EESTI STANDARD EVS-EN 15243:2007

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# Hoonete ventilatsioon – Kliimaseadmetega hoonete sisetemperatuuri ja koormuse ning energia arvutamine

Ventilation for buildings - Calculation of room temperatures and of load and energy for buildings with room conditioning systems

EESTI STANDARDIKESKUS

**EESTI STANDARDI EESSÕNA** **NATIONAL FOREWORD**

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|---|---|
| Käesolev Eesti standard EVS-EN 15243:2007 sisaldab Euroopa standardi EN 15243:2007 ingliskeelset teksti.<br><br>Käesolev dokument on jõustatud 30.10.2007 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.<br><br>Standard on kättesaadav Eesti standardiorganisatsioonist. | This Estonian standard EVS-EN 15243:2007 consists of the English text of the European standard EN 15243:2007.<br><br>This document is endorsed on 30.10.2007 with the notification being published in the official publication of the Estonian national standardisation organisation.<br><br>The standard is available from Estonian standardisation organisation. |

| | |
|---|---|
| **Käsitlusala:**<br>The scope of this European Standard is - To define the procedure how the calculation methods to determine the temperatures, sensible-loads and energy demands for the rooms shall be used in the design process. - To describe the calculation methods to determine the latent room cooling and heating load, the-building heating, cooling, humidification and dehumidification loads and the system heating,-cooling, humidification and dehumidification loads. - To define the general approach for the calculation of the overall energy performance of buildings-with room conditioning systems - To describe one or more simplified calculation methods for the system energy requirements of-specific system types, based on the building energy demand result from prEN ISO 13790, and to-define their field of application. | **Scope:**<br>The scope of this European Standard is - To define the procedure how the calculation methods to determine the temperatures, sensible-loads and energy demands for the rooms shall be used in the design process. - To describe the calculation methods to determine the latent room cooling and heating load, the-building heating, cooling, humidification and dehumidification loads and the system heating,-cooling, humidification and dehumidification loads. - To define the general approach for the calculation of the overall energy performance of buildings-with room conditioning systems - To describe one or more simplified calculation methods for the system energy requirements of-specific system types, based on the building energy demand result from prEN ISO 13790, and to-define their field of application. |

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EUROPEAN STANDARD

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English Version

# Ventilation for buildings - Calculation of room temperatures and of load and energy for buildings with room conditioning systems

Systèmes de ventilation des bâtiments - Calcul de la température des pièces, de la charge et de l'énergie pour les bâtiments équipés de système de climatisation

Lüftung von Gebäuden - Berechnung der Raumtemperaturen, der Last und Energie für Gebäuden mit Klimaanlagen

This European Standard was approved by CEN on 6 July 2007.

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# Foreword

This document (EN 15243:2007) has been prepared by Technical Committee CEN/TC 156 “Ventilation for buildings”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2008, and conflicting national standards shall be withdrawn at the latest by February 2008.

This standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association (Mandate M/343), and supports essential requirements of EU Directive 2002/91/EC on the energy performance of buildings (EPBD). It forms part of a series of standards aimed at European harmonisation of the methodology for the calculation of the energy performance of buildings. An overview of the whole set of standards is given in CEN/TR 15615, Explanation of the general relationship between various CEN standards and the Energy Performance of Buildings Directive (EPBD) ("Umbrella document").

Attention is drawn to the need for observance of EU Directives transposed into national legal requirements. Existing national regulations with or without reference to national standards, may restrict for the time being the implementation of the European Standards mentioned in this report.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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# Introduction

Clauses 13 and 14 of this standard deal with the calculation of the energy demand of HVAC systems, specifically in connection with the Energy Performance Rating in connection with the Energy Performance of Buildings Directive. The calculation of the building energy demand that has to be met is dealt with in prEN ISO 13790 "Thermal Performance of Buildings – Calculation of energy use for space heating and cooling" – this information is input data for the procedures addressed in this standard. Calculation methods satisfying this standard may also be used for other purposes, (for example, for system sizing). These are covered by Clauses 1 to 12 of the standard. Users of calculation methods should exercise care in ensuring that the need for appropriate modifications are considered and, if necessary, implemented for other applications.

The standard has an unusual large portion of informative annexes in terms of number and size. This is due to the fact that the area covered by this standard is highly dependent on the system solutions, which exist in a large number of variations, and therefore many issues can only be shown in an exemplary way and experts in the different countries would not agree in putting this generally in normative way. Also, due to the different approaches taken in the different countries for the implementation of the EPBD, different solutions should be possible in parallel and the normative part can only be general. Nevertheless, the standard intends to give room for documentation of specific solutions, in order to provide information in enough depth, to make common parts and difference transparent for possible closer harmonisation in future.

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# 1 Scope

The scope of this European Standard is:

— To define the procedure how the calculation methods to determine the temperatures, sensible loads and energy demands for the rooms shall be used in the design process.

— To describe the calculation methods to determine the latent room cooling and heating load, the building heating, cooling, humidification and dehumidification loads and the system heating, cooling, humidification and dehumidification loads.

— To define the general approach for the calculation of the overall energy performance of buildings with room conditioning systems.

— To describe one or more simplified calculation methods for the system energy requirements of specific system types, based on the building energy demand result from prEN ISO 13790, and to define their field of application.

A general framework standard is given which imposes an hourly calculation for all cases which cannot be covered by simplified methods, and gives requirements on what has to be taken into account. Input and output data are defined.

The target audience of this standard is twofold:

— Designers of HVAC systems, which are given an overview of the design process with the relevant references to the different involved standards (Clauses 5 to 12).

— Developers of regulations and tools, which find requirements for calculation procedures to be used for the energy requirements according to the EPBD (Clauses 13 and 14).

The idea followed by this standard is, that for the detailed approach one single calculation method is used for the different room related purposes such as room temperature calculation, room cooling and heating load calculation, and room energy calculation. This means, for the building type envisaged (buildings with room conditioning systems) it is an alternative to simplified calculation methods such as heating load according to EN 12831 and heating energy according to prEN ISO 13790. This standard does not describe any detailed methods for the sensible room based calculations. For this it refers to the relevant standards EN ISO 13791, EN ISO 13792, EN 15255 and EN 15265.

This standard specifies simplified methods and describes the necessary functionality of methods for the calculation of standardized annual energy consumption by systems providing temperature control, mechanical ventilation and humidity control in existing and new buildings. For brevity, these are described as HVAC systems. These systems may provide any or all of these services, including heating, cooling, air filtration, humidification or dehumidification. For the air side calculations of air based systems it refers to EN 15241. Systems providing heating but no other services are covered by EN 15316. These boundaries are, however, not kept strictly in the informative annexes, because some of the shown example calculations follow a holistic approach and this separation is therefore not always possible.

The standard specifically relates to demand calculations needed for Energy Performance Rating in connection with the Energy Performance of Buildings Directive.

These installations may include:

— Emission, distribution, storage and generation for cooling.

— Emission, distribution and heat exchanger for heating if these functions are performed using an air conditioning system; all heating functions performed by direct heating or using water as a heat transport medium are treated in other standards.

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The calculation of cooling and heating energy demand within buildings is dealt with by prEN ISO 13790 and is a required input. This standard only addresses these issues to the extent that HVAC systems have an influence on the loads.

The boundaries and relations between the covered areas are shown in Figure 1.

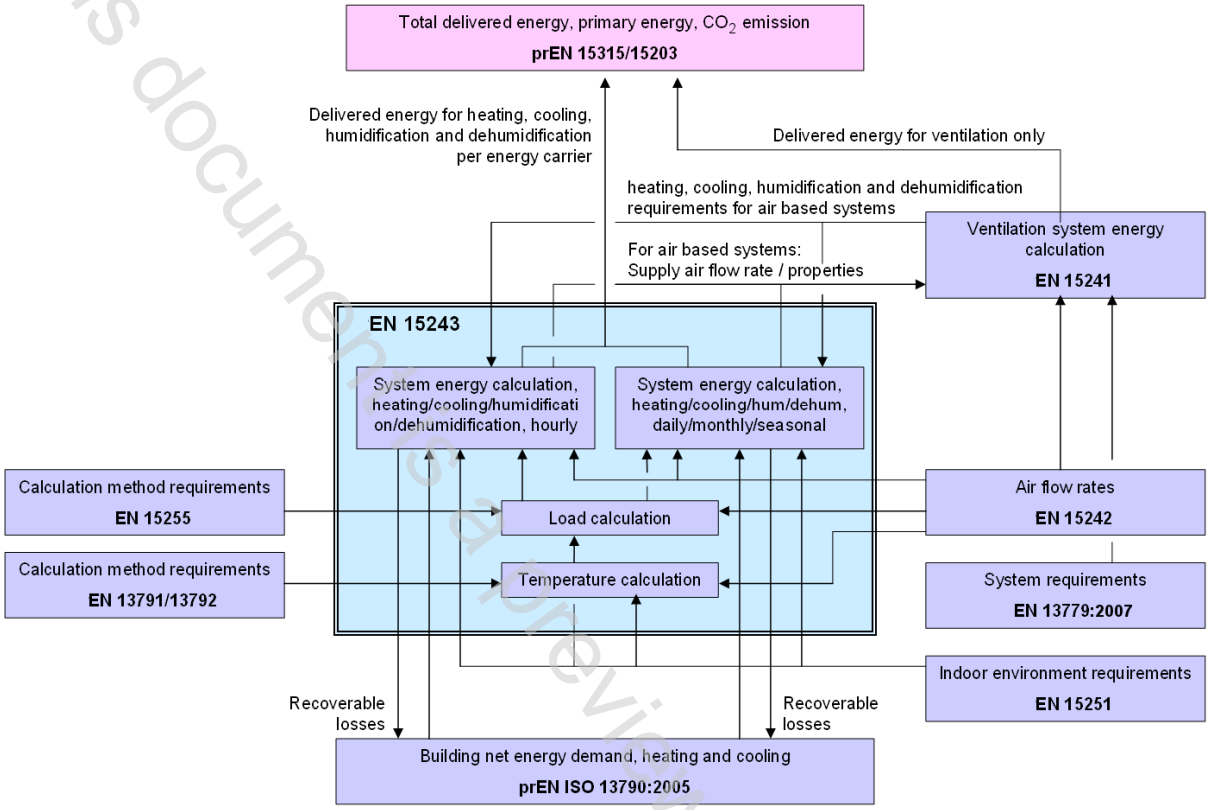


**Figure 1 — Chart showing the relations to other standards related to the EPBD**

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13779, *Ventilation for non-residential buildings — Performance requirements for ventilation and room-conditioning systems*

EN 15026, *Hygrothermal performance of building components and building elements — Assessment of moisture transfer by numerical simulation*

EN 15241, *Ventilation for buildings — Calculation methods for energy losses due to ventilation and infiltration in commercial buildings*

EN 15242:2007, *Ventilation for buildings — Calculation methods for the determination of air flow rates in buildings including infiltration*

EN 15251, *Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics*

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EN 15255:2007, *Thermal performance of buildings — Sensible room cooling load calculation — General criteria and validation procedures*

EN 15316-2-1, *Heating systems in buildings — Method for calculation of system energy requirements and system efficiencies — Part 2-1: Space heating emission systems*

EN 15377-3, *Heating systems in buildings — Design of embedded water based surface heating and cooling systems — Part 3: Optimizing for use of renewable energy sources*

prEN ISO 13790, *Energy performance of buildings — Calculation of energy use for space heating and cooling (ISO/DIS 13790:2005)*

EN ISO 13792, *Thermal performance of buildings — Calculation of internal temperatures of a room in summer without mechanical cooling — Simplified methods (ISO 13792:2005)*

prEN ISO 15927-2, *Hygrothermal performance of buildings — Calculation and presentation of climatic data — Part 2: Hourly data for design cooling load (ISO/DIS 15927-2:2007)*

EN ISO 15927-4, *Hygrothermal performance of buildings — Calculation and presentation of climatic data — Part 4: Hourly data for assessing the annual energy use for heating and cooling (ISO 15927-4:2005)*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

**3.1**
**room**
enclosed space or part of an enclosed space

**3.2**
**room heating load**
daily profile of the energy flow rate which must be added to a room under design conditions in order to keep its comfort conditions within a defined range

**3.3**
**room cooling load**
daily profile of the energy flow rate which must be extracted from a room under design conditions in order to keep its comfort conditions within a defined range

**3.4**
**room sensible cooling load**
daily profile of the energy flow rate which must be extracted from a room under design conditions in order to keep its temperature (air temperature or operative temperature) within a defined range

**3.5**
**room latent cooling load**
daily profile of the energy flow rate which must be extracted from a room under design conditions in order to keep its humidity below a defined limit

**3.6**
**basic room sensible cooling load**
daily profile of the energy flow rate which must be extracted from a room under design conditions in order to keep its air temperature at a constant value

**3.7**
**room latent heating load**
daily profile of the energy flow rate which must be added to a room under design conditions in order to keep its humidity above a defined limit

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