
Splošne metode za ocenjevanje zmožnosti za popravila, ponovno uporabo in izboljšave proizvodov, povezanih z energijo

General methods for the assessment of the ability to repair, reuse and upgrade energy related products

Allgemeine Verfahren zur Bewertung der Reparatur-, Wiederverwendbarkeit und Upgrade-Fähigkeit energieverbrauchsrelevanter Produkte

Méthodes générales pour l'évaluation de la capacité de réparation, réutilisation et amélioration des produits liés à l'énergie

[SIST EN 45554:2020](https://standards.iteh.ai/catalog/standards/sist/2fa5675c-7dc7-410a-96ab-2bc9b5b30288/sist-en-45554-2020)

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Ta slovenski standard je istoveten z: EN 45554:2020

ICS:

13.030.50 Recikliranje Recycling

SIST EN 45554:2020

en,fr,de

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 45554

February 2020

ICS 13.030.50

English Version

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reuse and upgrade energy-related products**

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Allgemeine Verfahren zur Bewertung der Reparatur-,
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This European Standard was approved by CENELEC on 2 December 2019. CEN and 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 CEN and CENELEC member.

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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 45554:2020) has been prepared by CEN/CLC/JTC 10 “*Energy-related products - Material Efficiency Aspects for Ecodesign*”.

The following dates are fixed:

- latest date by which this document has to be implemented (dop) 2020-12-02
at national level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with (dow) 2022-12-02
this document have to be withdrawn

The dual logo CEN-CENELEC standardization deliverables, in the numerical range of 45550 – 45559, have been developed under standardization request M/543 of the European Commission and are intended to potentially apply to any product within the scope of the Directive 2009/125/EC concerning energy-related products (ErP).

Topics covered in the above standardization request are linked to the following material efficiency aspects:

- a) Extending product lifetime
- b) Ability to reuse components or recycle materials from products at end-of-life
- c) Use of reused components and/or recycled materials in products

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

These standards are general in nature and describe or define fundamental principles, concepts, terminology or technical characteristics. They can be cited together with other product publications, e.g. developed by product technical committees.

This document is intended to be used by technical committees when producing horizontal, generic, and product-specific, or product group publications.

NOTE CEN-CENELEC JTC 10 uses either CEN or CENELEC foreword templates, as appropriate. The template for the current document is correct at the time of publication.

Introduction

In this document, common elements for the ability of an ErP to be repaired, reused or upgraded, such as an evaluation of the ability of parts to be disassembled, are addressed at part and product levels.

This document is especially linked to the generic documents on “Durability” and “Ability of ErPs to be remanufactured”, EN 45552, "General method for the assessment of the durability of energy-related products", and EN 45553, "General method for the assessment of the ability to remanufacture energy-related products", [1], respectively.

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1 Scope

This document provides generic methods to assess the following aspects:

1. the ability of products to be repaired
2. the ability of products, or parts thereof, to be reused
3. the ability of products to be upgraded

For the purposes of this document, “product” refers to “Energy-related Product (ErP)”.

This document includes generic criteria and methods relevant for assessing the ability of certain parts to be removed from products for the purpose of repair, reuse or upgrade.

NOTE The ability to of a product to be remanufactured is covered in prEN 45553:2018.

The methods in this document include product-related and support-related criteria when the product is placed on the market, taking into account knowledge of parts that are likely to fail, need replacing, or have reuse potential.

The decision whether a product should be repaired, reused or upgraded, is dependent on a range of factors such as health and safety, as well as economic, legal and environmental aspects. However, the question of whether it is reasonable to repair, reuse or upgrade products is outside of the scope of this document.

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 45552:—,¹ *General method for the assessment of the durability of energy-related products*

<https://standards.iteh.ai/catalog/standards/sist/2fa5675c-7dc7-410a-96ab-3b9b5b30288/sist-en-45554-2020>

EN 45559, *Methods for providing information relating to material efficiency aspects of energy-related products*

3 Terms, definitions and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions 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>

NOTE CEN CLC/TR 45550 [2], which is currently under development, contains additional definitions related to material efficiency of ErP.

3.1.1

part

hardware, firmware or software constituent of a product

¹ Under preparation. Stage at the time of publication: prEN 45552:2018

3.1.2**disassembly**

process whereby a product is taken apart in such a way that it could subsequently be reassembled and made operational

[SOURCE: IEC 62542 definition 6.1, modified by changing “an item” into “a product” and deleting the note]

3.1.3**reuse**

process by which a product or its parts, having reached the end of their first use, are used for the same purpose for which they were conceived

Note 1 to entry: Reuse after second or subsequent usage is also considered as reuse, but normal, regular or sporadic use is not considered as reuse.

3.1.4**repair**

process of returning a faulty product to a condition where it can fulfil its intended use

3.1.5**upgrade**

process of enhancing the functionality, performance, capacity or aesthetics of a product

Note 1 to entry: An upgrade to a product may involve changes to its software, firmware and/or hardware.

Note 2 to entry: Refer to the “Blue Guide” [3] for conditions under which a product is considered as a new product when placing it on the market after upgrading it.

3.2 Abbreviations

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The following abbreviations have been used in this document:

ErP	Energy-related Product
eDIM	Ease of Disassembly Metric
MOST	Maynard Operation Sequence Technique

4 How to use this document**4.1 General**

This document provides the following generic methods and criteria for assessing the ability of products, or parts thereof, to be repaired, reused and/or upgraded:

- An assessment method elaborated in 4.2 to Clause 8
- Two additional methods (Index and Time) offered as examples in A.1 and A.2, respectively.

This document is general in nature and allows the user to select assessment methods and criteria as appropriate for different groups of products. The options, list of criteria and their classifications provided in this document are not exhaustive. The relevance of each criterion and appropriateness of a classification for a specific product group shall be assessed according to the characteristics of the product group.

Clause 5 addresses the prioritization of parts and Clauses 6 and 7 list criteria that influence the ability of a product or parts thereof, to be repaired, reused and/or upgraded. A description and classification is provided for each criterion in Annex A.4. References linking each repair, reuse and upgrade criterion in the main text with its description and classification in the Annex is provided in Clauses 6 and 7. Clause 8 covers how the assessment can be reported.

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Additionally, information on an index for the ability of a product to be disassembled and the time for disassembly are provided in Annexes A.1 and A.2 respectively.

There is considerable overlap in terms of prioritization of parts and criteria among the three aspects this document addresses (repair, reuse and upgrade). Therefore, in order to facilitate their presentation, the aspect of repair is used as a basis when presenting methods and criteria, and separate subclauses address specific aspects related to reuse and upgrade.

The user of this document shall also provide a method to verify the result of the assessment. The assessment criteria shall be reliable, accurate and reproducible.

4.2 Steps to define a product-specific assessment method

When defining a product-specific assessment method, the user of this document shall use the following steps:

1. Determination of priority parts for the assessment (see Clause 5);
2. Identification of criteria (see Clause 6 and 7) and applicable categories relevant for the assessment of each priority part (See A.4.1 to A.4.12);
3. Assignment of a ranking/classification score to each applicable category of relevant criteria for each priority part (See A.4.1 and A.4.13);

Optionally, the following step can also be used:

4. Specification of a calculation method to aggregate results deriving from the aforementioned step 3, taking into account each criterion for each priority part (See A.4.13).

5 Identification of parts to be assessed

5.1 General considerations

To assess the ability of a product to be repaired, reused or upgraded, the user of this document shall establish a list of priority parts. This shall be based on available information or criteria as defined in 5.2.

It is necessary to prioritize parts because not all will be equally relevant to repair, reuse, or upgrade. The parts that have been prioritized are considered priority parts.

In order to identify priority parts, all parts shall be considered taking into account the analysis of EN 45552. The assessment described in Clauses 6 and 7 applies to priority parts only.

The following sources of information shall be consulted (as available; the list is non-exhaustive):

- Regulations;
- Product manufacturers;
- Parts manufacturers;
- Repair or maintenance organizations;
- Reuse organizations;
- Consumer organizations;
- Scientific literature and study reports.

The established product-group specific lists of priority parts for assessing the ability of a product to be repaired, reused or upgraded can be different from one another. The need to replace a part for repair or maintenance is also highly dependent on the technology used for that part. Parts providing the same function in similar products

can be based on different technologies, resulting in different likelihoods of failure or wear-out. Therefore, the identification of priority parts should also take into account such technology differences.

What determines a priority part is:

- The likelihood of the need to replace or upgrade the part,
- The suitability of the part for reuse, and
- The functionality of the part.

NOTE Priority parts likely to suffer damage or induce damage to the product upon removal do not facilitate repair, reuse or upgrade as those that are easily removable.

5.2 Assessment of the relevance of parts

5.2.1 Repair

Parts with a high average occurrence of failure shall be added to the list of priority parts for repair, taking into account their relevance to the functionality of the product.

Data shall be gathered to assess the likelihood that parts fail, such that replacement or repair are necessary. More details can be found in EN 45552.

Data may be based on physical testing, statistical surveys, calculations and field data. Accidental breakdowns and normal wear-out shall also be considered as sources of part failure.

NOTE Accidental breakdown is the unintentional breaking of a product by inadvertence, a mistake or a misuse of the user.

5.2.2 Reuse

Reuse of products

If deemed appropriate, the assessment of the ability of a product to be reused shall follow the criteria for repair in 5.2.1. If applicable, parts of a product containing personal data and parts of a product enabling the transfer and/or deletion of personal data shall be classified as priority parts.

Reuse of parts

For building a list of priority parts for their reuse, the following shall be taken into account:

- Parts can be harvested in cases where there is a high demand for them to be reused.
- Parts can be of reuse interest because they last longer than the lifetime of the product.

For some parts, the ability to be reused can be determined by the ability of user data to be transferred and/or deleted (see example in A.4.11), and factory settings to be restored (see example in A.4.12).

NOTE The motivation to reuse a part is influenced by its ability to withstand wear and tear and also by its continued compatibility with other products.

5.2.3 Upgrade

Parts subject to rapid technological changes or changes in use profiles over the use phase of the product shall be added to the list of priority parts for upgrade.

When compiling the list of priority parts for upgrade, the following shall be taken into account:

- Typical upgrade features and frequency of upgrade
- Product replacement motivations: the recurring motivations for replacing a still functioning product (i.e. motivated by increasing performance or functionality demands).
- Upgrade upon repair options: the priority parts for repair are analysed for their potential to be replaced with enhanced functionality or capacity.

5.3 Ranking parts in a priority parts list

Where relevant, the list of priority parts shall be ranked according to the criteria defined under 5.2, in terms of enabling repair, reuse or upgrade. Ranking helps to focus on the parts most likely to require repair, reuse or upgrade. If the ranking of priority parts takes place, it shall be used to weight the assessment results as described in Annex A.4.13.

6 Product-related criteria

6.1 Introduction

To determine the criteria for the assessment of a product or product group, the applicability, appropriateness and relevance shall be considered. The criteria listed in this and Clause 7 shall be compiled in a product-specific assessment method.

By way of example, these criteria are elaborated in Annex A, which provides a basis for the development of product-specific methods, and includes an example of a scoring system for the assessment of the ability of a product to be repaired, reused and/or upgraded.

The product-related criteria listed for repair can also be applicable for reuse and upgrade. Similarly, for any of the three aspects assessed, the other two can also have an influence and should be considered.

6.2 Repair

A non-exhaustive list of criteria influencing the ability of the product to be repaired is provided in this subclause. When defining a product-specific assessment method, the user of this document shall consider the criteria below to decide which of the criteria are relevant for the product group in question:

- Disassembly depth (see example in A.4.2);
- Fasteners and connectors (see example in A.4.3);
- Tools (see example in A.4.4);
- Working environment (see example in A.4.5); and
- Skill level (see example in A.4.6).

A list of basic tools used for repair purposes in general, regardless of the specific product being repaired is provided in Table A.3. If the concept of basic tools is used in the assessment of a specific product group, then the list in Table A.3 shall be used.

6.3 Reuse

Reuse can apply to both a product and a part.

NOTE The motivation to reuse a product or a part is influenced by its ability to withstand wear and tear and also by its continued compatibility with other products.

The ability of a product to be reused is influenced by its ability to be repaired or upgraded.

The ability of some products to be reused can be determined by the ability of user data to be transferred and/or deleted (see example in A.4.11), and factory settings to be restored (see example in A.4.12).