
**Močnostni transformatorji - Dodatne evropske zahteve - 1-2. del: Skupni del -
Ocena energetskih lastnosti**

Power transformers - Additional European requirements: Part 1-2 Common part -
Assessment of energy performance

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Ta slovenski standard je istoveten z: EN 50708-1-2:2021

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EUROPEAN STANDARD
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**Power transformers - Additional European requirements: Part 1-
2 Common part - Assessment of energy performance**

Transformateurs de puissance - Exigences européennes
supplémentaires: Partie 1-2 Partie commune - Evaluation
des performances énergétiques

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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

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European foreword

This document (EN 50708-1-2:2021) has been prepared by CLC/TC 14 “Power transformers”

The following dates are fixed:

- latest date by which this document has to be (dop) 2022-09-27
implemented at national level by publication of
an identical national standard or by
endorsement
- latest date by which the national standards (dow) 2024-09-27
conflicting with this document have to be
withdrawn

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Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

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Introduction

This document defines the rules for the assessment of energy performance by any interested stakeholders (for example manufacturers, suppliers and importers as well as users etc.) for example to provide a means of demonstrating the product conformity to the Commission Regulation (EU) 548/2014 of 21 May 2014 and Commission Regulation (EU) 2019/1783 of 1 October 2019 amending Regulation (EU) No 548/2014 on implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to small, medium and large power transformers.

NOTE In the document, the term Regulation refers to the EU Regulation 548/2014 and amendment 2019/1783.

This document contains particular requirements for specific transformers or transformer applications, which are based on the requirements of the general EN 50708-1-1:2020.

This document should be considered in conjunction with the requirements of the general parts.

The particular requirements of the different sub parts of EN 50708 supplement, modify or replace certain requirements of the general parts of EN 50708-1 and/or EN 50708-1-X being valid at the time of publication of this document. The absence of references to the exclusion of a part or a clause of a general part means that the corresponding clauses of the general part are applicable (undated reference).

Requirements of other -X parts with X greater than 1 being eventually relevant for cases covered by this document also apply. This document could therefore also supplement, modify or replace certain of these requirements valid at the time of publication of this document.

The main clause numbering of each part follows the pattern and corresponding references of EN 50708-1-1:2020. The numbers following the particular number of this document are those of the corresponding parts, or clauses of the other parts of the EN 50708 series, valid at the time of publication of this document.

In the case where new or amended general parts with modified numbering were published after the sub part was issued, the clause numbers referring to a general part in sub parts might no longer align with the latest edition of the general part. Dated references should be observed.

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1 Scope

This document applies to all power transformers in scope of TC 14.

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 45014, *General criteria for supplier's declaration of conformity (ISO/IEC Guide 22)*

EN 50708-1-1:2020, *Power transformers - Additional European requirements: Part 1-1: Common part - General requirements*

EN 50708 (series), *Power transformers*

EN 60076-1, *Power transformers - Part 1: General (IEC 60076-1)*

EN 60076-19, *Power transformers - Part 19: Rules for the determination of uncertainties in the measurement of the losses on power transformers and reactors (IEC 60076-19)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 50708 series apply.

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

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

4 Assessment of compliance

When CE marking, EC declaration of conformity and the technical documentation are required, the following prescriptions shall be applied:

- The technical documentation shall be provided and recorded by manufacturers or its representative established in the European Community or importers.
- The technical documentation shall always contain the values of energy performance even if transformers are excluded from energy performance requirements.

This clause shall apply even for transformers excluded from the energy performance requirements or even no energy performances requirements exist.

NOTE The values of energy performance, CE marking and EC declaration of conformity requirements are defined by relevant legislation.

Energy performance compliance assessment other than the ones required by EN 60076 and other documents of EN 50708 series are subject to agreement between the involved parties.

Table 1 gives an overview of the requirements for each subject.

Three levels of conformity assessments are defined according to Table 2.

Indication of recommended sampling is given in Clause 8.

Table 1 — List of data for compliance

Subject	Reference	Requirement
CE marking	ANNEX III of Directive 2009/125/EC	Affixed on the transformer
EC declaration of conformity	ANNEX VI of Directive 2009/125/EC	See Clause 5
Technical documentation	Point 4 of the ANNEX 1 of EU 548/14 and point 3 of the ANNEX 1 of EU 548/14.	See Clause 6

Table 2 — Level, documentations or/and measurement for conformity assessment

Level	Description of the process	Clause	Documentations or/and measurement for conformity assessment
Level 1	Check of the technical documentation and declaration of conformity	7.2	CE marking EC Declaration of conformity Technical documentation
Level 2	Check of additional documentation	7.3	CE marking EC Declaration of conformity Technical documentation Additional documentation
Level 3	Physical measurement of the energy performance	7.4	CE marking EC Declaration of conformity Technical documentation Additional documentation Witnesser measurement

5 Declaration of conformity and CE Marking

NOTE 1 In order to comply with this document, CE Marking and EC Declarations of Conformity are expected to be checked to comply with the relevant EU regulatory requirements.

The information required shall be in compliance with the EN 45014.

NOTE 2 When this document is issued the EC Declarations of Conformity requires the following elements:

- the name and address of the manufacturer or of its authorized representative;
- a description of the model sufficient for its unambiguous identification (i.e.: serial number);
- the references of the harmonized standards applied (i.e.: EN 50708 series);
- the other technical standards and specifications used (i.e.: EN IEC 60076 series);
- where appropriate, a complement with reference to other legislation potentially relevant for CE marking of transformers;
- the identification and signature of the person empowered to bind the manufacturer or its authorized representative.

6 Technical documentation

In order to comply with this document, technical documentation shall be checked to comply with EN 50708-1-1:2020, 5.3.4. and:

- The rating plate shall be filled in conformity with harmonized EN 50708 series standards.
- The declared values shall be the value measured on the transformer during the routines test, calculated values of losses are not allowed.
- No tolerances on the declared values are allowed.

NOTE 1 EU regulatory requirements could also be relevant.

NOTE 2 When this document is issued, requirements for technical documentation are set out in Annex IV of DIRECTIVE 2009/125/EC (Ecodesign framework), such as a list of appropriate standards, solutions adopted to meet applicable regulatory requirements, environmental assessments, results of measurements.

NOTE 3 The EN 50708 series are more stringent than the relevant legislation regarding the declared values and doesn't allow calculated declared values.

NOTE 4 According to relevant legislation no tolerance on the declared values are authorized.

It is strongly recommended to master measurements uncertainties: documentation should include an uncertainty evaluation statement for the testing set-up and a record of the elements of measurement uncertainty associated with each instrument.

7 Level of assessment

7.1 General

The target of the level 3 is to ensure that losses measured in the routine tests are reliable. The assessment of level 3 includes the assessment of level 1 and level 2.

Energy performance of power transformers shall be assessed by losses measurement following EN 60076-1 or in accordance with another applicable EN standard.

Measurement uncertainty shall be evaluated according with EN 60076-19 and shall be acceptable with reference to the allowed tolerances.

NOTE 1 A suitable value of the ratio between the measurement expanded uncertainty, as defined in EN 60076-19 and referring to a coverage factor $k = 2$ (i.e. to a confidence level of about 95 % assuming a normal distribution) and the tolerance is no larger than 0,2.

A valid calibration certificate issued by an accredited third party shall be available for each one of the measurement devices.

The measured value for fixed losses and calculated value for PEI deduced from losses shall comply with EN 50708 series.

Loss measurements shall be carried out by at least one of the following ways:

- 1) manufacturer's laboratory with or without third party (witnessing);
- 2) independent laboratory
- 3) on site with mobile station (when option 1 or 2 are not possible).

NOTE 2 The first 2 ways can coincide with the Factory Acceptance Test [FAT]

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The choice of the way to be adopted should be done according to background knowledge of the manufacturer's losses.

If all the requirements set by this clause are fulfilled, all the listed ways are technically equivalent, but their cost can vary in each different context.

NOTE 3 An competent third-party witness is strongly advised.

NOTE 4 In case of deviation in energy performance's measurement in manufacturer's laboratory with or without third party in comparison with the test reports from an independent laboratory, then measurement may be re-carried out by an independent laboratory.

NOTE 5 At this time there are no accurate methods to carry out this kind of measurement on site with mobile station and it is not advised to use this process until standardization body delivers a standard with this method.

NOTE 6 On-site measurements is not an option for manufacturers' conformity assessment as it must be done before the CE marking is affixed.

7.2 Delegation for tests

The entities having in charge the energy performance assessment in order to ease the check can delegate to some other organization (for example laboratories or utilities, ...) to carry out the assessment of the transformers.

To fulfil this delegation of tests the two following conditions are requested:

- The organization agrees to carry out the assessment of the transformers;
- the entities in charge of energy performance assessment examine and confirm the capacity of this organization to carry out the assessment of the transformers.

NOTE Large users of transformers already carry out energy performance checks on supplied transformers in compliance with the quality standards and processes in force.

7.3 Tolerances for assessment process

In order to comply with this document, technical tolerances shall be checked to comply with the relevant EU regulatory requirements.

NOTE When this document is issued, during assessment the tolerance of 5 % represents:

- the verification tolerance on loss components which is allowed as described in ANNEX III of Commission Regulation (EU) N.548/2014.
- the maximum deviation of the measurement carried out on each loss components from the declared values.

8 Sampling

When assessment of compliance should be performed statistically on a given stock of units the following sampling is recommended:

- Level 1 and Level 2: to 0,2 % of transformers with a minimum of 5 units per subject as applicable
- Level 3: to 0,1 % of transformers with a minimum one unit per subject as applicable.

NOTE 1 A stock of transformer could be for example: the entire production of a manufacturer, of a country, of a given type of transformer in a given time interval (typically 1 year).

NOTE 2 These sampling rates do not apply to any routine tests required by relevant standards of the EN 60076 and EN 50708 series.