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Heat cost allocators for the determination of the consumption of room heating radiators - Appliances with electrical energy supply

Heizkostenverteiler für die Verbrauchserfassung von Raumheizflächen - Geräte mit elektrischer Energieversorgung

Répartiteurs de frais de chauffage pour enregistrer les valeurs de consommation de surfaces de corps de chauffe - Appareils avec une alimentation en énergie électrique

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91.140.10	Sistemi centralnega ogrevanja	Central heating systems

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EUROPEAN STANDARD

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Heat cost allocators for the determination of the consumption of room heating radiators - Appliances with electrical energy supply

Répartiteurs de frais de chauffage pour déterminer la consommation des corps de chauffe - Appareils dotés d'une alimentation en énergie électrique

Heizkostenverteiler für die Verbrauchserfassung von Raumheizflächen - Geräte mit elektrischer Energieversorgung

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Foreword

This document (EN 834:2013) has been prepared by Technical Committee CEN/TC 171 “Heat cost allocation”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by February 2014, and conflicting national standards shall be withdrawn at the latest by February 2014.

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 supersedes EN 834:1994

Amendments

Compared to EN 834:1994, the following changes were made:

a) Definitions, requirements and test procedures have been refined and expanded,

b) Introduction of new values for the lower temperature limit,

c) Uniform definition for the mounting location of heat cost allocators on the radiator.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document deals with heat cost allocators with electrical power supply used for establishing the consumption value of room heating surfaces. It specifies the minimum requirements for the construction, materials, production, installation, function and evaluation of the displayed readings established by these measuring devices.

This document describes test procedures to establish compliance with the stated requirements and specifies instructions for their nature and scope.

1 Scope

NOTE See Clause 3 for a definition of the terms used below.

This European standard applies to heat cost allocators which are used to capture the proportionate thermal output of radiators in consumer units.

If an account unit comprises consumer units of different types (e.g. technically different types of heating systems or differences due to the consumer behaviour, e.g. industrial plants as opposed to private apartments), it could be necessary to divide this account unit into groups of users.

Heat cost allocators enable the determination of the heat consumption only of each radiator in a consumer unit as a share of the total heat consumption of the account unit or user group (see Clause 4); it is therefore necessary to determine this total heat consumption either by measuring the consumed fuel quantity or the amount of heat delivered (the latter by means of a heat meter, for example).

For the appropriate use of the heat cost allocators in accordance with this standard, the heating system needs to:

— correspond to the state of the art at the time of installation of the heat cost allocators;

— be operated in accordance with the state of the art (see A.2).

This standard specifies that heat cost allocators shall not be used for heating systems where the temperature of the heating system falls below or exceeds the temperature limits of the heat cost allocators, where the rating factor for the thermal output, K_Q, cannot be clearly specified or where the heating surface is inaccessible. This applies usually to the following heating systems:

— floor heating;

— radiant ceiling heating;

— flap-controlled radiators;

— radiators with ventilators;

— fan-assisted air heaters;

— heating systems with steam-operated radiators.

2 Normative references

Not applicable.

3 Terms and definitions

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

3.1
heat cost allocator
instrument for registration of the proportionate thermal output of radiators in consumer units

3.2
heat cost allocation system
overall system, as verified by an inspection authority, consisting of a heat cost allocator, installation equipment, installation instructions, rating system, existing rating factors, maintenance and reading instructions

3.3
measurement method
physical principle of measurement in combination with fundamental properties of the appliance type

Note 1 to the term: For heat cost allocators in accordance with this standard, the fundamental property of the appliance type characterizing the method is the number of measuring sensors for registering the relevant temperatures. The physical principle of measurement which is applied preferably is the temperature dependency of electrical components.

3.4
consumer unit
dwellings, office, business or industrial premises in which the heat is supplied by a common central heating system or by a common district heating connection

3.5
account unit
total of all consumer units

3.6
user group
group of consumer units within one account unit, each with a uniform heating system and comparable type of use

3.7
mean heating medium temperature
t_m
mean value of the flow and return temperatures of the heating medium

Note 1 to the term: In this standard, t_m is determined by adding up the logarithmic heating medium excess temperature, Δt_{ln}, (formula (2), see 5.2) and the reference air temperature, t_L.

3.8
heating medium excess temperature
Δt
temperature difference between the mean heating medium temperature and the reference air temperature

Note 1 to the term: In this standard, the heating medium excess temperature (abbreviated as "excess temperature") is determined as the logarithmic excess temperature Δt_{ln} in accordance with formula (2) (see 5.2).

3.9
design flow temperature
$t_{V,A}$
value of the flow temperature of the radiators required in order to reach the design indoor temperature in the heated rooms under steady state conditions at a heat load corresponding to a geographically determined design reference outside temperature

3.10
design return temperature
$t_{R,A}$
value of the return temperature of the radiators required in order to reach the design indoor temperature in the heated rooms under steady state conditions at a heat load corresponding to a geographically determined design reference outside temperature

3.11
mean design heating medium temperature
$t_{m,A}$
mean value of the design flow temperature and the design return temperature

Note 1 to the term: In this standard, $t_{m,A}$ is determined by adding up the logarithmic mean value of the design excess temperature and the basic reference air temperature of 20 °C in accordance with formula (2) (see 5.2).

3.12
base condition
radiator operating condition which is freely selectable within predefined limits and which is used for specifying the rating factors and for determining the c-values

3.13
basic reference air temperature
$t_{L,B}$
value of the air temperature at base condition

Note 1 to the term: For $t_{L,B}$ the specified target value is 20 °C, see 5.1.

3.14
reference air temperature
t_L
actual value of the air temperature while requirements are specified and measurements are carried out

3.15
heating medium base flow
medium flow through the radiator at base condition

3.16
temperature sensors
sensors consisting of a sensor element and a sensor casing, which generate a temperature-dependent signal

Note 1 to the term: The sensor casing serves both to transfer heat and to protect the sensor element from mechanical influences.

3.17
measuring range of temperature sensors
temperature range within which temperature sensors can be used

Note 1 to the term: For pairs of temperature sensors which are used for the determination of temperature differences, in addition to the measuring range, there is also a temperature difference range.

3.18
upper temperature limit
t_{max}
maximum mean design heating medium temperature $t_{m,A}$ of the heating system heating surfaces equipped with heat cost allocators at which the heat cost allocator can be used

Note 1 to the term: t_{max} is a property of the heat cost allocator which is determined by the temperature resistance of the components used.

3.19
lower temperature limit
t_{min}
minimum mean design heating medium temperature $t_{m,A}$ of the heating system at which the heat cost allocator can be used

Note 1 to the term: t_{min} is a property of the heat cost allocator, which is determined by the measurement method. This definition applies to double-pipe systems directly. For single-pipe systems, the mean design heating medium temperature $t_{m,A}$ of the heating system is replaced by the mean design heating medium temperature $t_{m,A}$ of the last radiator in the string or, as a substitute, the design return temperature $t_{R,A}$ of the string.

3.20
start temperature
t_Z
mean heating medium temperature of the radiator, $t_Z = t_m$, at partial load, with the mass flow corresponding to the base condition, at which the heat cost allocators start counting, in accordance with the single-sensor measurement method without a room temperature start sensor

3.21
start excess temperature
Δt_Z

mean heating medium excess temperature $\Delta t_Z = t_m - t_L$ of the radiator at partial load, with the mass flow corresponding to the base condition, at which the heat cost allocators start counting, in accordance with the two-sensor measurement method or single-sensor measurement method with a room temperature start sensor

3.22
***c*-value**
measure for the degree of thermal coupling between the temperature sensors and the temperatures to be registered

Note 1 to the term: The *c*-value is defined as a temperature difference ratio, see 5.2, formula 1.

3.23
displayed reading value
measuring value produced by the heat cost allocator which can be read off as a numerical value at the display device

Note 1 to the term: If this value does not equal zero at the beginning of the measuring period, the displayed reading relevant for the heat cost calculation is determined from the difference between the numerical values at the end and the beginning of the measuring period. The reading may be a non-rated value or the consumption value (see 3.24).

3.24
consumption value
displayed reading value rated by rating factors

3.25
counting rate
R
progression of the displayed reading or the consumption value per unit of time

Note 1 to the term: When determining the relative display deviation (3.28), the value measured at the temperatures of the operating state is referred to as the actual counting rate.

3.26
counting rate characteristic
relationship between the counting rate and, according to measurement method, the temperature or the temperature difference

Note 1 to the term: A distinction is made between the scheduled counting rate characteristic intended during the construction of the heat cost allocator and the actual counting rate characteristic in the appliance type. When determining the relative display deviation (3.28), the value of the counting rate determined from the scheduled counting rate characteristic at the temperatures of the operating state is referred to as the scheduled counting rate.

3.27
basic counting rate
R_B
value of the counting rate resulting from the scheduled counting rate characteristic at the temperature or temperature difference of the base condition and a c-value of zero

Note 1 to the term: It serves to determine the rating factor K_C (see 5.3.2).

3.28
relative display deviation
difference between the actual counting rate and the scheduled counting rate related to the scheduled counting rate

3.29
idle counting rate
counting rate at room temperature without thermal output from the radiator

3.30
reading
making available the displayed reading or the consumption values of the heat cost allocators for the purpose of heat cost calculation

3.31
visual reading
reading by means of visually reading off values at the display device of the heat cost allocator

3.32
close-range reading
reading by means of data transfer, via an interface, to a reader device which is arranged within sighting distance of the heat cost allocator

3.33
remote reading
reading by means of data transfer to a receiver

Note 1 to the term: Usually, the receiver is arranged outside the consumer unit.

3.34
reference output
thermal output of the radiator under prescribed operating conditions

3.35
reference system
Q(60 K), Q(50 K)
prescribed operating conditions of the radiator during the determination of the reference output

3.36
rating factors
factors by which the non-rated displayed reading values of the individual heat cost allocators are multiplied so as to be able to be used as consumption values directly for the consumer-based billing of heat costs

3.37
rating factor for the thermal output of the radiator
K_Q
non-dimensional numerical value of the reference output of the radiator expressed in watts or kilowatts

3.38
rating factor for the thermal coupling of the sensors
K_C
factor taking into account the different thermal coupling of the temperature sensors to the temperatures to be registered for different types of heating surfaces

Note 1 to the term: See also 5.3.2, formula 5.

3.39
rating factor for rooms with low design indoor temperatures
K_T
factor taking into account the change of the thermal output and the change of the temperature of the sensors where heat cost allocators according to the single-sensor measurement method are used at design indoor temperatures less than the basic reference air temperature

3.40
resulting rating factor
K
product of the individual rating factors

Note 1 to the term: See also 5.3.3, formula 6.

3.41
calendar function
control of specific processes of the heat cost allocator as a function of the specific point in time within the calendar year

3.42
transfer systems
any type of arrangement transferring signals between separately located assemblies of the heat cost allocator

3.43
manufacturer
person or organization responsible for the heat cost allocator system and the proper delivery and installation of the heat cost allocator

3.44
thermal impact
influence of heat supply or heat accumulation on the heat cost allocator, acting in addition to the uninfluenced heating operation

Note 1 to the term: Thermal impact can lead to incorrect displayed reading values.