SLOVENSKI STANDARD
oSIST-TP prCEN/TR 15615:2007

01-november-2007

Razlaga sploġne povezave med razliḷ nimi standardi CEN in Direktivo o energetski uḷ inkovitosti stavb (EPBD) - Krovni dokument

Explanation of the general relationship between various European Standards and the Energy Performance of Buildings Directive (EPBD) - Umbrella document

Ta slovenski standard je istoveten z: prCEN/TR 15615

ICS:

91.140.99	Druge napeljave v stavbah	Other installations in buildings

oSIST-TP prCEN/TR 15615:2007 **en**

TECHNICAL REPORT

RAPPORT TECHNIQUE

TECHNISCHER BERICHT

FINAL DRAFT
prCEN/TR 15615

October 2007

ICS 91.140.99

English Version

Explanation of the general relationship between various European Standards and the Energy Performance of Buildings Directive (EPBD) - Umbrella document

This draft Technical Report is submitted to CEN members for Technical Committee Approval. It has been drawn up by CEN/BT/WG 173.

CEN members are the national standards bodies of 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 United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. prCEN/TR 15615:2007: E

Contents

Page

Foreword

This document (prCEN/TR 15615:2007) has been prepared by CEN/BT/WG 173, the secretariat of which is held by NEN.

This document is currently submitted to the Technical Committee Approval.

This report refers to EU Directive 2002/91/EC of December 2002 on the Energy Performance of Buildings.

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.

Introduction

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

This is to be accomplished by increased energy efficiency 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 (EPBD 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 measures in Articles 4, 5, 6 and 7 is the existence of a general framework for a methodology of calculation of the total energy performance of buildings, as set out in Article 3 and the Annex to the Directive.

This technical report describes the European standards (ENs) that are intended to support the EPBD by providing the calculation methods and associated material to obtain the overall energy performance of a building.

In Annex A the standards concerned are arranged in a hierarchical fashion. Section 1 lists standards concerned with overall energy performance in support of Articles 4 to 7 of the Directive. Sections 2 to 5 list the standards relating to specific aspects or modules of building energy performance which contribute to the overall calculation. The content of the individual standards is summarised in Annex B.

Annex C provides a list of definitions, and Annex D a list of principal symbols, that are used consistently in the standards. It is intended that these annexes will form the basis of a future trilingual standard covering common definitions and symbols for energy calculations.

Explanation of the general relationship between various European standards and the Energy Performance of Buildings Directive (EPBD)

1 Relationship of the standards to the EPBD

1.1 Overview

The calculation methodology follows the framework set out in the Annex to the EPBD. The various standards used in this process are listed in Annex A. Many of the standards deal with specific aspects of the calculation (e.g. fabric losses, air changes, energy use for lighting, system performance): these aspects are drawn together in the following items:

EN number	Content
prEN 15603	Energy use, for space heating, cooling, ventilation, domestic hot water and lighting, inclusive of system losses and auxiliary energy; and definition of energy ratings
EN 15217	Ways of expressing energy performance (for the energy certificate) and ways of expressing requirements (for regulations); content and format of energy performance certificate
EN 15378	Boiler inspections
EN 15240	Air-conditioning inspections
EN ISO 13790	Energy needs for heating and cooling (taking account of losses and gains)

The main goal of these standards is to facilitate the implementation of the Directive in Member States. In consequence they do not prescribe a single definition of energy rating or the expression of energy performance, but rather give a limited number of options. Similarly the items on inspections offer various levels of inspection. It is up to national bodies to select one or more of the options given, depending on the purpose of the calculation and the type and complexity of the buildings and their services.

The four main components set out in the Directive relate to:

— calculation methodology;

— minimum energy performance requirements;

— energy performance certificate;

— inspections of boilers and air-conditioning.

Figure 1 illustrates how the standards are related to articles of the EPBD defining these requirements.

1.2 Calculation methodology

The standards providing the calculation methodology are indicated in Figure 1, either explicitly or by reference to Annex A.

The calculation methodology is used to determine the data for energy certificates. EN ISO 13790 allows for different levels of complexity:

— simplified monthly or seasonal calculation;

— simplified hourly calculation;

— detailed calculation,

which can be chosen according to relevant criteria related to the purpose of the calculation, such as new or existing buildings or type and/or complexity of the building and its services. The calculations are based on specified boundary conditions of indoor climate (EN 15251) and external climate. The simplified calculation methods are fully specified in the EN ISO 13790. The detailed calculation methods are not fully specified in EN ISO 13790, but any implementation needs to be validated according to the criteria in EN 15265 and the input and boundary conditions are to be consistent with the fully specified methods. Zoning arrangements (applicable to all calculation methods) are described in EN ISO 13790.

The characteristics of the technical building systems are included via:

— heating systems, EN 15316-1, EN 15316-2-1, EN 15326-2-3, EN 15316-4 (various parts) and EN 15377;

— cooling systems, prEN 15243;

— domestic hot water, prEN 15316-3 (various parts);

— ventilation, EN 15241;

— lighting, EN 15193;

— integrated building automation and controls, EN 15232.

1.3 Energy performance certificate

The indicative content of the energy performance certificate is set out in EN 15217. This standard also includes the definition of the energy performance indicator and different options for the energy performance classification.

prEN 15603 provides ratings to define energy performance. The categories for the purposes of certification are:

— calculated rating, based on calculated energy use under standardised occupancy conditions[1)];

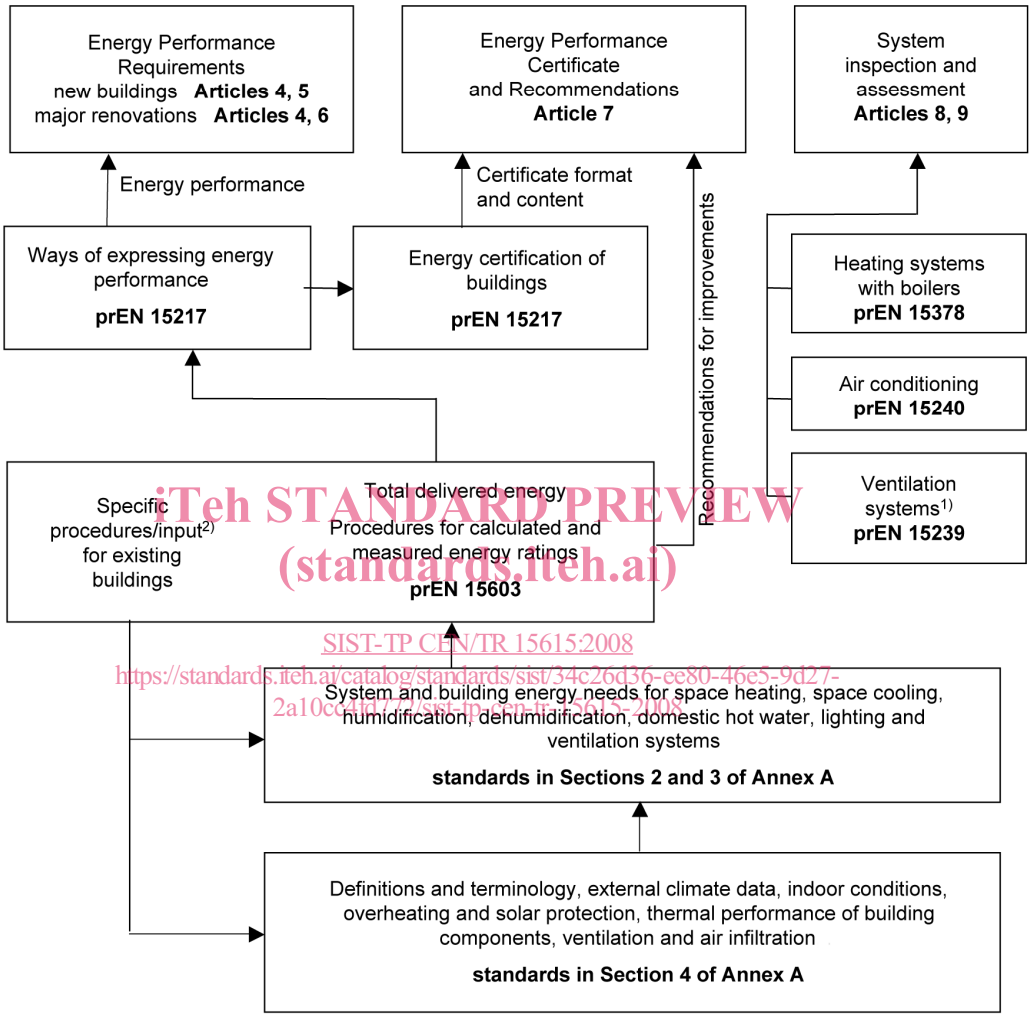
— measured rating, based on metered energy[2)].

1.4 Periodic inspections of boilers and air-conditioning systems

These standards provide guidelines for the inspection of boilers and heating systems (EN 15378), ventilation systems (EN 15239) and air-conditioning systems (EN 15240). They provide for different levels of inspection.

1) Also known as "asset rating"

2) Also known as "operational rating"



1) Not explicitly mentioned in the Directive

2) Unless covered by other standards

Figure 1 — Methodology for calculating energy performance (Article 3 and Annex)

2 CEN Committees

The Technical Committees of CEN that were involved in the preparation of the standards comprise:

CEN/TC 89 Thermal performance of buildings and building components;

CEN/TC 156 Ventilation for buildings;

CEN/TC 169 Light and lighting;

CEN/TC 228 Heating systems in buildings;

CEN/TC 247 Building automation, controls and building management.

The process has been overseen by CEN/BT TF 173, energy performance of buildings project group, which coordinated the work so as to ensure that standards prepared in different committees interface with each other in a suitable way.

3 Definitions

NOTE The definitions given here are those used within the Technical Report. A more extensive list of definitions is given in Annex C.

3.1
building
construction as a whole, including its envelope and all technical building systems, for which energy is used to condition the indoor climate, to provide domestic hot water and illumination and other services related to the use of the building

NOTE The term can refer to the building as a whole or to parts thereof that have been designed or altered to be used separately.

3.2
new building
for calculated energy rating: building at design stage or under construction
for measured energy rating: building too recently constructed to have reliable records of energy use

3.3
existing building
for calculated energy rating: building that is erected
for measured energy rating: building for which actual data necessary to assess the energy use are known or can be measured

3.4
technical building system
technical equipment for heating, cooling, ventilation, domestic hot water, lighting and electricity production

NOTE 1 A technical building system can refer to one or to several building services (e.g. heating system, heating and domestic hot water system).

NOTE 2 A technical building system is composed of different subsystems.

NOTE 3 Electricity production can include cogeneration and photovoltaic systems.

3.5
building automation and control
products, software, and engineering services for automatic controls, monitoring and optimization, human intervention, and management to achieve energy-efficient, economical, and safe operation of building services equipment.

3.6
auxiliary energy
electrical energy used by technical building systems for heating, cooling, ventilation and/or domestic water to support energy transformation to satisfy energy needs

NOTE 1 This includes energy for fans, pumps, electronics, etc. Electrical energy input to the ventilation system for air transport and heat recovery is not considered as auxiliary energy, but as energy use for ventilation (C.4.18).

NOTE 2 In EN ISO 9488, *Solar energy – Vocabulary*, the energy used for pumps and valves is called "parasitic energy".

3.7
cogeneration
simultaneous generation in one process of thermal energy and electrical or mechanical energy

NOTE Also known as combined heat and power (CHP).

3.8
air conditioning system
combination of all components required to provide a form of air treatment in which temperature is controlled, possibly in combination with the control of ventilation, humidity and air cleanliness

3.9
dehumidification
process of removing water vapour from air to reduce relative humidity

3.10
humidification
process of adding water vapour to air to increase relative humidity

3.11
ventilation
process of supplying or removing air by natural or mechanical means to or from any space

NOTE Such air is not required to have been conditioned.

3.12
ventilation heat recovery
heat recovered from the exhaust air to reduce the ventilation heat transfer

3.13
system thermal loss
thermal loss from a technical building system for heating, cooling, domestic hot water, humidification, dehumidification or ventilation that does not contribute to the useful output of the system

NOTE 1 A system loss can become an internal heat gain for the building if it is recoverable.

NOTE 2 Thermal energy recovered directly in the subsystem is not considered as a system thermal loss but as heat recovery and directly treated in the related system standard.

NOTE 3 Heat dissipated by the lighting system or by other services (e.g. appliances of computer equipment) is not part of the system thermal losses, but part of the internal heat gains.

3.14
recoverable system thermal loss
part of a system thermal loss which can be recovered to lower either the energy need for heating or cooling or the energy use of the heating or cooling system

NOTE This depends on the calculation approach chosen to calculate the recovered gains and losses (holistic or simplified approach).

3.15
recovered system thermal loss
part of the recoverable system thermal loss which has been recovered to lower either the energy need for heating or cooling or the energy use of the heating or cooling system

NOTE This depends on the calculation approach chosen to calculate the recovered gains and losses (holistic or simplified approach).

3.16
energy source
source from which useful energy can be extracted or recovered either directly or by means of a conversion or transformation process

NOTE Examples include oil or gas fields, coal mines, sun, forests etc.

3.17
energy carrier
substance or phenomenon that can be used to produce mechanical work or heat or to operate chemical or physical processes [ISO 13600:1997]

NOTE The energy content of fuels is given by their gross calorific value.

3.18
delivered energy
total energy, expressed per energy carrier, supplied to the technical building systems through the system boundary, to satisfy the uses taken into account (heating, cooling, ventilation, domestic hot water, lighting, appliances etc.) or to produce electricity

NOTE 1 For active solar and wind energy systems the incident solar radiation on solar panels or on solar collectors or the kinetic energy of wind is not part of the energy balance of the building. It is decided at national level whether or not renewable energy produced on site is part of the delivered energy.

NOTE 2 Delivered energy can be calculated for defined energy uses or it can be measured.

3.19
exported energy
boundary and used outside the system boundary

NOTE 1 It can be specified by generation types (e.g. CHP, photovoltaic, etc) in order to apply different weighting factors.

NOTE 2 Exported energy can be calculated or it can be measured.

3.20
non-renewable energy
energy taken from a source which is depleted by extraction (e.g. fossil fuels)

3.21
renewable energy
energy from a source that is not depleted by extraction, such as solar energy (thermal and photovoltaic), wind, water power, renewed biomass

NOTE In ISO 13602-1:2002, renewable resource is defined as "natural resource for which the ratio of the creation of the natural resource to the output of that resource from nature to the technosphere is equal to or greater than one".

3.22
primary energy
energy that has not been subjected to any conversion or transformation process

NOTE 1 Primary energy includes non-renewable energy and renewable energy. If both are taken into account it can be called total primary energy.

NOTE 2 For a building, it is the energy used to produce the energy delivered to the building. It is calculated from the delivered and exported amounts of energy carriers, using conversion factors.

3.23
energy performance of a building
calculated or measured amount of weighted net delivered energy actually used or estimated to meet different needs associated with a standardised use of a building, which may include, inter alia, energy used for heating, cooling, ventilation, domestic hot water and lighting

3.24
energy rating
evaluation of the energy performance of a building based on the weighted sum of the calculated or measured use of energy carriers

3.25
calculated energy rating
energy rating based on calculations of the net delivered energy used by a building for heating, cooling, ventilation, domestic hot water and lighting

NOTE National bodies decide whether other energy uses resulting from occupants' activities such as cooking, production, laundering, etc. are included or not. If included, standard input data shall be provided for the various types of building and uses. Lighting is always included except (by decision of national bodies) for residential buildings.

3.26
standard energy rating
calculated energy rating using actual data for the building and standard use data set

NOTE 1 It represents the intrinsic annual energy use of a building under standardised conditions. This is particularly relevant to certification of standard energy performance.

NOTE 2 It can also be termed "asset energy rating".

3.27
measured energy rating
energy rating based on measured amounts of delivered and exported energy

NOTE 1 The measured rating is the weighted sum of all energy carriers used by the building, as measured by meters or other means. It is a measure of the in-use performance of the building. This is particularly relevant to certification of actual energy performance.

NOTE 2 Also known as "operational rating".

3.28
energy certificate
certificate recognised by a member state or a legal person designated by it, which includes the energy performance of a building

NOTE The meaning of the terms “certificate” and "certification" in this standard differ from that in EN 45020, *Standardization and related activities – General vocabulary (ISO/IEC Guide 2:2004).*

3.29
space heating
process of heat supply for thermal comfort

3.30
space cooling
process of heat extraction for thermal comfort

3.31
heat gains
heat generated within or entering into the conditioned space from heat sources other than energy intentionally utilised for heating, cooling or domestic hot water preparation

NOTE 1 These include internal heat gains and solar heat gains. Sinks that extract heat from the building are included as gains, with a negative sign. In contrast with heat transfer, for a heat source (or sink) the difference between the temperature of the considered space and the temperature of the source is not the driving force for the heat flow.

NOTE 2 For summer conditions heat gains with a positive sign constitute extra heat load on the space.

3.32
internal heat gains
heat provided within the building by occupants (sensible metabolic heat) and by appliances such as lighting, domestic appliances, office equipment, etc., other than energy intentionally provided for heating, cooling or hot water preparation

NOTE This includes recoverable system thermal losses, if the holistic approach for the calculation of the recovered system losses is chosen.

3.33
solar heat gain
heat provided by solar radiation entering, directly or indirectly (after absorption in building elements), into the building through windows, opaque walls and roofs, or passive solar devices such as sunspaces, transparent insulation and solar walls

NOTE Active solar devices such as solar collectors are considered as part of the technical building system.

4 Overview of the calculation process

The calculation is based on the characteristics of the building and its installed equipment, as listed in the Annex to the EPBD. It is structured in three levels:

- calculation of the building energy needs for heating and cooling;
- calculation of the building delivered energy for heating and cooling, ventilation, domestic hot water and lighting;
- calculation of the overall energy performance indicators (primary energy, CO_2 emissions, etc.).

The calculation sequence is:

a) Calculate the building energy needs for heating and cooling, using applicable standards listed in Section 3 of Annex A. This part of the calculation considers only the building properties and not those of the heating/cooling system and results in the energy to be emitted by heat emitters, or energy to be extracted from the conditioned space, in order to maintain the intended internal temperature. EN ISO 13790 covers both heating and cooling. To perform this calculation, data for indoor climate requirements, internal heat gains, building properties and outdoor climatic conditions are needed, and these are obtained using the standards listed in Section 4 of Annex A. EN ISO 13790 includes guidance for partitioning a complex building into separate zones for the purposes of the calculation.

b) Take account of the characteristics of the space heating, cooling, ventilation, domestic hot water and lighting systems, inclusive of controls and building automation, to calculate the delivered energy, using standards listed in Section 2. Energy used for different purposes and by different fuels is recorded separately. The calculations take account of heat emission, distribution, storage and generation, and include the auxiliary energy needed for fans, pumps etc.

c) Combine the results from b) for different purposes and from different fuels to obtain the overall energy use and associated performance indicators, using standards listed in Section 1.

There is an interlinkage between steps a) and b) because system losses that are recovered can be counted as gains for the building part of the calculation. Two approaches are permitted:

— Holistic approach
The effect of all heat gains associated with building and its technical building systems are considered in the calculation of the energy needs for heating and cooling. When these gains cannot be predicted without knowing the heating and cooling needs, steps a) and b) may have to be iterated. In the first calculation the gains from systems are omitted in the calculation of the energy needs, in subsequent iterations they are included from the system calculations in the previous iteration.

— Simplified approach
The recovered system heat losses, obtained by multiplying the recoverable thermal system losses by a conventional recovery factor, are directly subtracted from the loss of each technical building system.