

**Hoonete küttesüsteemid. Süsteemide energiavajaduse ja süsteemide tõhususe arvutusmeetod. Osa 3-3: Hoonesisesed soojaveevarustuse süsteemid, soojusallikad**

Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 3-3: Domestic hot water systems, generation

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 15316-3-3:2007 sisaldab Euroopa standardi EN 15316-3-3:2007 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 22.11.2007 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 15316-3-3:2007 consists of the English text of the European standard EN 15316-3-3:2007.</p> <p>This document is endorsed on 22.11.2007 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--	---

<p><b>Käsitlusala:</b></p> <p>This European Standard is part of a set of standards covering the methods for calculation of system energy requirements and system efficiencies of heating systems in buildings. In particular this standard is one of a number of standards dealing with domestic hot water systems. The scope of this specific part is to standardise the methods for calculation of: - thermal losses from the domestic hot water generation system; - recoverable thermal losses for space heating from the domestic hot water generation system; - auxiliary energy of the domestic hot water generation systems.</p>	<p><b>Scope:</b></p> <p>This European Standard is part of a set of standards covering the methods for calculation of system energy requirements and system efficiencies of heating systems in buildings. In particular this standard is one of a number of standards dealing with domestic hot water systems. The scope of this specific part is to standardise the methods for calculation of: - thermal losses from the domestic hot water generation system; - recoverable thermal losses for space heating from the domestic hot water generation system; - auxiliary energy of the domestic hot water generation systems.</p>
--	--

ICS 91.140.10

Võtmesõnad:

ICS 91.140.10

English Version

## Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 3-3: Domestic hot water systems, generation

Systèmes de chauffage dans les bâtiments - Méthode de calcul des besoins énergétiques et des rendements des systèmes - Partie 3-3 : Systèmes de production d'eau chaude sanitaire, génération

Heizungsanlagen in Gebäuden - Verfahren zur Berechnung der Energieanforderungen und Nutzungsgrade der Anlagen - Teil 3-3: Trinkwassererwärmung, Erzeugung

This European Standard was approved by CEN on 18 August 2007.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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

# Contents

Page

Foreword.....	4
Introduction .....	6
1 Scope .....	7
2 Normative references .....	7
3 Terms and definitions .....	7
4 Symbols, units and indices .....	10
5 Energy output of the domestic hot water generation sub-system .....	11
5.1 General.....	11
5.2 Domestic hot water systems with a single heat generator .....	11
5.3 Domestic hot water systems with multiple heat generators .....	12
5.3.1 General.....	12
5.3.2 Domestic hot water systems with different types of heat generators in a series configuration .....	12
5.3.3 Domestic hot water systems with multiple heat generators in a parallel configuration.....	12
6 Indirectly heated hot water storage vessel .....	13
7 Primary circulation pipes .....	14
7.1 General.....	14
7.2 Thermal losses by a simple estimation method.....	14
7.3 Thermal losses by a detailed calculation method.....	14
8 Direct heated domestic hot water generation devices .....	14
8.1 General.....	14
8.2 Heat generation systems in single-family dwellings .....	15
8.3 Heat generation systems others than for single-family dwellings .....	16
8.3.1 Oil and gas fired boilers .....	16
8.3.2 Direct gas fired domestic storage water heater .....	16
8.3.3 Direct electrical heated domestic storage water heaters .....	16
8.3.4 Alternative generators.....	17
9 Auxiliary energy .....	17
9.1 Total auxiliary energy consumption .....	17
9.2 Auxiliary energy consumption for primary circulation pumps.....	18
9.3 Auxiliary energy consumption for direct heated domestic hot water generation devices .....	18
10 Recoverable heat losses, recovered heat losses and unrecoverable heat losses .....	18
Annex A (informative) Calculation of thermal loss from a gas or oil fired boiler in systems other than for single family dwellings .....	20
A.1 Calculation of total boiler thermal loss .....	20
A.2 Calculation of heat loss during boiler operation.....	20
A.3 Calculation of stand-by heat loss .....	21
A.3.1 General.....	21
A.3.2 Average boiler temperature during a stand-by period.....	21
A.3.3 Load factor of a boiler .....	21
A.3.4 Auxiliary energy consumption for a boiler .....	22
A.3.5 Nominal output efficiency of a boiler.....	22
Annex B (informative) Thermal loss from a gas fired domestic storage water heater .....	24
Annex C (informative) Thermal loss from an electrical heated domestic storage water heater (with continuous power on).....	26

**Annex D (informative) Thermal loss from an electrical heated domestic storage water heater (with  
timed power on)..... 27**

**Bibliography..... 31**

This document is a preview generated by EVS

## Foreword

This document (EN 15316-3-3:2007) has been prepared by Technical Committee CEN/TC 228 "Heating systems in buildings", the secretariat of which is held by DS.

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 April 2008, and conflicting national standards shall be withdrawn at the latest by April 2008.

This document 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 calculation of the energy performance of buildings. An overview of the whole set of standards is given in prCEN/TR 15615.<sup>1</sup>

The subjects covered by CEN/TC 228 are the following:

- design of heating systems (water based, electrical etc.);
- installation of heating systems;
- commissioning of heating systems;
- instructions for operation, maintenance and use of heating systems;
- methods for calculation of the design heat loss and heat loads;
- methods for calculation of the energy performance of heating systems.

Heating systems also include the effect of attached systems such as hot water production systems.

All these standards are systems standards, i.e. they are based on requirements addressed to the system as a whole and not dealing with requirements to the products within the system.

Where possible, reference is made to other European or International Standards, a.o. product standards. However, use of products complying with relevant product standards is no guarantee of compliance with the system requirements.

The requirements are mainly expressed as functional requirements, i.e. requirements dealing with the function of the system and not specifying shape, material, dimensions or the like.

The guidelines describe ways to meet the requirements, but other ways to fulfil the functional requirements might be used if fulfilment can be proved.

Heating systems differ among the member countries due to climate, traditions and national regulations. In some cases requirements are given as classes so national or individual needs may be accommodated.

In cases where the standards contradict with national regulations, the latter should be followed.

EN 15316 *Heating systems in buildings — Method for calculation of system energy requirements and system efficiencies* consists of the following parts:

*Part 1: General*

*Part 2-1: Space heating emission systems*

*Part 2-3: Space heating distribution systems*

*Part 3-1: Domestic hot water systems, characterisation of needs (tapping requirements)*

*Part 3-2: Domestic hot water systems, distribution*

*Part 3-3: Domestic hot water systems, generation*

*Part 4-1: Space heating generation systems, combustion systems (boilers)*

*Part 4-2: Space heating generation systems, heat pump systems*

*Part 4-3: Heat generation systems, thermal solar systems*

*Part 4-4: Heat generation systems, building-integrated cogeneration systems*

*Part 4-5: Space heating generation systems, the performance and quality of district heating and large volume systems*

*Part 4-6: Heat generation systems, photovoltaic systems*

*Part 4-7: Space heating generation systems, biomass combustion systems*

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 United Kingdom.

## Introduction

This European Standard is one of a number of standards that together describe methods for calculation of system energy requirements and system efficiencies related to domestic hot water systems. In particular this European Standard specifies methods for calculation of the input energy requirements and energy losses of the generation units.

The user needs to refer to other European Standards or to national documents for input data and detailed calculation procedures not provided by this European Standard.

Only the calculation methods are normative. Values necessary to complete the calculations should be given in a national annex.



## 1 Scope

This European Standard is part of a set of standards covering the methods for calculation of system energy requirements and system efficiencies of heating systems in buildings. In particular this standard is one of a number of standards dealing with domestic hot water systems.

The scope of this specific part is to standardise the methods for calculation of:

- thermal losses from the domestic hot water generation system;
- recoverable thermal losses for space heating from the domestic hot water generation system;
- auxiliary energy of the domestic hot water generation systems.

These values are input data for calculation of the overall energy use according to prEN 15603 and EN 15316-1.

This European Standard specifies the:

- inputs;
- calculation methods;
- outputs.

## 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 15316-3-2, *Heating systems in buildings — Method for calculation of system energy requirements and system efficiencies — Part 3-2 Domestic hot water systems, distribution*

prEN 50440, *Efficiency of domestic electrical storage water-heaters*

## 3 Terms and definitions

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

### 3.1

#### **auxiliary energy**

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

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

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

### 3.2

#### **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