

Hoonete küttesüsteemid. Süsteemide energiavajaduse ja süsteemide tõhususe arvutusmeetod. Osa 4-2: Küttesüsteemide soojusallikad, soojuspump-süsteemid

Heating systems in buildings - Method for calculation of system energy requirements and system efficiencies - Part 4-2: Space heating generation systems, heat pump systems

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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English Version

**Heating systems in buildings - Method for calculation of system
energy requirements and system efficiencies - Part 4-2: Space
heating generation systems, heat pump systems**

Systèmes de chauffage dans les bâtiments - Méthode de
calcul des besoins énergétiques et des rendements des
systèmes - Partie 4-2 : Systèmes de génération de
chauffage des locaux, systèmes de pompes à chaleur

Heizungsanlagen in Gebäuden - Verfahren zur Berechnung
der Energieanforderungen und Nutzungsgrade der Anlagen
- Teil 4-2: Wärmeerzeugung für die Raumheizung,
Wärmepumpensysteme

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Foreword

This document (EN 15316-4-2:2008) 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of an identical text or by endorsement, at the latest by December 2008, and conflicting national standards shall be withdrawn at the latest by December 2008.

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.

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 CEN/TR 15615 [13].

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 part of a series of standards on the methods for calculation of system energy requirements and system efficiencies. The framework for the calculation is described in the general part (EN 15316-1 [9]).

The energy performance can be assessed by determining either the heat generation sub-system efficiencies or the heat generation sub-system losses due to the system configuration.

This European Standard presents methods for calculation of the additional energy requirements of a heat generation sub-system in order to meet the distribution sub-system demand. The calculation is based on the performance characteristics of the products given in product standards and on other characteristics required to evaluate the performance of the products as included in the system. Product data, e.g. heating capacity or *COP* of the heat pump, shall be determined according to European test methods. If no European methods exist, national methods can be used.

This method can be used for the following applications:

- judging compliance with regulations expressed in terms of energy targets;
- optimisation of the energy performance of a planned heat generation sub-system, by applying the method to several possible options;
- assessing the effect of possible energy conservation measures on an existing heat generation sub-system, by calculating of the energy use with and without the energy conservation measure.

Only the calculation method is normative. The user shall refer to other European Standards or to national documents for input data. Additional values necessary to complete the calculations are to be given in a national annex, if no national annex is available, default values are given in an informative annex where appropriate.

1 Scope

This European Standard covers heat pumps for space heating, heat pump water heaters (HPWH) and heat pumps with combined space heating and domestic hot water production in alternate or simultaneous operation, where the same heat pump delivers the heat to cover the space heating and domestic hot water heat requirement.

The scope of this part is to standardise the:

- required inputs,
- calculation methods,
- resulting outputs,

for heat generation by the following heat pump systems, including control, for space heating and domestic hot water production:

- electrically-driven vapour compression cycle (VCC) heat pumps,
- combustion engine-driven vapour compression cycle heat pumps,

— thermally-driven vapour absorption cycle (VAC) heat pumps,
using combinations of heat source and heat distribution as listed in Table 1.

Table 1 — Heat sources and heat distribution in the scope of this European Standard

Heat source	Heat distribution
Outdoor air	Air
Exhaust-air	Water
Indirect ground source with brine distribution	Direct condensation of the refrigerant in the appliance (VRF)
Indirect ground source with water distribution	
Direct ground source (Direct expansion (DX))	
Surface water	
Ground water	

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 255-3:1997, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors — Heating mode — Part 3: Testing and requirements for marking for sanitary hot water units*

EN 308, *Heat exchangers — Test procedures for establishing performance of air to air and flue gases heat recovery devices*

EN 14511:2007 (all parts), *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling*

CEN/TS 14825:2003, *Air conditioners, liquid chilling packages and heat pumps with electrically driven compressors for space heating and cooling — Testing and rating at part load conditions*

prEN 15203, *Energy performance of buildings — Application of calculation of energy use to existing buildings*

EN 15316-2-3, *Heating systems in buildings — Method for calculation of system energy requirements and system efficiencies — Part 2-3: Space heating distribution systems*

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*

EN 15316-3-3, *Heating systems in buildings — Method for calculation of system energy requirements and system efficiencies — Part 3-3: Domestic hot water systems, generation*

EN 15316-4-1, *Heating systems in buildings — Method for calculation of system energy requirements and system efficiencies — Part 4-1: Space heating generation systems, combustion systems (boilers)*

EN ISO 7345:1995, *Thermal insulation — Physical quantities and definitions (ISO 7345:1987)*

EN ISO 13790 *Energy performance of buildings — Calculation of energy use for space heating and cooling (ISO 13790:2008)*

EN ISO 15927-6, *Hygrothermal performance of buildings — Calculation and presentation of climatic data — Part 6: Accumulated temperature differences (degree-days) (ISO 15927-6:2007)*

3 Terms, definitions, symbols and units

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 7345:1995 and the following apply.

3.1.1

alternate operation

production of heat energy for the space heating and domestic hot water system by a heat generator with double service by switching the heat generator either to the domestic hot water operation or the space heating operation

3.1.2

application rating conditions

mandatory rated conditions within the operating range of the unit that are published by the manufacturer or supplier

3.1.3

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 the 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 [15], the energy used for pumps and valves is called "parasitic energy".

NOTE 3 In the frame of this standard, the driving energy input for electrically-driven heat pumps in the system boundary of the *COP* according to EN 14511 and an electrical back-up heater is not entitled auxiliary energy but only additional electrical input not considered in the *COP*.

3.1.4

balance point temperature

temperature at which the heat pump heating capacity and the building heat load are equal

3.1.5

bin

statistical temperature class (sometimes a class interval) for the outdoor air temperature, with the class limits expressed in a temperature unit

3.1.6

building services

services provided by technical building systems and by appliances to provide indoor climate conditions, domestic hot water, illumination levels and other services related to the use of the building