England, Italy, Czech Republic.

3 Software enquiry (Brussels, 29th of June 2009)

3.1 Introduction

This enquiry was made and sent preliminary to the CENSE workshop "Towards Pan-European software for Building energy performance?" held in Brussels on 29th of June 2009.

The objective of this workshop was to explore the possible of extension existing design tools to the regulatory systems (software tools linked to the national transpositions of the Energy Performance of Buildings Directive (EPBD)).

3.2 Software enquiry

19 answers from 12 countries have been answered (**see table below**), mainly from software developers (12), from energy experts (9) from industrials (1) and authorities (1).

CH	NL	DE	UK	SI	LV	TR	HR	AT	IT	SK	FR

Table 1 : Countries participating

The enquiry was structured into three sections:

- the software tools for non EPBD purposes (design tools and yearly energy calculations);
- the software tools for national EPBD purposes (calculation method, minimum requirements, certificates, inspection);
- CEN standards and software.

3.2.1 Software tools for non EPBD purposes

3.2.1.1 1.1 Ventilation

- Design tools

Most of software tools propose ventilation and it is considered as an important topic in design as heating or cooling.

- Yearly calculations

Even for non EPBD purposes the yearly calculation is still made under steady state conditions but dynamics methods are also proposed.

	Data exchange	Design tools (Sizing / Power)		Yearly calculations (i.e. energy consumption, running costs)				
		Content		Calculation		Calculation step		
		technical	economical	steady state	dynamics	yearly	monthly	hourly
Energy	IFC, NBDM, XML							
ventilation	6	14	3	9	7	3	9	6

Table 2: Results of enquiries

3.2.1.2 1.2 summer comfort and indoor air quality

In the questionnaire was asked if software related to other topics were developed or sold. A list of items was proposed (see table below):

	Data exchange	Design tools (Sizing / Power)		Yearly calculations (i.e. energy consumption, running costs)				
		Content		Calculation		Calculation step		
		technical	economical	steady state	dynamics	yearly	monthly	hourly
Summer comfort	5	9	1	5	6	6	3	5
Indoor air quality	5	3	1	2	2	1	1	1
Environment	3	5	1	4		4		1
Architecture	4	2		1	1	2	1	1
Acoustics	2	7	1	5		1		2

According to the answers provided by the participants to the workshop, many software propose indication on summer comfort but few on indoor air quality. In the future, this topic will become more and more important especially with the development of low energy houses (high air tightness, controlled ventilation...).

3.2.2 CEN standards and software

The third section of the questionnaire deals with the awareness on the CEN standards, their use in software and the availability of national annexes (example: climate). In the questionnaire is also asked to specify the opinion about the structure, the content and the need for major changes in the standards.

Based on results, three packages of standards can be distinguished:

- standards in use since years and needed for sizing or building regulation:
EN 12831 (heat load), EN 13790 (energy use);
top standards of the EPBD mandate
EN 15603 (holistic approach), EN 15217 (certificate);
- new EPBD standards dealing with technical building systems
EN 15316 (heating systems), (EN 15241 ventilation), EN 15193 (lighting);
- economical calculations (EN 15459).

The first category is well know (>50%), the second category is known (50 % <> 25 %), the third category is less known (<25%).

The use of the standards in software varies between 70 % (EN 13790) and 10% (EN 15459). The meaning of "use" can be very different. It can vary from the strictly and complete application of the standard, to partly copy it or to follow only the principles.

EN 15241 and EN 15242 are known but generally not implemented on software. The structure are judged unclear. Efforts have still to be made on the structure and the content for the technical building systems standards.

4 Short Questionnaires about EN 15241 – EN 15242 – EN 13779

Energy experts from countries answered the questionnaires:

- . Denmark,
- . France,
- . England
- . Italy,
- . Czech Republic

The answers concern all buildings sectors, with a majority for residential buildings.

Scale 5-1 (5= I highly agree; 1= I do not agree at all; ?= I don't know)

Question 1: Which major changes in the content of this specific CEN standard/cluster of CEN standards are required to make it/them applicable for the national building regulations?

- *Its structure is clear and understandable:* **3.6**
- *It's structure is clear and understandable:* **3**
- *It requires more background information or guidance to be able to use it:* **3.1**
- *It covers all relevant issues:* **1.6**
- *This subject is not regulated in our country and therefore not relevant:***3.6**
- *It needs to make a systematic split between the (harmonized) method and the (national/regional) input data:* **3**
- *It needs to contain a more concrete method:* **2.4**
- *It needs to provide more normative options to choose:* **2.4**
- *It needs to provide fewer options to choose:* **1.4**
- *It needs to be more detailed:* **2.2**
- *It needs to be less detailed:***2.2**
- *It needs to be made more unambiguous:* **2.2**
- *It needs no major changes:* **2.2**

Question 2: To your opinion, which main operational obstacles need to be removed to implement this specific CEN standard/cluster of CEN standards in the national building regulations?

- *There is no operational obstacle: this specific cluster of CEN standards is or will (in near future) be put in force by our national/regional regulation:* **3**
- *To agree nationally upon the national method requires already a lot of time and energy; adding a CEN circuit would only mean more time and effort and more risk:* **1.6**
- *To agree nationally upon the national method requires already a lot of time and energy; we would probably implement this cluster of CEN standards in the near future in case of a transparent planning of revisions (when and what):* **1.6**
- *The timing of the preparation of CEN standards did not coincide with the timing decided at national level (from projectplan to implementation in the law and application in practice):* **1.6**

- *We need a national method that is compact; consequently we (intend to) integrate selected parts from the CEN standards : 2.2*
- *The CEN standards do not enable us to link the calculation method to national product certification (national product labels or quality marks):1*
- *The standards are too hard to get compared to national building regulation (e.g. publication, costs):2*
- *People involved in our national or regional building regulations should become involved in the standardization activities, otherwise they go their own way:3*

Question 3: Comparison of this specific cluster of CEN standards with national calculation procedures used in the building regulations

- *This specific cluster of CEN standards is or will (in near future) be put in force by our national/regional regulation:2.4*
- *National practitioners are (or will be) aware of this specific cluster of CEN standards:3*
- *National practitioners apply or will apply this specific cluster of CEN standards:3*
- *This specific cluster of CEN standards is not relevant for national practitioners, because it is intended for specialists:1.8*
- *On this topic, our national calculation procedures, used in the building regulations, are (in comparison with the CEN standards):*
 - *better technical content:1.5*
 - *more detailed:3.5*
 - *easier to apply:2.5*
 - *quite similar:3.3*
 - *better adapted to national situation:2*

5 Feedback on inspection standards, other feedback

5.1 Feedback on inspection standards

This issue was taken up especially during the REHVA General Assembly (Amsterdam, 14-16 May 2009). A workshop was organised there by the HarmonAC project, and the results of this workshop was also discussed at the REHVA Technology and Research Committee (TRC) and the CENSE Workshop during those days. This summary gives the main conclusions and recommendations to be taken into account in the future revision of the inspection standards. More information about the existing inspection standards can be found from CENSE Information Papers IP 109, 115 and 116.

There is a need to build up the "big picture" of inspections, including also links to the other elements of the EPBD (EP requirements and calculations, Certificates), and including clear definitions of "air conditioning systems". The basic definition should include a list of functions, allowing a few different interpretations of the scope but strictly within a common framework. Only when the picture is complete and clear, it would be possible to :

- discuss the topic without misunderstanding
- make any judgement about appropriateness of inspection times, extents and frequencies
- judge the impact of inspections
- leave the door open for developments, in a controlled way

-avoid to regard inspections as an isolated issue, and enable to see inspections as an integral part of the whole "EP package", closely linked to certificates and also to EP calculations.

REHVA TRC meeting a strong reaction from the TRC participants: immediate actions are needed, even though the Workshop revealed a lot of open questions. EN 15240 is perhaps one of the best known EPBD standards, but should be made much more unambiguous and user-friendly, giving less options and preferably merged with EN 15239. Right after the TRC meeting, the CENSE Workshop made further suggestions towards a kind of modular approach, i.e. to develop the structure of EN 15240 and any REHVA document to deal with each inspection item separately where possible, but within a framework which will in the end cover all technical building systems, allowing also simple inclusion of further inspection items where heating and ventilation aspects are included whenever relevant. This approach could allow an answer to the revealed "tendency to escape inspections" due to a somewhat ambiguous definition of "air conditioning system".

The recast EPBD gives a modified definition of "air conditioning system", which still could be interpreted in many different ways. The next revision (and possible merger) of EN 15240 and EN 15239, and supporting more detailed guidance for e.g. different building types, new and existing, as recommended by the discussions in REHVA GA 2009, should also clarify this definition further.

5.2 Other feedback

Other feedback (gained from these standards – or related issues) indicate a few needs for improvement, including various needs to take better into account some national or regional features within a common framework.

One example of these features is ventilation heat recovery – the question of yearly efficiency. A general assumption is that the yearly efficiency is equal to the measured temperature ratio. This assumption may be sufficient in mild climates, but gives too high figures especially in Nordic climates and applications where (intentionally or not) only a part of extract air flows through the heat recovery unit. In warm climates other aspects can appear if the same kind of equipment is applied for cooling in summertime.

6 Conclusions and Recommendations

The answers presented above confirm the interest on ventilation, inspections and indoor air quality for buildings regulation in Member States but also, some points to recast and to update. These standards are judged covering all relevant issues but not sufficiently detailed and concrete to be implemented on software. Series of recommendations are listed below.

Conclusions and recommendations for the standard on room conditioning systems EN 15243 are

- Development of methods to determine cold distribution efficiency: the standard does not provide concrete calculation methods for annual cold distribution efficiency. This is due to the variety of systems, the complex nature of interaction between heat and cold distribution and the lack of (national) methods on this subject.
- Asses the Eurovent guidelines on their usefulness to determine cold generation efficiency : the standard does not provide concrete calculation methods for annual cold generation efficiency. This is due to the variety of generators and systems and the lack of (international) standards on testing cooling machines and systems. However in recent years Eurovent has published test guidelines for several systems.

Conclusions and recommendations for standards on inspections are:

- Avoid regarding inspections as an isolated issue but as an integral part of the whole "EP package": there is a need to build up the "big picture" of inspections, including also links to the other elements of the EPBD (EP requirements and calculations, Certificates), and including clear definitions of "air conditioning systems". The basic definition should include a list of functions, allowing a few different interpretations of the scope but strictly within a common framework.

Conclusions and recommendations for standards on ventilation are:

- Development of multi-criteria approach: In EN 15242, ventilation was taken from the hygienic point of view. In low energy building, ventilation will be also an important factor for energy and comfort.
- Connection of EN15241 and EN 15232: control systems will have an important position in the future. In EN 15241, a connection should be made with control standard EN 15232

Concerning the general issues, we might recommend that the next set of standards should have a new template:

- Nomenclature : to present all parameters and unities
- Description of the technique and physic models: natural ventilation, balanced systems,
- Providing examples in annexes
- Flowchart: to present the calculation model and to facilitate the implementation on software.
- To increase the adoption of these standards, an Excel sheet must be proposed.

Annex A – CENSE Software workshop enquiry (Brussels June 29, 2009)

1) Your software tools for non EPBD purposes

	Data exchange (IFC, NBDM)	Design tools (Sizing / Power)		Optimisation tools (energy consumption)				
		Content		Calculation		Calculation step		
		technical	economical	steady state	dynamics	yearly	monthly	hourly
Energy								
heating								
cooling								
ventilation								
hot water								
lighting								
Acoustics								
Build. structure								

2) Your software tools for EPBD purposes

	Data exchange (IFC, NBDM)	Software mandatory	Procedure mandatory	Other tools allowed	Agreement needed	Free software	used in oth. countries
Minimum perf. requirements							
Energy use calculated							
measured							
Display Energy Certificates							
Inspection							

3) CEN standards and software

	Heat load EN 12831	Rating EN 15217	Overall energy use EN 15603	Energy need EN 13790	Heating EN 15316	Ventilation EN 15241	Lighting EN 15193	Economic EN 15459
I know these standards								
I use them in our software								

Give a note from 5=best to 0=bad

structure clear								
good content								
Agree or disagree from 5= I agree to 0= I disagree								
more detailed method needed								
less options needed								
major changes needed								

Annex B – Three Short Questionnaires about EN 15241 – EN 15242 – EN 13779

Mail addressed to all the CEN list of contacts:

On topic: **CENSE Project : CEN standards 15241,15242,13779**

Dear colleagues,

The European project IEE CENSE (www.iee-cense.eu) aims to accelerate adoption and improved effectiveness of building energy performance CEN standards in EU Member States, related to the European Energy Performance of Buildings Directive (EPBD).

Goal:

The preferred option for achieving more transparency and harmonisation, is that any CEN standard developed to support the EPBD:

- (this is essential!) is referred to in the national or regional building regulations,
- typically after having been published by the national CEN Member Body as EN-national standard (translated or not),
- optionally with a national annex containing the relevant national choices, boundary conditions and input data

However, the CENSE Information Paper P90, available at the website (http://www.iee-cense.eu/upload/sites/iee-cense/wp6/6.5/p090_en_cense_overview_use_cen_standards.pdf), shows that in many Member States the CEN standards are used in the building regulations in a "practical way", e.g. by copying parts of the technical content into national documents.

One of the main goals of the CENSE project is to learn from the Member States what are the main obstacles for a more direct implementation of each of these standards.

The responses will be used to prepare recommendations to CEN for the second generation of CEN standards to support the EPBD, to be prepared within the next few years.

Feedback:

Within this context we prepared or are preparing a number of questionnaires on specific topics.

Knowing that the persons who are capable to give us the requested information are as a rule extremely occupied, we kindly ask you to quickly answer the questions below, by simply typing in your reply-email.

Please check our website regularly for information on these and other CENSE activities.

Thank you very much in advance for your effort and your cooperation! We will keep you informed on the results.

Hicham LAHMIDI

Questionnaire on the following cluster of CEN standards: 15241, 15242, 13779

Please send us a reply-email with your answers to the questions simply typed in.

Scale:

Answering can be done by simply “giving a number”. In general, we offer a statement asking for your (dis-)agreement, where you can use the following scale: 5-0:

5 = I highly agree

4 = I agree

3 = I generally agree

2 = I hardly agree

1 = I do not agree at all

0 = I don't know

Question 1: Which major changes in the content of this specific cluster of standards are required to make them applicable for the national building regulations.

Scale 5-1 (5= I highly agree; 1= I do not agree at all; 0= I don't know)

Concerning this specific cluster of CEN standards:

- It's structure is clear and understandable.
- It requires more background information or guidance to be able to use it.
- It covers all relevant issues.
- This subject is not regulated in our country and therefore not relevant.
- It needs to make a systematic split between the (harmonized) method and the (national/regional) input data.
- It needs to contain a more concrete method.
- It needs to provide more normative options to choose.
- It needs to provide fewer options to choose.
- It needs to be more detailed.
- It needs to be less detailed.
- It needs to be made more unambiguous.
- It needs no major changes.

- Other:

Comments: *(Certainly you are always free and welcome to type comments as well. Content-related details (like which issues are not covered or which major changes are needed) are especially useful for us!)*

.....

Question 2: To your opinion, which main operational obstacles need to be removed to implement this cluster of CEN standards in the national building regulations?

Scale 5-1 (5= I highly agree; 1= I do not agree at all; 0= I don't know)

- There is no operational obstacle: this specific cluster of CEN standards is or will (in near future) be put in force by our national/regional regulation.
- To agree nationally upon the national method requires already a lot of time and energy; adding a CEN circuit would only mean more time and effort and more risk.
- To agree nationally upon the national method requires already a lot of time and energy; we would probably implement this cluster of CEN standards in the near future in case of a transparent planning of revisions (when and what).
- The timing of the preparation of CEN standards did not coincide with the timing decided at national level (from projectplan to implementation in the law and application in practice).
- We need a national method that is compact; consequently we (intend to) integrate selected parts from the CEN standards.
- The CEN standards do not enable us to link the calculation method to national product certification (national product labels or quality marks).
- The standards are too hard to get compared to national building regulation (e.g. publication, costs).

-
- People involved in our national or regional building regulations should become involved in the standardization activities, otherwise they go their own way.
 - Other:

Comments:

Question 3: Comparison of this specific cluster of CEN standards with national calculation procedures used in the building regulations

Scale 5-1 (5= I highly agree; 1= I do not agree at all; 0= I don't know)

- This specific cluster of CEN standards is or will (in near future) be put in force by our national/regional regulation.
- National practitioners are (or will be) aware of this specific cluster of CEN standards.
- National practitioners apply or will apply this specific cluster of CEN standards.
- This specific cluster of CEN standards is not relevant for national practitioners, because it is intended for specialists.
- On this topic, our national calculation procedures, used in the building regulations, are (in comparison with the CEN standards):
 - o better technical content;
 - o more detailed;
 - o easier to apply;
 - o quite similar;
 - o better adapted to national situation.
- Other:
- This question is irrelevant and could be deleted, because it does not help to identify major obstacles or good practice examples on the use of the CEN standards.

Comments:(in particular we would appreciate some explanation of your answer)....

Question 4: Your response is most relevant for?:

- Which country: ...<country name, if relevant>...
- Which profession: ...<name of profession/business, if relevant>...

Comments:

General comments:

Thanks in advance for your cooperation! We will keep you informed on the results.

Please check our website (www.iee-cense.eu) regularly for information on these and other CENSE activities

Hicham LAHMIDI

