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DIRECTORATE D - New Energies & Demand Management

Regulatory Policy & Promotion of New Energies and of Demand Management

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Mandate to CEN, CENELEC and ETSI for the elaboration and adoption of standards for a methodology calculating the integrated energy performance of buildings and estimating the environmental impact, in accordance with the terms set forth in Directive 2002/91/EC¹

1. Motivation

One important function of a building is to provide a comfortable and healthy environment for its occupants, the attainment of which generally requires the use of energy for heating and/or cooling and for ventilation, domestic hot water, lighting and other amenities. The use of energy for these purposes exploits natural energy resources in competition with other energy needs and also causes environmental impact. Attention is also paid to the generation of CO₂ by the use of this energy.

Directive 2002/91/EC on the energy performance of buildings (EPBD) requires several different measures and tools to achieve the prudent and rational use of energy resources and to reduce the environmental impact of the energy use for buildings.

This is to be achieved by increasing energy efficiency and the enhanced use of renewable energies in both new and existing buildings. One tool for this will be the application by Member States of minimum requirements on the energy performance of new buildings and for large existing buildings that are subject to major renovation (Articles 4, 5 and 6). Other tools will be energy certification of buildings (Article 7) and inspection of boilers and air-conditioning systems (Articles 8 and 9).

A basic requirement for the measures in Articles 4, 5 and 6 is the existence of a general framework for a methodology of calculation of the integrated energy performance of buildings, as set forth in Article 3 and in the Annex to the Directive.

Access to such a calculation methodology in the form of European standards will make it possible to harmonise the various measures for improving the energy efficiency in buildings between the Member States. It will increase the accessibility, transparency and objectivity of the energy performance assessment in the Member States, as mentioned in recital (10) of EPBD. The use of European standards for calculating energy performance, as well as for energy performance certification and the inspection of boilers and air-conditioning systems will also reduce costs

¹ Directive 2002/91/EC of 16 December 2002 on the Energy Performance of Buildings. OJ L 1/65-71 of 4.1.2003.

compared to developing separate standards at national level. The standards should be flexible enough to allow for necessary national and regional differentiation.

Parts of such a methodology already exist in the form of a number of European standards for calculation and testing. To fulfil the objectives of the EPBD, further standards need to be developed and integrated and some existing standards need to be modified and/or extended. Special care must be taken to eliminate the existing interface problems between the standards.

2. Description of mandated work

The basis for the standardisation work to be carried out by CEN, CENELEC and ETSI according to this mandate is found in the ANNEX of the EPBD.

The standardisation work will cover:

- a methodology for calculation of the energy performance of buildings, in terms of Article 3 of the Directive, taking into account the requirements set forth in Articles 4, 5 and 6.
- a clear identification of the calculation methodology used for determining the integrated, overall energy performance of new and existing buildings, using standard performance calculation methods for building products, installations and systems, including heating, cooling, ventilation, infiltration and lighting. This work should also take in account relevant standards developed for EU-labelled products and equipment. A justification for the choice of the way of expressing energy performance should be included.
- methods of assessment suitable to be used to certify buildings, with all necessary calculation procedures and parameters for an energy performance certificate and parameters for recommendations for the improvement of energy performance as required by Article 7. Details of layout and content are advisory and will be left to the Member States to decide;
- General guidelines with possible alternative methods for the inspection of boilers, heating systems and air-conditioning systems required by Article 8 and 9. The guidelines should take account of the relevant methodologies for calculating the energy performance of products and heating and cooling systems used in calculating the overall energy performance of buildings.

The methodology should not only be used for new buildings but also for existing buildings and be adaptable to energy performance certification purposes for both new and existing buildings (Article 2.3), with clear distinctions being made between the two whenever necessary. If it proves to be difficult to adapt and apply the methodology to existing buildings, separate or alternative methods of calculating the energy performance of existing buildings in the scope of the Directive should be proposed (e.g. using historical data and documented knowledge of earlier building techniques, construction products, methods, etc.).

The standards will cover all building types in the EPBD Annex, part 3.

The standards under the mandate shall thus constitute an integrated and interacting methodology for the calculation of the energy uses and losses for heating and cooling, ventilation, domestic hot water, lighting, natural lighting, passive solar systems, passive cooling, position and orientation, automation and controls², and auxiliary installations necessary for maintaining a comfortable indoor environment³. The methodology shall integrate, where relevant, the positive influences of active solar systems and heat and electricity from renewable energy sources, as well as quality CHP (including micro-CHP) and district heating and cooling systems⁴. It should also facilitate an estimation of environmental impact from this energy use and provide data requirements for carrying out standard economic evaluations for the use of different systems.

The work will take the following concepts into consideration.

- Energy demand for heating, cooling and ventilation of a building.
- Demand for lighting and daylighting and the interaction of the two.
- The energy efficiency of the heating, cooling, ventilation and installed lighting systems including integrated building automation, controls and building management.
- The integration of renewable energy sources, passive cooling, and other energy sources as shown above, including the possibility of additional calculation modules for new energy sources.
- The need for the methodology to help engineers and architects optimise the energy performance of the building during each phase of the design, planning and verification stages in new and existing buildings. This use is in addition to the assessment function of the standard calculation methodologies.

² The effect on energy performance of automation and controls will generally be included in each system's performance instead of being treated as a separate system.

³ Consideration should also be given to the possibility of several different levels of indoor climate.

⁴ The development of performance standards and quality criteria for CHP, district heating and cooling and other external heat and cooling sources are outside the scope of this mandate. However, these standards will have to be taken from other sources and introduced in the integrated calculation methodology.

- Calculation methodologies for expressing primary energy use and the environmental impact of such energy use, including CO2 emissions, as well as advice on ways to express them in the energy performance certificate.

Priority should be given to the main issues and standards needed for the integrated calculation of the energy performance of buildings. Each standard should include a functional description of the methodology in transparent and easily understandable terms and a simplified expression of this methodology. A justification for including it in the integrated performance of the building should also be provided. To ensure fairness and comparability only one standard should be developed for each subject except where alternative guidelines are requested.

3. Execution of request

The Commission requests CEN, CENELEC and ETSI⁵ :

- to develop and adopt the standards listed in Annex A attached⁶;
- to establish a high-level working group, or appoint and modify an existing group, such as CEN-PG-EPBD with CEN-CMC, to ensure that the deadlines set in the timetable below are met and to file regular progress reports;
- to encourage and facilitate the participation of European Commission officials and EPBD Article 14 Committee and its subgroup representatives in relevant standardisation meetings for the purpose of verifying and monitoring progress in meeting timetables and objectives; and
- to allow for modification of the work programme and the use of additional external resources with a view to meeting the deadlines set forth in the timetable below.

Maximum **transparency** of all input and results, including on-going work and draft standards, will be ensured through the use of regular reports, CIRCA and other websites, such as the European standards organisations`, etc.

The work will make full use of relevant International, European and National standardisation activities. The standards will take proper account of the work of the Product TCs (including those for heat pumps and heat exchangers, air-conditioning, refrigeration and thermal insulation), and other Directives, such as the Construction Products Directive (89/106/EEC), the Labelling Directive (92/75/EC) and Mandate M324 and the Boiler Efficiency Directive (92/42/EC) and its revision, and an extended EN ISO 13790. Contact will be established with the TCs and bodies working with these Directives and duplication of work will be avoided.

From the date of acceptance of this mandate by CEN, CENELEC and ETSI the stand-still period, in accordance with Article 7.1 of the Directive 98/34/EEC, will start.

4. Organisations to be associated

⁵ It is proposed that the following TCs are mainly but not exclusively involved in the execution of the request: CEN/TC 89; CEN/TC 156; CEN/TC 228; CEN/TC 169; and CEN/TC 247.

⁶ This does not prevent CENELEC and ETSI from proposing additional work items to be included in the Annex to this mandate.

All relevant and necessary parties, including representatives of the building sector, ECOS⁷, ANEC⁸, TUTB⁹, CENELEC TCs, CEN-Energy Management, EUEB¹⁰ national standardisation bodies and representatives of the European Commission and the EPBD Article 14 Committee and its subgroups shall be actively associated with the standardisation work through regular progress reports and, when appropriate, participation in the TCs.

5. Timetable

By the end of 2003 or early in 2004, an umbrella document will be presented that describes the objective, scope and current status of all the standards that are relevant to the calculation methodology, including new and existing standards. The document should explain the relationship between the standards.¹¹ The use of standards developed outside CEN/CENELEC/ETSI being considered for integration in overall performance should be indicated when information is available. To the extent possible, priorities should be set¹².

By the summer of 2004, drafts will be available to assess the possibility of achieving prENs by the end of the year. The status of these drafts will form the basis to make a decision by the Commission on the necessity of taking additional measures.

By the end of 2004, at a minimum “stage 40” documents (English versions of the prEN text) will be available for all the standards proposed in Annex A, with partial delivery made in accordance with a schedule to be determined in an agreement between the Commission and CEN.

The standards will then be finalised in accordance with normal procedures and agreed target dates.

⁷ European Environmental Citizens Organisations for Standardisation

⁸ European Association for the Co-ordination of Consumer Representation in Standardization

⁹ Trade Unions Technical Board

¹⁰ European Union Eco-Labeling Board

¹¹ When possible, especially when different approaches may be chosen, a note or outline of the approach being considered should be provided (e.g., effect on overall performance of including renewables).

¹² The stand-still period should be specified in as much detail as possible as different standards and stages are involved in the request.

Annex A

Relevant standards must take into account the positive influences of daylighting, solar shading, passive cooling, position and orientation, renewables, the quality of district heating and cooling and the quality of CHP (including on-site). The standard should be structured to allow for the modular inclusion of future technologies and for separate standards covering the above topics when necessary. See applications of calculations for building types in EPBD Annex, part 3.

Section 1: Standards concerned with overall energy use in buildings (based on results from standards in section 2)

No	Work item	Present stage	Publication form	Responsible TC	GTR WI EN no.	Stage by the end 2004	Comment
1.	Energy performance of buildings – Methods of assessment to be used for the energy certification of buildings (Including guidelines for developing certification schemes)	New	EN	TC 89 ¹³		Stage 40	Stage 64, 2006-06 (Stage 40 for guidelines)
2.	Energy performance of buildings – Overall energy use, primary energy and CO ₂ emissions	New	EN	TC 228		Stage 40	Stage 64, 2006-09
3.	Energy performance of buildings – Ways of expressing energy performance of buildings ¹⁴	New	EN	TC 89		Stage 40	Stage 64, 2006-06
4.	Energy performance of buildings – Application of calculation of energy use to existing buildings	New	EN	TC 89		Stage 40	Stage 64, 2006-06
5.	Energy performance of buildings – Systems and methods for the inspection of boilers and heating systems. ¹⁵	New	EN	TC 228 ¹⁶		Stage 40	Stage 40 (as initial objective)
6	Energy performance of buildings – Guidelines for the inspection of air-conditioning systems. ¹⁷	New	EN	TC 156 ¹⁸		Stage 40	Stage 40 (as initial objective)

¹³ For overall co-ordination and interface and integration work, a special formation of TC 89/156/228/169/247 such as the current CEN-PG-EPBD group should be used.

¹⁴ Including standard methodology for conversion of final to primary energy.

¹⁵ Based on the relevant parts of the methodology for calculating the energy performance of buildings. CEN/TC109 to be consulted.

¹⁶ Included under “overall energy use” to provide to the CEN-PG-EPBD with responsibility for co-ordination and assigned to TC 228.

¹⁷ Based on the relevant parts of the methodology for calculating the energy performance of buildings.

¹⁸ Included under “overall energy use” to provide to the CEN-PG-EPBD with responsibility for co-ordination and assigned to TC156.

Section 2: Standards concerned with calculation of delivered energy (based where relevant on results from standards in section 3)

No	Work item	Present stage	Public-action form	Responsible TC	GTR WI EN no.	Stage by end 2004	Comment
7.	Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies – Part 1: General	46	EN	TC 228	prEN 14335	49	64 2006
8.	Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies – Part 2.1: Space heating emission systems	40	EN	TC 228	WI 228013-2	46	64 2006
9.	Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies – Part 2.2: Space heating generation systems: Part 2.2.1. Boilers Part 2.2.2. Heat pumps Part 2.2.3. Thermal Solar systems Part 2.2.4 The performance and quality of CHP electricity and heat (incl on-site and micro-CHP). ¹⁹ Part 2.2.5. The performance of quality district heating and large volume systems. ²⁰ Part 2.2.6. The performance of other renewables heat and electricity. ²¹	31 ? ? ? ?	EN	TC 228 ²² (TC 312) ²³ See footnote. See footnote.	WI 228013-3	40	64 2007 CHP Dir. & Committee Euroheat & Power proposal.
10.	Heating systems in buildings - Method for calculation of	31	EN	TC 228	WI	40	64

¹⁹ Part 2.2.4, including performance standards for CHP, will be developed primarily by committees and groups other than CEN/CENELEC/ETSI, and modified when necessary.

²⁰ Part 2.2.5, including performance standards for district heating and cooling, will be developed primarily by committees and groups other than CEN/CENELEC/ETSI, and modified when necessary.

²¹ Part 2.2.6, including performance standards for other (external) renewable systems, will be developed primarily by committees and groups other than CEN/CENELEC/ETSI, and modified when necessary.

²² All efforts should be made to take into account and make full use of calculation methods for energy performance of products and installations, such as those developed for Directive 92/42/EC and 92/75/EC, as well as prEN 13203 of CEN/TC 109 and prEN 14435 of CEN/TC 228 and the work of CEN/TC130. The work of CEN/TC 180 should be included, especially heat radiation.

²³ With input from TC 312 on thermal solar systems.

No	Work item	Present stage	Public-action form	Responsible TC	GTR WI EN no.	Stage by end 2004	Comment
	system energy requirements and system efficiencies – Part 2.3: Space heating distribution systems				228013-4		2007
11.	Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies – Part 3.1: Domestic hot water systems, including generation efficiency and the tap water requirements.	31	EN	TC 228	WI 228013-5	40	64 2007
12.	Dynamic calculation of room temperatures and of load and energy for buildings with room conditioning systems (including solar shading, passive cooling, and position and orientation)	31	prEN	TC 156	WI 156058	Stage 40	Stage 64, 2007-09
13.	Energy performance of buildings – Energy requirements for lighting (including daylighting)	New	prEN	TC 169		Stage 40	First meeting 29/10/03 to confirm time plans
14.	Thermal performance of buildings – Calculation of energy use for space heating and cooling – Simplified method	New	prEN	TC 89		Stage 40	Stage 64 2007 Based on EN ISO 13790
15.	Thermal performance of buildings – Calculation of energy use for space heating – Simplified method with extension of scope of EN ISO 13790	64	EN ISO 13790	TC89		64 by 2003	existing

Section 3: Standards concerned with calculation of net energy for heating and cooling

No	Work item	Present stage	Public-action form	Responsible TC	GTR WI EN no.	Stage by the end 2004	Comment
16.	Thermal performance of buildings – Sensible room cooling load calculation – General criteria and validation procedures	32	prEN	TC 89	WI 89045	Stage 40	Stage 64, 2006-02
17.	Energy performance of buildings – Calculation of energy use for space heating and cooling – General criteria and validation procedures	32	prEN	TC 89	WI 89064	Stage 40	Stage 64, 2006-02
18.	Ventilation for buildings – Calculation methods for the determination of air flow rates in dwellings including infiltration ²⁴	49	EN	TC 156	WI 156033 (if appropriate) prEN 13465	64	FV ends 2003-10
19.	Ventilation for buildings – Calculation methods for the determination of air flow rates in buildings including infiltration. (The items 18 and 19 could possibly merge) ²⁵ .	11	prEN	TC 156	WI 156077(if appropriate)	40	Or part 2 of 13465
20.	Ventilation for buildings – Calculation methods for energy requirements due to ventilation systems in buildings	11	prEN	TC 156	WI 156078	40	Stage 64 2007
21.	Ventilation for buildings – Calculation methods for energy requirements due to ventilation systems in dwellings.	11	prEN	TC 156	WI 156079	40	Merge with 20 if possible.
22.	Calculation methods for energy efficiency improvements by the application of integrated building automation products and systems ²⁶ .	31	prEN	TC247	WI0247 043	Stage 40	
23.	Review of standards dealing with calculation of heat	Review	EN ISO	TC 89	(see	Stage	Revision

²⁴ N.B. Average values for air flow rates are necessary for calculation of performance and not minimum requirements for equipment, which would be misleading. If necessary, several different classes of indoor climate may be prescribed.

²⁵ Ibid.

²⁶ Many of these automation and control systems should be integrated into the individual systems, such as heating, cooling lighting, etc.

	transmission in buildings. – 1 st set	w			scope)	40 2004-03	led by ISO (UK Conve nor)
24.	Review of standards dealing with calculation of heat transmission in buildings. – 2 nd set	Revie w	EN ISO	TC 89 ²	(see scope)	Stage 40	Revision led by ISO (UK Conve nor)
25.	Ventilation for non residential buildings – Performance requirements for ventilation and room conditioning systems.	49	EN	TC 156	WI 156057 prEN 13779	64	May be subject to immediate revision
26.	Design of Embedded water based surface heating and cooling systems, to facilitate renewable low temperature heating and high temperature cooling.	30	EN	TC228	228015	40	64 2006
27.	Performance requirements for temperature calculation procedure without mechanical cooling.	46	EN	TC89	WI 89038 PrEN 13791	49	Stage 64 2005
28.	Performance requirements for temperature calculation procedure with mechanical cooling.	46	EN	TC89	WI 89038 PrEN 13792	49	Stage 64 2005
29.	Data requirements for standard economic evaluation procedures, including for renewable energy sources. ²⁷	11	PrEN	TC228	WI228016	40	64 2007
30.	Inspection of ventilation systems	new	PrEN	TC156		40	64 2007
31.	How to specify criteria for the internal environment, (thermal, lighting, IAQ) ²⁸ .	new	PrEN	TC156		40	64 2007

²⁷ For overall co-ordination and interface and integration work, a special formation of TC 89/156/228/169/247 such as CEN-PG-EPBD should be used

²⁸ For overall co-ordination and interface and integration work, a special formation of TC 89/156/228/169/247 such as CEN-PG-EPBD should be used