



**NSAI**  
Standards

Irish Standard  
I.S. EN 50600-4-7:2020

# Information technology - Data centre facilities and infrastructures - Part 4-7: Cooling Efficiency Ratio

**I.S. EN 50600-4-7:2020**

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation — recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

*This document replaces/revises/consolidates the NSAI adoption of the document(s) indicated on the CEN/CENELEC cover/Foreword and the following National document(s):*

*NOTE: The date of any NSAI previous adoption may not match the date of its original CEN/CENELEC document.*

*This document is based on:*

EN 50600-4-7:2020

*Published:*

2020-04-03

*This document was published under the authority of the NSAI and comes into effect on:*

2020-04-29

ICS number:

35.020

35.110

35.160

NOTE: If blank see CEN/CENELEC cover page

NSAI  
1 Swift Square,  
Northwood, Santry  
Dublin 9

T +353 1 807 3800  
F +353 1 807 3838  
E standards@nsai.ie  
W NSAI.ie

Sales:  
T +353 1 857 6730  
F +353 1 857 6729  
W standards.ie

Údarás um Chaighdeáin Náisiúnta na hÉireann

## National Foreword

I.S. EN 50600-4-7:2020 is the adopted Irish version of the European Document EN 50600-4-7:2020, Information technology - Data centre facilities and infrastructures - Part 4-7: Cooling Efficiency Ratio

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

For relationships with other publications refer to the NSAI web store.

**Compliance with this document does not of itself confer immunity from legal obligations.**

*In line with international standards practice the decimal point is shown as a comma (,) throughout this document.*

This page is intentionally left blank

EUROPEAN STANDARD

**EN 50600-4-7**

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2020

---

ICS 35.020; 35.160; 35.110

English Version

## Information technology - Data centre facilities and infrastructures - Part 4-7: Cooling Efficiency Ratio

Technologie de l'information - Installation et infrastructures  
de centres de traitement de données - Partie 4-7: Taux  
d'efficacité de refroidissement

Informationstechnik - Einrichtungen und Infrastrukturen von  
Rechenzentren - Teil 4-7: Wirkungsgrad der Kühlung (CER)

This European Standard was approved by CENELEC on 2020-02-10. CENELEC 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-CENELEC Management Centre or to any CENELEC 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 CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

<b>Contents</b>	<b>Page</b>
<b>European foreword</b> .....	<b>3</b>
<b>Introduction</b> .....	<b>4</b>
<b>1 Scope</b> .....	<b>7</b>
<b>2 Normative references</b> .....	<b>7</b>
<b>3 Terms, definitions and abbreviations</b> .....	<b>7</b>
3.1 Terms and definitions .....	7
3.2 Abbreviations.....	7
3.3 Symbols .....	8
<b>4 Applicable area of the data centre</b> .....	<b>8</b>
<b>5 Determination of Cooling Efficiency Ratio</b> .....	<b>8</b>
5.1 Definition of CER.....	8
5.2 Determining total energy use in multi-purpose buildings using CER .....	9
<b>6 Measurement of Cooling Efficiency Ratio</b> .....	<b>10</b>
6.1 General .....	10
6.2 Requirements .....	10
6.3 Recommendations .....	10
<b>7 Reporting of CER</b> .....	<b>10</b>
7.1 General .....	10
7.2 Requirements .....	10
7.3 Recommendations .....	11
<b>Annex A (informative) Correlation of CER and other KPIs</b> .....	<b>12</b>
<b>Annex B (normative) Examples of usage of CER</b> .....	<b>13</b>
<b>Annex C (informative) Parameters influencing CER</b> .....	<b>14</b>
<b>Annex D (normative) Derivatives of CER</b> .....	<b>15</b>
<b>Bibliography</b> .....	<b>18</b>
<b>Figures</b>	
<b>Figure 1 — Schematic relationship between the EN 50600 series of documents</b> .....	<b>5</b>
<b>Figure 2 — Heat loads in multipurpose buildings and energy used for cooling</b> .....	<b>9</b>
<b>Figure D.1 — Example of measured CEF and it's derivatives</b> .....	<b>17</b>
<b>Tables</b>	
<b>Table A.1 — Terms of efficiency for cooling machines</b> .....	<b>12</b>

## **European foreword**

This document (EN 50600-4-7:2020) has been prepared by CLC/TC 215 “Electrotechnical aspects of telecommunication equipment”.

The following dates are fixed:

- latest date by which this document has (dop) 2021-02-10  
to be implemented at national level by  
publication of an identical national  
standard or by endorsement
- latest date by which the national (dow) 2023-02-10  
standards conflicting with this document  
have to be withdrawn

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association.

## EN 50600-4-7:2020 (E)

## Introduction

The unrestricted access to internet-based information demanded by the information society has led to an exponential growth of both internet traffic and the volume of stored/retrieved data. Data centres are housing and supporting the information technology and network telecommunications equipment for data processing, data storage and data transport. They are required both by network operators (delivering those services to customer premises) and by enterprises within those customer premises.

Data centres need to provide modular, scalable and flexible facilities and infrastructures to easily accommodate the rapidly changing requirements of the market. In addition, energy consumption of data centres has become critical both from an environmental point of view (reduction of carbon footprint) and with respect to economic considerations (cost of energy) for the data centre operator.

The implementation of data centres varies in terms of:

- a) purpose (enterprise, co-location, co-hosting, or network operator facilities);
- b) security level;
- c) physical size;
- d) accommodation (mobile, temporary and permanent constructions).

The needs of data centres also vary in terms of availability of service, the provision of security and the objectives for energy efficiency. These needs and objectives influence the design of data centres in terms of building construction, power distribution, environmental control and physical security. Effective management and operational information is required to monitor achievement of the defined needs and objectives.

This series of European Standards specifies requirements and recommendations to support the various parties involved in the design, planning, procurement, integration, installation, operation and maintenance of facilities and infrastructures within data centres. These parties include:

- 1) owners, facility managers, ICT managers, project managers, main contractors;
- 2) architects, consultants, building designers and builders, system and installation designers;
- 3) facility and infrastructure integrators, suppliers of equipment;
- 4) installers, maintainers.

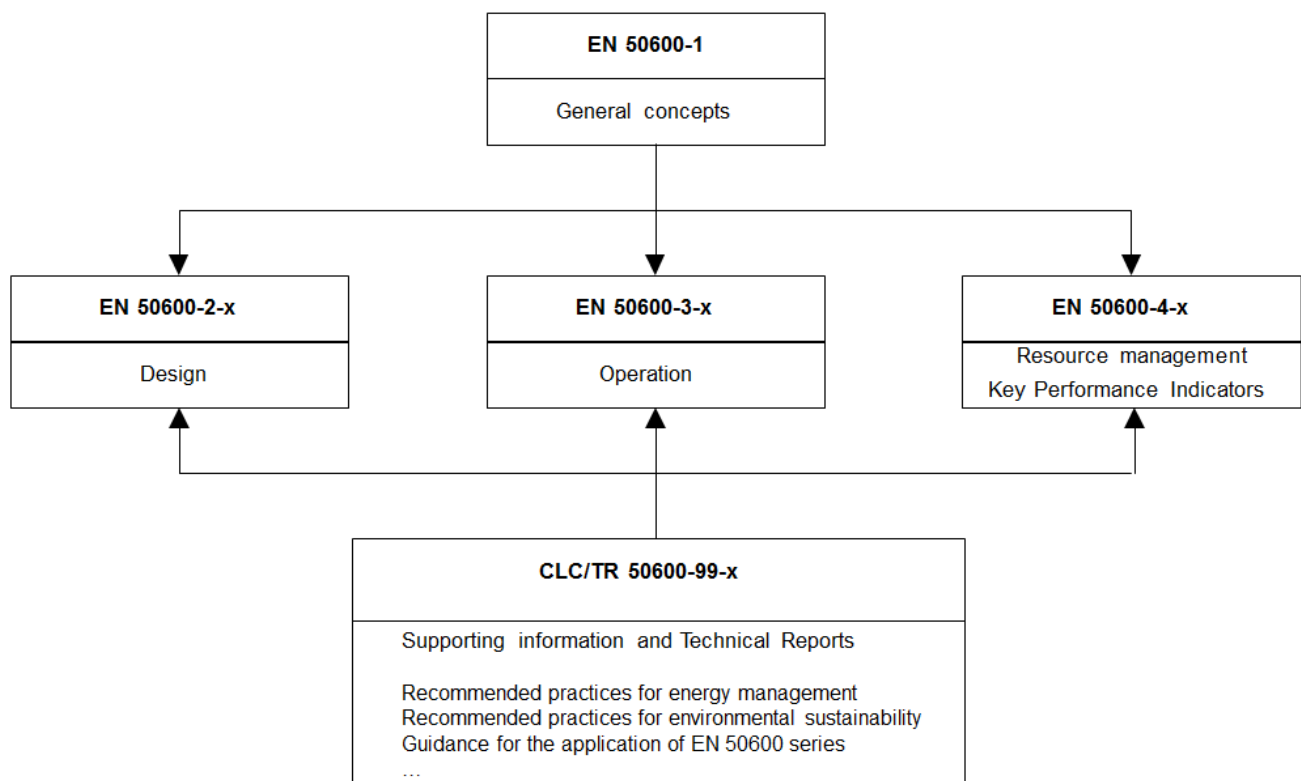
At the time of publication of this document, the EN 50600 series will comprise the following standards and documents:

- EN 50600-1, *Information technology — Data centre facilities and infrastructures — Part 1: General concepts*;
- EN 50600-2-1, *Information technology — Data centre facilities and infrastructures — Part 2-1: Building construction*;
- EN 50600-2-2, *Information technology — Data centre facilities and infrastructures — Part 2-2: Power supply and distribution*;
- EN 50600-2-3, *Information technology — Data centre facilities and infrastructures — Part 2-3: Environmental control*;
- EN 50600-2-4, *Information technology — Data centre facilities and infrastructures — Part 2-4: Telecommunications cabling infrastructure*;
- EN 50600-2-5, *Information technology — Data centre facilities and infrastructures — Part 2-5: Security systems*;



- EN 50600-3-1, *Information technology — Data centre facilities and infrastructures — Part 3-1: Management and operational information*;
- EN 50600-4-1, *Information technology — Data centre facilities and infrastructures — Part 4-1: Overview of and general requirements for key performance indicators*;
- EN 50600-4-2, *Information technology — Data centre facilities and infrastructures — Part 4-2: Power Usage Effectiveness*;
- EN 50600-4-3, *Information technology — Data centre facilities and infrastructures — Part 4-3: Renewable Energy Factor*;
- FprEN 50600-4-6, *Information technology — Data centre facilities and infrastructures — Part 4-6: Energy Reuse Factor*
- FprEN 50600-4-7, *Information technology — Data centre facilities and infrastructures — Part 4-7: Cooling Efficiency Ratio*;
- CLC/TR 50600-99-1, *Information technology — Data centre facilities and infrastructures — Part 99-1: Recommended practices for energy management*;
- CLC/TR 50600-99-2, *Information technology — Data centre facilities and infrastructures — Part 99-2: Recommended practices for environmental sustainability*;
- CLC/TR 50600-99-3, *Information technology — Data centre facilities and infrastructures — Part 99-3: Guidance to the application of EN 50600 series*

The inter-relationship of the standards within the EN 50600 series is shown in Figure 1.



**Figure 1 — Schematic relationship between the EN 50600 series of documents**

EN 50600-2-X standards specify requirements and recommendations for particular facilities and infrastructures to support the relevant classification for “availability”, “physical security” and “energy efficiency enablement” selected from EN 50600-1.

**EN 50600-4-7:2020 (E)**

EN 50600-3-X documents specify requirements and recommendations for data centre operations, processes and management.

EN 50600-4-X documents specify requirements and recommendations for key performance indicators (KPIs) used to assess and improve the resource usage efficiency and effectiveness, respectively, of a data centre.

In today's digital society data centre growth, and power consumption in particular, is an inevitable consequence and that growth will demand increasing power consumption despite the most stringent energy efficiency strategies. This makes the need for key performance indicators that cover the effective use of resources (including but not limited to energy) and the reduction of CO<sub>2</sub> emissions essential.

**NOTE** Within the EN 50600-4-X series, the term "resource usage effectiveness" is more generally used for KPIs in preference to "resource usage efficiency", which is restricted to situations where the input and output parameters used to define the KPI have the same units.

In order to enable the optimum resource effectiveness of data centres a suite of effective KPIs is needed to measure and report on resources consumed in order to develop an improvement roadmap.

These standards are intended to accelerate the provision of operational infrastructures with improved resource usage effectiveness.

This document specifies Cooling Efficiency Ratio to determine the efficient utilization of energy resources to provide the temperature control required by spaces of the data centre.

Additional standards in the EN 50600-4-X series will be developed, each describing a specific KPI for resource usage effectiveness or efficiency.

The EN 50600-4-X series does not specify limits or targets for any KPI and does not describe or imply, unless specifically stated, any form of aggregation of individual KPIs into a combined nor an overall KPI for data centre resource usage effectiveness or efficiency.

This document is intended for use by and collaboration between data centre managers, facility managers, ICT managers, and main contractors.

This series of European Standards does not address the selection of information technology and network telecommunications equipment, software and associated configuration issues.

## 1 Scope

This document specifies the Cooling Efficiency Ratio (CER) as a Key Performance Indicator (KPI) to quantify the efficient use of energy to control the temperature of the spaces within the data centre.

This document:

- a) defines the Cooling Efficiency Ratio (CER) of a data centre;
- b) describes the relationship of this KPI to a data centre's infrastructure, information technology equipment and information technology operations;
- c) defines the measurement, the calculation and the reporting of the parameter;
- d) provides information on the correct interpretation of the CER.

Annex A describes the correlation of CER and other KPIs.

Annex B provides examples of the application of CER.

Annex C introduces the parameters that affect CER.

Annex D describes requirements and recommendations for derivatives of KPIs associated with CER.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 50600-1, *Information technology - Data centre facilities and infrastructures - Part 1: General concepts*

EN 50600-4-1, *Information technology - Data centre facilities and infrastructures - Part 4-1: Overview of and general requirements for key performance indicators*

## 3 Terms, definitions and abbreviations

### 3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50600-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

#### 3.1.1

##### **Cooling Efficiency Ratio**

ratio of total heat removed and electrical energy used by a cooling system

#### 3.1.2

##### **Cooling Performance Ratio**

ratio of actual heat load and electrical power used by a cooling system

### 3.2 Abbreviations

For the purposes of this document, the abbreviations given in EN 50600-1, EN 50600-4-1 and the following apply.

CEF	Cooling Efficiency Factor
CER	Cooling Efficiency Ratio

This is a free preview. Purchase the entire publication at the link below:

[Product Page](#)

- 
- [Looking for additional Standards? Visit Intertek Inform Infostore](#)
  - [Learn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation](#)
-