

## Warmtekostenverdelers voor bepaling van het verbruik van verwarmingsradiatoren. Toestellen met elektrische energievoorziening

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

1e druk, november 1994  
UDC 681.125-83:697.347:620.1

Dit document bevat de officiële Engelse versie van de Europese norm EN 834, oktober 1994.

Deze norm heeft de status van Nederlandse norm.

Normcommissie 349 004 "Warmtemeters"

Behoudens uitzondering door de wet gesteld mag zonder schriftelijke toestemming van het Nederlands Normalisatie-instituut niets uit deze uitgave worden verveelvoudigd en/of openbaar gemaakt door middel van fotokopie, microfilm, opslag in computerbestanden of anderszins, hetgeen ook van toepassing is op gehele of gedeeltelijke bewerking.

Het Nederlands Normalisatie-instituut is met uitsluiting van ieder ander gerechtigd de door derden verschuldigde vergoedingen voor verveelvoudiging te innen en/of daartoe in en buiten rechte op te treden, voor zover deze bevoegdheid niet is overgedragen c.q. rechtens toekomt aan de Stichting Reprorecht.

Hoewel bij deze uitgave de uiterste zorg is nagestreefd, kunnen fouten en onvolledigheden niet geheel worden uitgesloten. Het Nederlands Normalisatie-instituut en/of de leden van de commissies aanvaarden derhalve geen enkele aansprakelijkheid, ook niet voor directe of indirecte schade, ontstaan door of verband houdende met toepassing van door het Nederlands Normalisatie-instituut gepubliceerde uitgaven.

Prijsklasse 60

Voorbeeld  
Preview

UDC 681.125-83:697.347:620.1

Descriptors: Metrology, buildings, heating, energy consumption, measuring instruments, temperature measuring instruments, recording apparatus, electric power supply, performance evaluation, measurements, specifications, installation, utilization, inspection

English version

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

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

Heizkostenverteiler für die Verbrauchswertefassung von Raumheizflächen. Geräte mit elektrischer Energieversorgung

This European Standard was approved by CEN on 1994-10-14. 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 Central Secretariat or to any CEN member.

The 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

## Contents

		Page
	<b>Foreword</b> .....	4
<b>1</b>	<b>Introduction</b> .....	4
<b>2</b>	<b>Scope and general terms</b> .....	4
<b>3</b>	<b>Functional principle and measuring principle</b> .....	5
<b>4</b>	<b>Definitions</b> .....	5
4.1	Reference condition .....	5
4.2	Reference counting rate .....	6
4.3	Temperature sensors .....	6
4.4	Measuring range of temperature sensors .....	6
4.5	Design flow temperature, design return temperature, mean design heating medium temperature .....	6
4.6	Upper temperature limit .....	6
4.7	Lower temperature limit .....	6
4.8	Start temperature .....	7
4.9	Displayed reading .....	7
4.10	Rated displayed reading .....	7
4.11	Counting rate .....	7
4.12	Nominal meter characteristic .....	7
4.13	Relative display deviation .....	7
4.14	Idle counting rate .....	7
4.15	Measuring period .....	7
4.16	c-value .....	7
4.17	Full utilization period .....	8
4.18	Rating factors .....	8
4.19	Transmission systems .....	9
4.20	Manufacturer .....	9
<b>5</b>	<b>Requirements for the heat cost allocators</b> .....	9
5.1	Requirements concerning temperature strain .....	9
5.2	Storage temperature .....	10
5.3	Start temperature .....	10
5.4	Idle counting rate .....	10
5.5	Temperature sensors .....	10
5.6	Calculator / Central unit .....	10
5.7	Auxiliary power supply .....	11
5.8	Overflow of the display .....	11
5.9	Resolution of the display .....	11
5.10	Function check .....	11
5.11	Maximum permissible errors .....	11
5.12	Ageing .....	12
5.13	Electrical, electrostatic and magnetic influences .....	12
5.14	Thermal influence on heat cost allocators operating on the single sensor principle .....	12
5.15	Thermal influence on heat cost allocators with a room temperature sensor .....	12
5.16	Thermal influence on other parts and components .....	12
5.17	Influence on transmission systems .....	12
5.18	Sealing .....	12
<b>6</b>	<b>Requirements for use and installation</b> .....	13
6.1	Temperature limits .....	13
6.2	Installation of sensors .....	13
6.3	Installation position of the sensors .....	13
6.4	Wire and signal cable installation .....	13
6.5	Conformity of instruments .....	13

<b>7</b>	<b>Requirements for the rating</b> .....	14
7.1	Resulting rating factor $K$ .....	14
7.2	Rating factor $K_Q$ .....	14
7.3	Rating factor $K_C$ .....	14
7.4	c-value .....	14
7.5	Rating factor $K_T$ .....	14
<b>8</b>	<b>Requirements for maintenance and reading</b> .....	14
<b>9</b>	<b>Testing</b> .....	15
9.1	General .....	15
9.2	Test documents .....	15
9.3	Test report .....	15
9.4	Test protocols .....	15
<b>10</b>	<b>Test procedures</b> .....	15
10.1	Construction .....	15
10.2	Sealing .....	15
10.3	Temperature durability .....	15
10.4	Error limits .....	16
10.5	Ageing .....	16
10.6	External influences .....	17
10.7	c-values, test procedure .....	17
10.8	c-values, test range .....	17
10.9	Rating factor $K_Q$ .....	18
10.10	Rating factor $K_C$ .....	18
<b>11</b>	<b>Marking</b> .....	18
<b>Annex A (informative)</b>		
<b>Information and recommendations</b> .....		
A.1	Heating systems .....	19
A.2	Recommended field of application .....	19
A.3	Heat emission not controllable by the consumer .....	19
A.4	Additional corrections .....	20
<b>Annex B (informative)</b>		
<b>Bibliography</b> .....		
		22

## Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 171 "Heat cost allocation", the secretariat of which is held by DIN.

This standard includes 2 informative annexes A and B. These parts of the standard are not binding.

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 1995, and conflicting national standards shall be withdrawn at the latest by April 1995.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

## 1 Introduction

This standard defines heat cost allocators with electrical power supply, which serve to establish the consumption value of a room radiator. It also specifies the minimum requirements for construction, materials, production, installation, function and evaluation of the displayed readings established by these measuring devices.

This standard specifies test procedures to establish the compliance with the stated requirements and gives instruction for the manner and the extent of their realization.

## 2 Scope and general terms

Heat cost allocators in accordance with this standard are instruments for the registration of the thermal output of radiators in consumer units.

Consumer units are dwellings, office buildings, business premises or industrial plants in which the heat is supplied by a common central heating system or by a common district heating connection.

A complete grouping of consumer units is called an account unit.

It could be necessary to divide an account unit into groups of users, if an account unit comprises consumer units of different types (e.g. technically different types of heating systems or because of consumer behaviour e.g. industrial plants as opposed to private apartments).

Heat cost allocators only allow the determination of the heat consumption of each radiator in a consumer unit as a share of the total heat consumption of the account unit or user group (see clause 3). 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 e.g. by a heat meter).

The condition for correct use of heat cost allocators in accordance with this standard is that they are used in a heating system which

- at the time of installation of the heat cost allocators, corresponds to the state of the art and
- is operated in accordance with the state of the art (see annex A, A.1).

Heat cost allocators in accordance with this standard shall not be used for heating systems where the temperature limits are exceeded, where the rating factor for the thermal power,  $K_0$ , is not clearly specified or where the heating surface is inaccessible. This applies e. g. to following heating systems:

underfloor heating

radiant ceiling heating

flap-controlled radiators

radiators with ventilators

fan-assisted air heaters

heating systems where the radiators attached thereto are operated by steam

### 3 Functional principle and measuring methods

Heat cost allocators in accordance with this standard are measuring devices for the registration of the temperature integral with respect to time. The temperature is the basis for the determination of the thermal output of the radiators on which the heat cost allocators are installed. Heat cost allocators in accordance with this standard with electrical power supply use one or more of the characteristic temperatures which determine the thermal output of the radiator surface to obtain their output. The non-rated displayed reading is the approximate value of the time integral of the measured characteristic temperature of the radiator or the time integral of the temperature difference between the radiator surface and the room.

The rated displayed reading is obtained from the non-rated displayed reading by multiplication by rating factors, particularly with those for the nominal thermal power of the radiator and those for the thermal contact between the surface and the sensors (see 4.18).

The consumption value is approximately proportional to the heat emitted in the measuring period from the heating surface and consumed by the user. The consumption value (see 4.10) is obtained either by reading off directly at the heat cost allocators or by later conversion of the non-rated displayed reading (see 4.9).

Thus the consumption value is a measuring result influenced by characteristics of the heat cost allocators, of the radiator, of secondary requirements and by factors of uncertainty of the rating factors and the installation. Accordingly the measuring deviations (measuring errors) of the recorded heat consumption are not only dependent on the heat cost allocator alone. Thus, heat cost allocators cannot be calibrated in the same way as heat meters.

Because of the described characteristics the measuring result is not related to physical energy units. The consumption value is non-dimensional. It is only a value relative to the sum of the consumption values of the account unit or of the group of users. A relative value of a measured consumption value which has been defined in that way has to be understood as a part of the total heat, consumed by the account unit or of the group of users. At the end of the measuring period, this value is established separately for every radiator. From the sum of all the consumption values of the radiators of a consumer unit, the above relative value will determine the part of the heat consumption of the respective consumer unit related to the total consumption of the account unit or the group of users.

Heat cost allocators consist of at least a case, sensors, calculator, display, power supply, installation and seal. The seal serves to protect against unauthorized manipulation. Each heat cost allocator is a functional unit. Its individual parts shall be manufactured in compliance with certain tolerances. Thus each part of a particular kind of heat cost allocator (type, make) function equally when used in the same way.

Heat cost allocators in accordance with this standard work according to one of the following measuring principles:

The single-sensor measuring principle utilizes one temperature sensor. The sensor records the temperature of the radiator surface or of the heating medium.

The two-sensor measuring principle utilizes two temperature sensors. One sensor measures the temperature of the radiator surface or of the heating medium, the second sensor measures the room temperature or a temperature in a defined relation to this.

The measuring principle using the logarithmic excess temperature measures with three sensors the flow and return temperatures of the heating medium and the room temperature.

### 4 Definitions

For the purpose of this standard, the following definitions apply.

#### 4.1 Reference condition

For the purpose of determining the rating factors and the c-value, a reference condition shall be defined. The

reference condition can be freely selected within certain limits.

The reference condition of a radiator is as follows:

- upper flow inlet
- mean heating medium temperature:  $t_m = 40\text{ °C}$  to  $60\text{ °C}$
- reference air temperature  $t_L = (20 \pm 2)\text{ °C}$ . It shall be measured 0,75 m above the floor and at a distance of 1,5 m from the heating surface in a test chamber with a stable climate.
- heating medium flow (water flow through the radiator) at  $t_v / t_R / t_L = 90\text{ °C} / 70\text{ °C} / 20\text{ °C}$

where:

$t_v$  is the flow temperature

$t_R$  is the return temperature

#### 4.2 Reference counting rate

The reference counting rate is the value of the counting rate related to the nominal meter characteristic (see 4.12) at reference condition (c-value equals zero). It serves to determine the rating factor  $K_C$  (see 4.18.2).

#### 4.3 Temperature sensors

Temperature sensors consist of the sensor element and the sensor casing, which serves to protect the sensor element from mechanical influences and to conduct heat.

#### 4.4 Measuring range of temperature sensors

The measuring range is the range within which the temperature sensors can be used for measurement. When using pairs of temperature sensors, which measure temperature differences, the measuring range is supplemented by the range of temperature difference.

#### 4.5 Design flow temperature, design return temperature, mean design heating medium temperature

The design flow and return temperatures are the temperatures of the heating medium of the radiators required 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. The mean value of the design flow temperature  $t_{v,A}$  and the design return temperature  $t_{r,A}$  is the mean design heating medium temperature  $t_{m,A}$ . This temperature is to be determined from the logarithmic mean value of the excess temperatures relating to the reference air temperature of  $20\text{ °C}$ .

#### 4.6 Upper temperature limit

The upper temperature limit  $t_{max}$  is the maximum mean design heating medium temperature of the radiators in the heating system at which the heat cost allocator may be used. It is determined on basis of the materials and parts used.

#### 4.7 Lower temperature limit

The lower temperature limit  $t_{min}$  is the lowest mean design heating medium temperature of the heating system



at which the heat cost allocator is permitted to be used. For single pipe heating systems, this is the mean design heating medium temperature of the last radiator in the string or, as substitute, the design return temperature of the string. The lower temperature limit depends on the metering principle.

#### 4.8 Start temperature

The start temperature  $t_2$  is the mean heating medium temperature in the radiator, in the partial load range with the mass flow corresponding to the reference condition, at which the heat cost allocator starts counting.

#### 4.9 Displayed reading

The displayed reading generally is the measuring value produced by the heat cost allocator which can be read off as a numerical value at the display device. If this value is not equal to zero at the beginning of the measuring period (see 4.15), the displayed reading relative 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 an unrated or a rated value (see 4.10).

#### 4.10 Rated displayed reading

The rated displayed reading is the displayed reading rated by the rating factors according to 4.18.

#### 4.11 Counting rate

The counting rate  $R$  is the progression of the display per unit of time.

#### 4.12 Nominal meter characteristic

The meter characteristic is the intended relation between the counting rate and, according to measuring principle, the temperature or the temperature difference.

#### 4.13 Relative display deviation

The relative display deviation is the difference between the actual display counting rate and the nominal counting rate related to the nominal display counting rate.

#### 4.14 Idle counting rate

The idle counting rate is the counting rate at room temperature, without thermal output from the radiator.

#### 4.15 Measuring period

The measuring period is the period of time in which the heat consumption is recorded without interruption.

#### 4.16 c-value

The c-value expresses the degree of thermal coupling between the temperature sensors and the temperatures to be recorded. It is defined as a temperature difference ratio according to following equation:

# Bestelformulier

## Stuur naar:

NEN Standards Products & Services  
t.a.v. afdeling Klantenservice  
Antwoordnummer 10214  
2600 WB Delft



**NEN** Standards Products & Services

Postbus 5059  
2600 GB Delft

Vlinderweg 6  
2623 AX Delft

T (015) 2 690 390  
F (015) 2 690 271

[www.nen.nl/normshop](http://www.nen.nl/normshop)

## Ja, ik bestel

\_\_ ex. NEN-EN 834:1994 en Warmtekostenverdelers voor bepaling van het verbruik van verwarmingsradiatoren - Toestellen met elektrische energievoorziening € 50.04

**Wilt u deze norm in PDF-formaat? Deze bestelt u eenvoudig via [www.nen.nl/normshop](http://www.nen.nl/normshop)**

### Gratis e-mailnieuwsbrieven

Wilt u op de hoogte blijven van de laatste ontwikkelingen op het gebied van normen, normalisatie en regelgeving? Neem dan een gratis abonnement op een van onze e-mailnieuwsbrieven. [www.nen.nl/nieuwsbrieven](http://www.nen.nl/nieuwsbrieven)

## Gegevens

Bedrijf / Instelling \_\_\_\_\_

T.a.v. \_\_\_\_\_ O M O V

E-mail \_\_\_\_\_

Klantnummer NEN \_\_\_\_\_

Uw ordernummer \_\_\_\_\_ BTW nummer \_\_\_\_\_

Postbus / Adres \_\_\_\_\_

Postcode \_\_\_\_\_ Plaats \_\_\_\_\_

Telefoon \_\_\_\_\_ Fax \_\_\_\_\_

**Factuuradres** (indien dit afwijkt van bovenstaand adres)

Postbus / Adres \_\_\_\_\_

Postcode \_\_\_\_\_ Plaats \_\_\_\_\_

Datum \_\_\_\_\_ Handtekening \_\_\_\_\_

### Retourneren

Fax: 015 2 690 271

E-mail: [klantenservice@nen.nl](mailto:klantenservice@nen.nl)

Post: NEN Standards Products & Services,

t.a.v. afdeling Klantenservice  
Antwoordnummer 10214,  
2600 WB Delft

(geen postzegel nodig).

### Voorwaarden

- De prijzen zijn geldig tot 31 december 2018, tenzij anders aangegeven.
- Alle prijzen zijn excl. btw, verzend- en handelingskosten en onder voorbehoud bij o.m. ISO- en IEC-normen.
- Bestelt u via de normshop een pdf, dan betaalt u geen handeling en verzendkosten.
- Meer informatie: telefoon 015 2 690 391, dagelijks van 8.30 tot 17.00 uur.
- Wijzigingen en typfouten in teksten en prijsinformatie voorbehouden.
- U kunt onze algemene voorwaarden terugvinden op: [www.nen.nl/leveringsvoorwaarden](http://www.nen.nl/leveringsvoorwaarden).