



# SLOVENSKI STANDARD

## SIST EN 50600-4-2:2017

01-februar-2017

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**Informacijska tehnologija - Naprave in infrastruktura podatkovnih centrov - 4-2.  
del: Učinkovitost porabe energije**

Information technology - Data centre facilities and infrastructures - Part 4-2: Power Usage Effectiveness

Informationstechnik - Einrichtungen und Infrastrukturen von Rechenzentren - Teil 4-2: Kennzahl zur eingesetzten Energie

Technologie de l'information - Installation et infrastructures de centres de traitement de données - Partie 4-2 : Efficacité de l'utilisation de l'énergie

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**Ta slovenski standard je istoveten z: EN 50600-4-2:2016**

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**ICS:**

35.110            Omreževanje            Networking

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EUROPEAN STANDARD

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**Information technology - Data centre facilities and infrastructures  
- Part 4-2: Power Usage Effectiveness**

Technologie de l'information - Installation et infrastructures  
de centres de traitement de données - Partie 4-2 : Efficacité  
de l'utilisation de l'énergie

Informationstechnik - Einrichtungen und Infrastrukturen von  
Rechenzentren - Teil 4-2: Kennzahl zur eingesetzten  
Energie

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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## European foreword

This document (EN 50600-4-2:2016) has been prepared by CLC/TC 215 “Electrotechnical aspects of telecommunication equipment”.

The following dates are fixed:

- latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) [2017-07-10]
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) [2019-10-10]

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] 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.

Regarding the various parts in the EN 50600 series, see the Introduction.

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## 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.

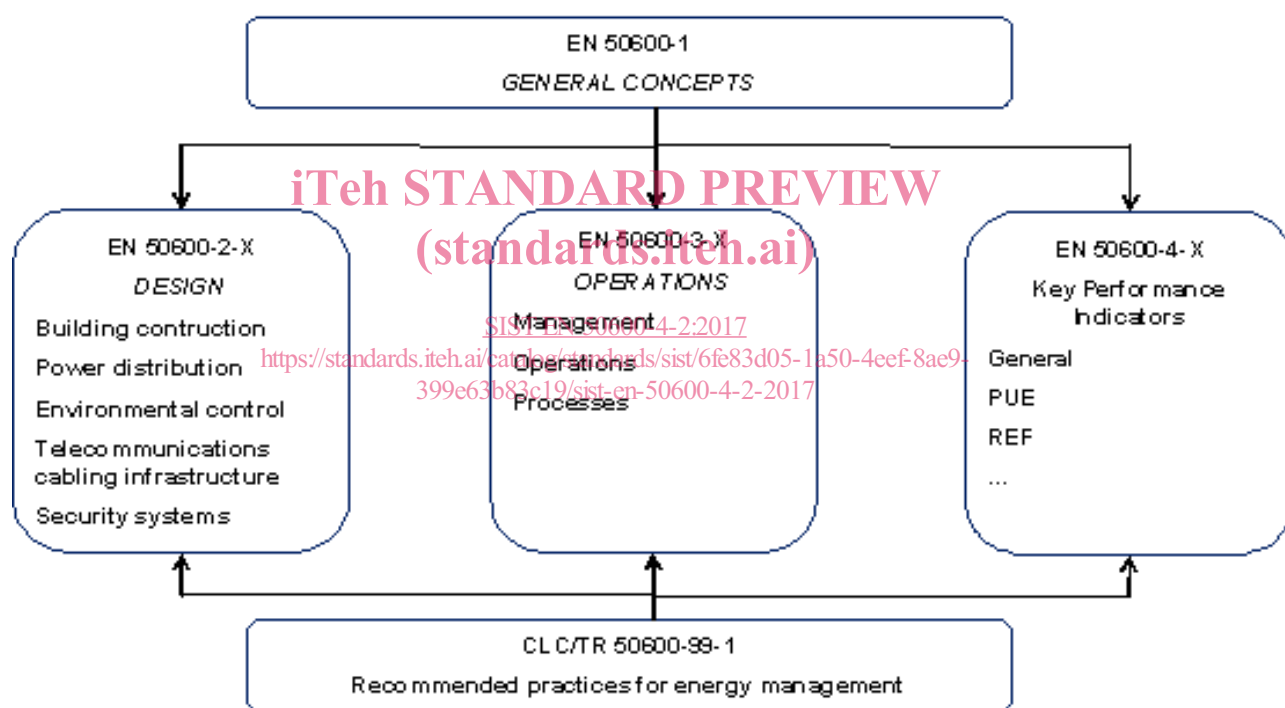
At the time of publication of this European Standard, the EN 50600 series will comprise the following standards and documents:

- 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 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*;
- CLC/TR 50600-99-1, *Information technology — Data centre facilities and infrastructures — Part 99-1: Recommended practices for energy management*.

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 50600-3-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.

**EN 50600-4-2:2016**

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 European Standard specifies Power Usage Effectiveness (PUE), which has become a popular metric to determine the efficient utilization and distribution of energy resources within a data centre.

It is recognized that the term “efficiency” should be employed for PUE but “effectiveness” provides continuity with earlier market recognition of the term.

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 European Standard 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.

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## 1 Scope

This European Standard specifies the Power Usage Effectiveness (PUE) as a Key Performance Indicator (KPI) to quantify the efficient use of energy in the form of electricity.

NOTE See the Note 1 to entry in Definition 3.1.3.

This European Standard:

- a) defines the Power Usage Effectiveness (PUE) of a data centre;
- b) introduces PUE measurement categories;
- c) describes the relationship of this KPI to a data centre's infrastructure, information technology equipment and information technology operations;
- d) defines the measurement, the calculation and the reporting of the parameter;
- e) provides information on the correct interpretation of the PUE.

PUE derivatives are described in Annex C.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 50600-4-1:2016, *Information technology — Data centre facilities and infrastructures — Part 4-1: Overview of and general requirements for key performance indicators*

EN 62052 (all parts), *Electricity metering equipment (AC) — General requirements, tests and test conditions (IEC 62052 series)*

EN 62053 (all parts), *Electricity metering equipment (a.c.) — Particular requirements (IEC 62053 series)*

## 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.

#### 3.1.1

##### **information technology equipment energy consumption**

energy consumed, measured in kilowatt-hour (kWh), by equipment that is used to store, process, and transport data within the computer room, telecommunication room and control room spaces

Note 1 to entry: Examples are servers, storage equipment and telecommunications equipment.

#### 3.1.2

##### **power distribution unit**

equipment that allocates or partitions power for other energy consuming equipment

**EN 50600-4-2:2016****3.1.3****Power Usage Effectiveness**

ratio of the data centre total energy consumption to information technology equipment energy consumption, calculated, measured or assessed across the same period

Note 1 to entry: It is recognized that the term “efficiency” should be employed for PUE but “effectiveness” provides continuity with earlier market recognition of the term.

Note 2 to entry: Sometimes the inverse value of PUE, referred to as Data Centre Infrastructure Efficiency (DCiE), is used.

**3.1.4****partial Power Usage Effectiveness**

derivative of PUE, which is the ratio of the total energy consumption within a defined boundary to the information technology equipment energy consumption

**3.1.5****designed Power Usage Effectiveness**

derivative of PUE, which is a projected PUE determined by the design targets of the data centre

**3.1.6****interim Power Usage Effectiveness**

derivative of PUE, which is measured over a specified time other than a year

**3.1.7****total annual data centre energy consumption**

total energy consumption for all energy types serving the data centre, measured in kWh at its boundary

Note 1 to entry: Energy is measured with energy metering devices at the boundary of the data centre or points of generation within the boundary.

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Note 2 to entry: This includes electricity, natural gas and district utilities such as supplied chilled water or condenser water.

Note 3 to entry: Total annual energy includes supporting infrastructure.

**3.2 Abbreviations**

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

CRAC	Computer Room Air Conditioner/Conditioning
CRAH	Computer Room Air Handler units
dPUE	designed Power Usage Effectiveness
DX	Direct Expansion
idPUE	interim designed Power Usage Effectiveness
iPUE	interim Power Usage Effectiveness
PDU	Power Distribution Unit
pPUE	partial Power Usage Effectiveness
PUE	Power Usage Effectiveness
r.m.s.	root mean square
ROI	Return On Investment