SLOVENSKI STANDARD
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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 Reparier-, 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

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

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

This draft European Standard is submitted to CENELEC members for enquiry. Deadline for CENELEC: 2019-01-25.

It has been drawn up by the Technical Committee CEN/CLC/JTC 10. If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
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Contents

Page

European foreword

This document [prEN 45554:2018] has been prepared by CEN/CLC/JTC 10 "***Energy-related products - Material Efficiency Aspects for Ecodesign***".

This document is currently submitted to the CENELEC Enquiry.

The following dates are proposed:

• latest date by which the existence of this document has to be announced at national level	(doa)	dor + 6 months
• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	dor + 12 months
• latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	dor + 36 months (to be confirmed or modified when voting)

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 re-use components or recycle materials from products at end-of-life

c) Use of re-used components and/or recycled materials in products

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, or product-group, standards, e.g. developed by product technical committees.

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

Note CEN/CENELEC/JTC 10 is a dual logo TC, and uses either CEN or CENELEC foreword templates, as appropriate. The template for the current document is correct at the time of publication.

Introduction

As ErPs can often not be completely recycled and the benefits associated with material recovery cannot fully compensate the energy (and material) demand of the whole production chain, each disposed ErP also means losses in energy and materials. In particular, precious and special metals are currently recycled to a very limited extent and plastics are mainly used for energy recovery. Therefore, prolonging useful life by repair and re-use are relevant contributions to resource efficiency of ErPs.

In order to ensure that measures do indeed reduce the environmental impact related to an ErP, the entire life cycle needs to be considered. In the case of prolonging useful life this includes for example the evaluation of trade-offs between longer lifetime and reduced environmental impacts of new products. Whilst such aspects establish a relevant context for this document, they are not addressed in this document.

In this document, common elements for reparability, reusability and upgradeability such as an evaluation of the ease of disassembly are addressed at a part and product level. Quantitative (index-related) evaluation and qualitative (checklist / scoring based evaluation) options for assessment of reparability, reusability and upgradability are considered.

The decision whether a product should be repaired, reused or upgraded or not, may be dependent on a range of factors such as hazards or hygiene issues on the one hand, or economic, legal and environmental aspects on the other hand. However, the question of whether a product should or should not be repaired, reused or upgraded is outside of the scope of this document.

This document is especially linked to the generic documents on “Durability” and “Ability to re-manufacture”, prEN 45552 and prEN 45553, respectively.

1 Scope

This document provides generic methods to assess the following aspects:

1. the ability to repair products
2. the ability to re-use products, or parts thereof
3. the ability to upgrade products

It includes generic criteria and methods relevant for assessing the ability to access or remove certain parts from products for the purpose of repair, re-use or upgrading.

NOTE Abilities to refurbish and re-manufacture are covered in prEN 45553:2018.

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

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.

prEN 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 prCEN/CLC/TR 45550, which is currently under development, contains additional definitions related to Material Efficiency of ErPs.

3.1.1
part
hardware, firmware or software constituent of a product

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
re-use
operation by which products or parts that are not waste are used for the same purpose for which they were conceived by another user

Note 1 to Entry: the transfer of ownership is essential part of the concept of re-use

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 to enhance the functionality, performance, capacity or aesthetics of a product

Note 1 to entry: upgrade may involve changes to the software, firmware and/or hardware

[SOURCE: IEC 62075:2012, definition 3.23, modified by the addition of Note 1 to entry.]

3.2 Abbreviations

The following abbreviations have been used in this document:

ErP	Energy-related Product
MTBF	Mean Time Between Failures

4 How to use this document

This document provides assessment types and criteria that shall be considered when developing product-specific methods for assessing the ability to repair, reuse and upgrade of ErPs. It is general in nature and provides options allowing for the selection of assessment types and criteria as appropriate for each product group. The options, list of criteria and their classification provided in this document are not exhaustive. The user of the document can decide not to implement certain assessment types or criteria, when developing product-specific assessment methods. The relevance of each criterion and appropriateness of a classification for a specific product group shall be assessed on product-by-product basis according to the characteristics of the product group.

The document addresses the prioritization of parts and lists criteria that influence repair, re-use, upgrade. A description and classification is provided for each criterion in Annex A. References linking each repair, re-use, upgrade criterion in the main text with its description and classification in the Annex are provided in sections 6 and 7. Further ways of assessing repair, re-use, upgrade quantitatively are also provided in Annex A.

There is considerable overlap in terms of prioritization of parts and criteria among the three aspects this document addresses (repair, re-use 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 subsections address specificities related to re-use and upgrade.

This document contains the following assessment types:

- Semiquantitative assessment, i.e. individual or combined classification of criteria associated with the product, and

- Quantitative assessment, i.e. numeric measuring of the degree to which a criterion is addressed in the product (e.g. indices)

Qualitative assessment is also possible, i.e. evaluating the existence of specific criterion associated with the product without classification or combination of criteria. As this can be readily derived from a semiquantitative assessment, this approach is not elaborated separately in this document. However, the criteria described in Annex A may be used as a basis for such approaches.

The user of the document shall also provide a method to verify the assessment.

5 Identification of parts to be assessed

5.1 General considerations

In order to simplify the assessment, a prioritization of parts may take place because not all parts will be equally prone to be repaired, re-used, or upgraded. Therefore, not all parts need to be assessed.

In order to identify priority parts, all parts shall be considered. If priority parts are identified, the assessment described in the Clauses 6 and 7 applies to these priority parts only.

Therefore, to assess the ability of a product to be repaired, re-used or upgraded the user of this document shall either:

1. establish a list of priority parts based on
    a. available information or
    b. criteria as defined in section 5.2, or;
2. establish criteria on how to define priority parts, or;
3. do a combination of both.

For the above, at least the following sources of information shall be considered (as available):

— regulations

— product manufacturers

— parts manufacturers

— repair or maintenance organizations

— re-use organizations

— consumer organizations

— scientific literature and study reports

The lists established for assessing the ability to repair, re-use and upgrade might need to be different from each other.

The relevance of having a part replaceable or upgradeable is highly dependent on the likelihood that such a replacement is needed for repairing or upgrading the product.

For the assessment of priority parts, technological differences amongst products of a product group should be considered, because different technologies that realize the same function might have completely different relevance with regard to reparability, re-usability and upgradability.

Example Electric motors that last below X hours

5.2 Assessment of the relevance of parts

5.2.1 Repair

Evaluation of parts for repair should focus on the average occurrence of failure of the part.

Relevant data shall be considered that allows assessment of the likelihood that parts fail making replacement or repair necessary. Data may be based on statistical surveys, calculations (e.g. MTBF) or experimental data. Part failure, accidental breakdowns and normal wear-out shall be considered. More details can be found in the standard dealing with durability assessment methods in prEN 45552.

5.2.2 Re-use

If deemed appropriate, the parts prioritization for the assessment of reusability of products should follow the criteria for repair. If applicable, parts potentially enabling the transfer and deletion of personal data should be classified as priority parts.

For the assessment of reusability of parts, the user of the document may follow the general considerations in 6.3. so as to develop a list of priority parts.

5.2.3 Upgrade

The evaluation of parts for upgrade is expected to focus mainly, but not exclusively, on parts subject to rapid technological changes or changes in use profiles over the use phase of the product.

In order to identify priority parts for upgrade purposes, the following should be considered from the sources listed in 5.1:

— **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).

— **Repair to upgrade 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

When establishing a list of priority parts, it shall be considered to rank or weight the parts according to the criteria defined under 5.2 in terms of enabling repair, reuse and upgrade respectively. The ranking of priority parts shall be used to weight the assessment results as described in Annex A.1.13.

6 Product-related criteria

6.1 Introduction

This clause gives an overview of the product criteria that shall be considered in the course of writing product-group specific standards. The criteria listed in this and the following clause may be compiled in a product-specific assessment method.

These criteria are elaborated in Annex A, also providing an example of a scoring system for the semiquantitative and quantitative assessment of repair, re-use and upgrade, which provides a basis for the development of product-specific methods.

The criteria listed for repair might also be applicable for the other two aspects. Similarly, for any of the three aspects assessed, the other two may also have an influence and may be considered.

6.2 Repair

A non-exhaustive list of criteria influencing repair is provided in this section. When defining a product-specific assessment method, the user of this document shall consider the criteria below.

- Disassembly sequence and depth (A.1.2)
- Fasteners (A.1.3)
- Tools (A.1.4)
- Working environment (A.1.5)
- Skill level (A.1.6)

A list of tools most commonly used for repair purposes in general, regardless of the specific product being repaired is provided in Table 3 of A.1.4. If the category of Basic Tools is used in the assessment of a specific product group, then the list in Table 3 shall be used.

6.3 Re-use

Re-use can apply to both a product and a part. The ability to re-use a product or a part is predominantly influenced by its ability to withstand wear and tear, which may be assessed according to EN 45552. The ability to re-use is also influenced by the ability to repair and the ability to upgrade.

For some products, the ability to be re-used may be determined by the ability of user data to be transferred and deleted (A.1.11), and factory settings to be restored (A.1.12).

It should also be noted that reliability and durability assessments of the part are relevant.

6.4 Upgrade

The upgradability of the product can be assessed based on the ability to add or replace one or more priority upgrade parts. For assessing the upgradability of products, the criteria referenced in Clause 6 should be followed. Specific attention however should be given to the role of software and firmware. The ability to upgrade a product might have a positive impact on the likelihood that a product is re-used.

7 Support-related criteria

7.1 Introduction

This clause provides an overview of the support-related criteria that shall be considered in the course of writing product-group specific standards. The criteria listed in this and the previous clause may be compiled in a product specific assessment method.

NOTE Manufacturer support is limited to services provided and/or authorized by the manufacturer.

These criteria are elaborated in Annex A, also providing an example of a scoring system for the semiquantitative and quantitative assessment of repair, re-use and upgrade, which provides guidelines for the development of product-specific methods.

7.2 Repair

Next to the assessment of the product-related criteria specified in Clause 6, the support provided by manufacturer for repair should be assessed based on the declaration of the manufacturer or publicly available information of the manufacturer. A non-exhaustive list of support-related criteria influencing repair is provided in this section. Some of these criteria are also relevant for re-use and upgrade. When defining a product-specific assessment method, the user of this document shall consider the criteria below:

- Diagnostic support and interfaces (A.1.7)
- Availability of spare parts (A.1.8)
- Types and availability of information (A.1.9)
- Return models (A.1.10)

7.3 Re-use

To a large extent, the ability of products to be re-used is dependent on the ability to be repaired and/or upgraded. Support-related criteria for repair and upgrade are therefore also relevant for re-use.

Specifically for re-use, all criteria of manufacturer support that enable the transfer of ownership are relevant, including information, tools and services offered by the manufacturer to facilitate identification of the product or