



# SLOVENSKI STANDARD

## SIST EN 50645:2018

01-januar-2018

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### Zahteve za okoljsko primerno zasnovu majhnih močnostnih transformatorjev

Ecodesign requirements for small power transformers

Exigences en matière d'écoconception applicables aux transformateurs de faible puissance

(standards.iteh.ai)

Ta slovenski standard je istoveten z: **EN 50645:2017**

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#### **ICS:**

13.020.99	Drugi standardi v zvezi z varstvom okolja	Other standards related to environmental protection
29.180	Transformatorji. Dušilke	Transformers. Reactors

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EUROPEAN STANDARD

**EN 50645**

NORME EUROPÉENNE

EUROPÄISCHE NORM

October 2017

ICS 29.180

English Version

**Ecodesign requirements for small power transformers**Exigences en matière d'écoconception applicables aux  
transformateurs de faible puissanceAnforderungen an die umweltgerechte Gestaltung von  
Kleinleistungstransformatoren

This European Standard was approved by CENELEC on 2017-07-31. 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.

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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 50645:2017) has been prepared by CLC/BTTF 146-1 “*Losses of small transformers: methods of measurement, marking and other requirements related to eco-design regulation*”.

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.

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) 2018–07–31
- latest date by which the national standards conflicting with this document have to be withdrawn (dow) 2020–07–31

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For the relationship with EU Directive(s) see informative Annex ZZ, which is an integral part of this document.

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## EN 50645:2017

### 1 Scope

This European Standard gives Ecodesign requirements for small power transformers complying with the EN 61558 series and in relation to Commission Regulation (EU) N° 548/2014 implementing the European Directive 2009/125/EC.

This European Standard is applicable to transformers with 50 Hz AC input and output with a rated power of 1 kVA or more and a voltage lower than 1 kV, except those excluded in the regulation.

For transformers with a voltage between 1 kV and 1,1 kV, this standard may be used as a guide.

### 2 Normative references

Not applicable.

### 3 Terms and definitions

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

NOTE Unless otherwise specified, the terms “voltage” and “current” imply the r.m.s. values of alternating voltage and current.

#### 3.1

##### **(power) transformer**

static piece of apparatus with two or more windings which, by electromagnetic induction, transforms a system of alternating voltage and current into another system of voltage and current usually of different values and at the same frequency for the purpose of transmitting electrical power

[SOURCE: IEC 421-01-01]

Note 1 to entry: The term frequency also implies that the waveform remains the same.

#### 3.2

##### **short-circuit voltage**

voltage to be applied to the **input winding**, when the windings are at ambient temperature, to produce in the short-circuited **output winding** a current equal to the **rated output current**

Note 1 to entry: The **short-circuit voltage** is usually expressed as a percentage of the **rated supply voltage**.

#### 3.3

##### **rated output current**

output current at rated supply voltage, rated supply frequency and rated output voltage, at rated power factor, assigned to the transformer by the manufacturer for the specified operating conditions of the transformer

#### 3.4

##### **rated supply voltage**

supply voltage (for polyphase supply, the phase-to-phase voltage) assigned to the **transformer** by the manufacturer for the specified operating conditions of the **transformer**

#### 3.5

##### **rated output voltage**

output voltage (for polyphase supply, the phase-to-phase voltage) at **rated supply voltage**, **rated supply frequency** and **rated output current**, at **rated power factor**, assigned to the **transformer** by the manufacturer for the specified operating conditions of the **transformer**

**3.6****rated power factor**

power factor assigned to the **transformer** by the manufacturer for the specified operating conditions of the **transformer**

**3.7****input circuit**

circuit intended to be connected to the supply consisting of the **input winding** and the **internal circuits**

**3.8****output circuit**

circuit to which the distribution circuit, appliance or other equipment is to be connected, consisting of the **output winding** and the **internal circuits**

**3.9****internal circuit**

circuit which consists of components, interconnections and connections to the terminals and the windings, excluding protective earth circuit

**3.10****input winding**

winding of the **input circuit**

**3.11****output winding**

winding of the **output circuit**

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**3.12****rated supply frequency**

frequency on the input of the transformer assigned by the manufacturer

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Note 1 to entry: The supply frequency is the frequency of the mains.

**3.13****load loss (P<sub>k</sub>)**

active power absorbed by the transformer when supplied with its short-circuit voltage, its secondary windings being short-circuited

**3.14****rated power (S<sub>r</sub>) (or rated output)**

product of the **rated output voltage** and the **rated output current** or, for three-phase transformers,  $\sqrt{3}$  times the product of the rated output voltage and the rated output current; if the transformer has more than one output winding or a tapped output winding, the rated output denotes the maximum sum of the products of rated output voltage and rated output current for output circuits intended to be loaded simultaneously

**3.15****no-load loss (P<sub>0</sub>)**

active power absorbed by the transformer when supplied with its **rated supply voltage** at **rated supply frequency**, with no load on the output

**3.16****rated ambient temperature (t<sub>a</sub>)**

maximum temperature at which the transformer may be operated continuously under normal conditions of use

Note 1 to entry: The value of the rated ambient temperature (t<sub>a</sub>) does not preclude temporary operation of the transformer at a temperature not exceeding (t<sub>a</sub> + 10) °C.

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### 4 General notes on tests

Tests according to this European Standard are:

- type tests (defined in Clauses 6 and 7);
- routine tests (defined in Annex A).

Each sample **transformer** shall comply with all the relevant tests.

Tests are carried out on specimens as delivered.

**Transformers** designed for more than one **rated supply voltage** are tested with the maximum **rated power** at the lower supply voltage.

### 5 Marking and other information

**5.1** The **transformers** shall be marked on rating plate with the values for:

- a) rated power;
- b) **load loss**;
- c) **no-load loss**;
- d) electrical power of any cooling system required at no load operation;
- e) weight and nature of conductors;
- f) weight and nature of core material.

**5.2** The information listed in 5.1, the manufacturer's name and address, and the model identifier (type reference) of the transformers shall be marked in the technical documentation if it exists.

### 6 No-load loss ( $P_0$ )

**6.1** When the **transformer** is connected to the **rated supply voltage**, at the **rated supply frequency**, with no load on the output, the **no-load loss** shall not be higher by more than 5 % from the marked value.

NOTE 1 The ratio is defined as follows: 
$$\frac{|P_{0 \text{ measured}} - P_{0 \text{ marked}}|}{P_{0 \text{ marked}}} \times 100 \%$$

NOTE 2 The value of 5 % corresponds to the "verification tolerances" specified in the regulation.

*Compliance is checked by measuring the **no-load loss** at ambient temperature.*

**6.2** The electrical power of any cooling system required at no load shall not be higher by more than 5 % from the declared value.

NOTE The value of 5 % corresponds to the "verification tolerances" specified in the regulation.



## 7 Load loss ( $P_k$ )

The **load loss** shall not be higher by more than 5 % from the marked value.

NOTE 1 The ratio is defined as follows: 
$$\frac{|P_{k \text{ measured}} - P_{k \text{ marked}}|}{P_{k \text{ marked}}} \times 100 \%$$

NOTE 2 The value of 5 % corresponds to the "verification tolerances" specified in the regulation.

Compliance is checked as follows:

- the active power consumed by the transformer shall be measured when steady-state conditions are established at its rated ambient temperature  $t_a$  or 25 °C, the transformer being supplied with its short-circuit voltage and the secondary windings being short-circuited.

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