



SLOVENSKI STANDARD

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Splošne metode za ocenjevanje možnosti za recikliranje in predelavo proizvodov, povezanih z energijo

General methods for assessing the recyclability and recoverability of energy related products

Allgemeines Verfahren zur Bewertung der Rezyklierbarkeit und Wiederverwertbarkeit energieverbrauchsrelevanter Produkte

Méthodes générales pour l'évaluation de la recyclabilité et de la valorisabilité des produits liés à l'énergie

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EUROPEAN STANDARD

EN 45555

NORME EUROPÉENNE

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English version

General methods for assessing the recyclability and recoverability of energy-related products

Méthodes générales pour l'évaluation de la recyclabilité et de la récupérabilité des produits liés à l'énergie

Allgemeines Verfahren zur Bewertung der Recyclingfähigkeit und Verwertbarkeit energieverbrauchsrelevanter Produkte

This European Standard was approved by CEN on 6 October 2019.

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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 CEN and 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 foreword

This document (EN 45555:2019) has been prepared by Technical Committee CEN/CLC/JTC 10 “Energy-related products - Material Efficiency Aspects for Ecodesign”, the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2020, and conflicting national standards shall be withdrawn at the latest by May 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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/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-specific, 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, or product or product-group standards.

Attention is drawn to safety and other legislations relevant to ErP. Their purpose is to ensure that all products intended for or likely to be used by consumers and other users under normal or reasonable foreseeable conditions are safe.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

To close the loop in a circular economy, amongst other measures, an efficient handling of waste is paramount. Recovering materials and energy can reduce environmental impacts over the product lifecycle, including reduced extraction of natural resources and associated emissions of primary material production. To determine the recycling potential of an energy-related product (ErP) in terms of how easy it is to recycle/recover materials from the product or to what degree a product can undergo recycling/recovery, the concepts of recyclability and recoverability are introduced.

While recycling of ErPs aims at closing the circular economy loop, trade-offs might arise between different material efficiency related topics. For instance mass of an ErP, durability, reparability, reusability and energy efficiency, need to be balanced in order to improve the environmental benefit. See also ISO Guide 64 [12]. Further explanation on the relationship with environmental impacts of recycling and recovery, including environmental benefits, are displayed in the informative Annex C.

NOTE The Waste Framework Directive 2008/98/EC [9] provides the concept of waste hierarchy, which ranks the waste management practices from highest to lowest priority as follows: prevention, preparing for reuse, recycling, recovery and disposal.

Once an ErP has reached its end-of-life (EoL) and has become waste, the ErP can be either prepared for reuse, recycled/recovered. This document elaborates on the product characteristics which are relevant for recyclability and recoverability of an entire ErP. The focus is therefore on the recyclability/recoverability of the product itself rather than the recycling or recovery processes. The general method presented in this document takes into account the availability and efficiency of state-of-the-art recycling and recovery processes to determine the recyclability/recoverability rate of an ErP. Based on the reference EoL treatment scenario, it is assumed that the assessment of the recyclability/recoverability of an ErP as a whole may be valid for a certain period of time in a given geographical area.

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1 Scope

This document establishes general principles for:

- Assessing the recyclability of energy-related products;
- Assessing the recoverability of energy-related products.

This document also considers:

- The ability to access or remove certain components, assemblies, materials or substances from products to facilitate their extraction at the end-of-life for ease of treatment, recycling and other recovery operations;
- The recyclability of critical raw materials (CRMs).

This document defines parameters which are applicable for the development of product or product-group standards in order to calculate recyclability/recoverability rates. This document serves as a method for writing product or product-group standards, rather than being directly applied. Additional information and requirements not provided in this document will be necessary for product or product-group standards.

This document is not applicable to generate publicly available product information and compare products in absence of product standards based on this document.

Although this document can be used for a product or product-group, for the sake of a better readability only "product" is used throughout the rest of the document.

2 Normative references

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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 45558, *General method to declare the use of critical raw materials in energy-related products*

EN 45559:2019, *Methods for providing information relating to material efficiency aspects of energy-related products*

3 Terms and definitions

3.1 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 See FprCLC/TR 45550 for additional definitions related to material efficiency of ErP.

3.1.1

EoL

end-of-life

life cycle stage of a product starting when it is removed from its intended use stage

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Note 1 to entry: Within this standard, removal from its intended use phase includes when it has been discarded as waste.

[SOURCE: IEV 904-01-17, modified with the addition of the Note 1 to entry and alignment of wording M/543]

3.1.2**EoL treatment****end-of-life treatment**

operation of any kind by which a product is recovered or disposed of

3.1.3**recovery**

operation of any kind, the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy

Note 1 to entry: Annex II of the Waste Framework Directive (2008/98/EC) sets out a non-exhaustive list of recovery operations.

[SOURCE: Directive 2008/98/EC, modified by moving the last sentence of definition to NOTE 1 to entry]

3.1.4**material recovery**

recovery operation of any kind, other than energy recovery and the reprocessing into materials that are to be used as fuels or other means to generate energy

Note 1 to entry: Material recovery includes, *inter alia*, preparing for reuse, recycling and backfilling.

[SOURCE: Directive 2008/98/EC, modified by moving the last sentence of definition to Note 1 to entry]

3.1.5**energy recovery**

production of useful energy through direct and controlled combustion or other processing of waste

[SOURCE: IEV 904-04-03, modified by deletion of Note 1 to entry]

3.1.6**recycling**

recovery operation of any kind, by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes excluding energy recovery

Note 1 to entry: Recycling includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

[SOURCE: Directive 2008/98/EC, modified by moving the last sentence of definition to NOTE 1 to entry]

3.1.7**waste**

substance or object of any kind, which the holder discards or intends or is required to discard

[SOURCE: Directive 2008/98/EC]

3.1.8**disposal**

operation of any kind, which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy

Note 1 to entry: Annex I of the Waste Framework Directive (2008/98/EC) sets out a non-exhaustive list of disposal operations.

[SOURCE: Directive 2008/98/EC, modified by deleting the last sentence of definition and adding NOTE 1 to entry]

3.1.9**part**

hardware, firmware or software constituent of a product

Note 1 to entry: Firmware and software are not relevant for the purpose of this document.

[SOURCE: EN 45554:-¹definition 3.2]

3.1.10**backfilling**

recovery operation of any kind where suitable non-hazardous waste is used for purposes of reclamation in excavated areas or for engineering purposes in landscaping

Note 1 to entry: Waste used for backfilling must substitute non-waste materials, be suitable for the aforementioned purposes, and be limited to the amount strictly necessary to achieve those purposes.

[SOURCE: Directive (EU) 2018/851, modified by moving the last sentence of definition to NOTE 1 to entry]

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3.2 Abbreviations

The following abbreviations have been used in this document:

| | |
|-----|-------------------------|
| CRM | critical raw material |
| EoL | end-of-life |
| ErP | energy-related products |

4 Overview and guidance

For the assessment of the recyclability/recoverability of an ErP, it shall be assumed that the entire ErP undergoes the respective reference EoL treatment scenario. It shall be assumed that no preparing for reuse takes place in this assessment. The users of this document shall select one reference EoL treatment scenarios. Comparison of recyclability/recoverability rates of different products of the same type, shall only be carried out using the same reference EoL treatment scenario.

The ability of an ErP to be recycled and recovered depends upon the following factors:

- the design characteristics of the product such as its structure, material composition, size, mass;

¹ Under preparation. Stage at time of publication: FprEN 45554

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- the techniques, combination or sequence of techniques used to recycle or recover a given waste stream.

NOTE 1 The design characteristics of the product can facilitate selected recycling and recovery processes. This could be done for example by marking certain parts, which are separated during the recovery process, in order to make them easier to identify for removal. Easy removal of certain parts does not necessarily increase recoverability if those parts are not removed in the reference EoL treatment scenario considered.

The recyclability/recoverability assessment of an ErP shall be based on the reference EoL treatment scenario defined according to Clause 5 on a product basis.

The reference EoL treatment scenario shall be based on 5.3, taking into account:

- Product-related representativeness;
- Technological representativeness;
- Temporal representativeness;
- Geographical representativeness.

Based on technical constraints and legal requirements of the specified treatment, criteria at product level shall be defined in order to assess the compatibility of the product with the specified treatment. Clause 6 provides guidelines for selecting criteria that may be considered for a qualitative assessment and that shall be considered in order to define recyclability/recoverability rates (see Clause 7).

See a detailed description of the workflow for the users of this document in Annex A.

NOTE 2 Criteria could, for example, include the ability to remove parts from a product due to treatment related reasons or legal requirements.

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EXAMPLE 1 Due to technical constraints of certain recycling methods, all the loaded plastic (whether brominated flame retardants are present or not) have to be sorted in order to remove plastic containing brominated flame retardants.

EXAMPLE 2 Due to legal requirements it has to be possible to remove toner cartridges, liquid, paste, and colour toner from a product containing them as an identifiable stream or an identifiable part of a stream during the treatment step.

Clause 8 describes requirements on the communication of the recyclability/recoverability assessment result.

Figure 1 describes, in the form of a flow chart, the logic of this document and links between the different parts.

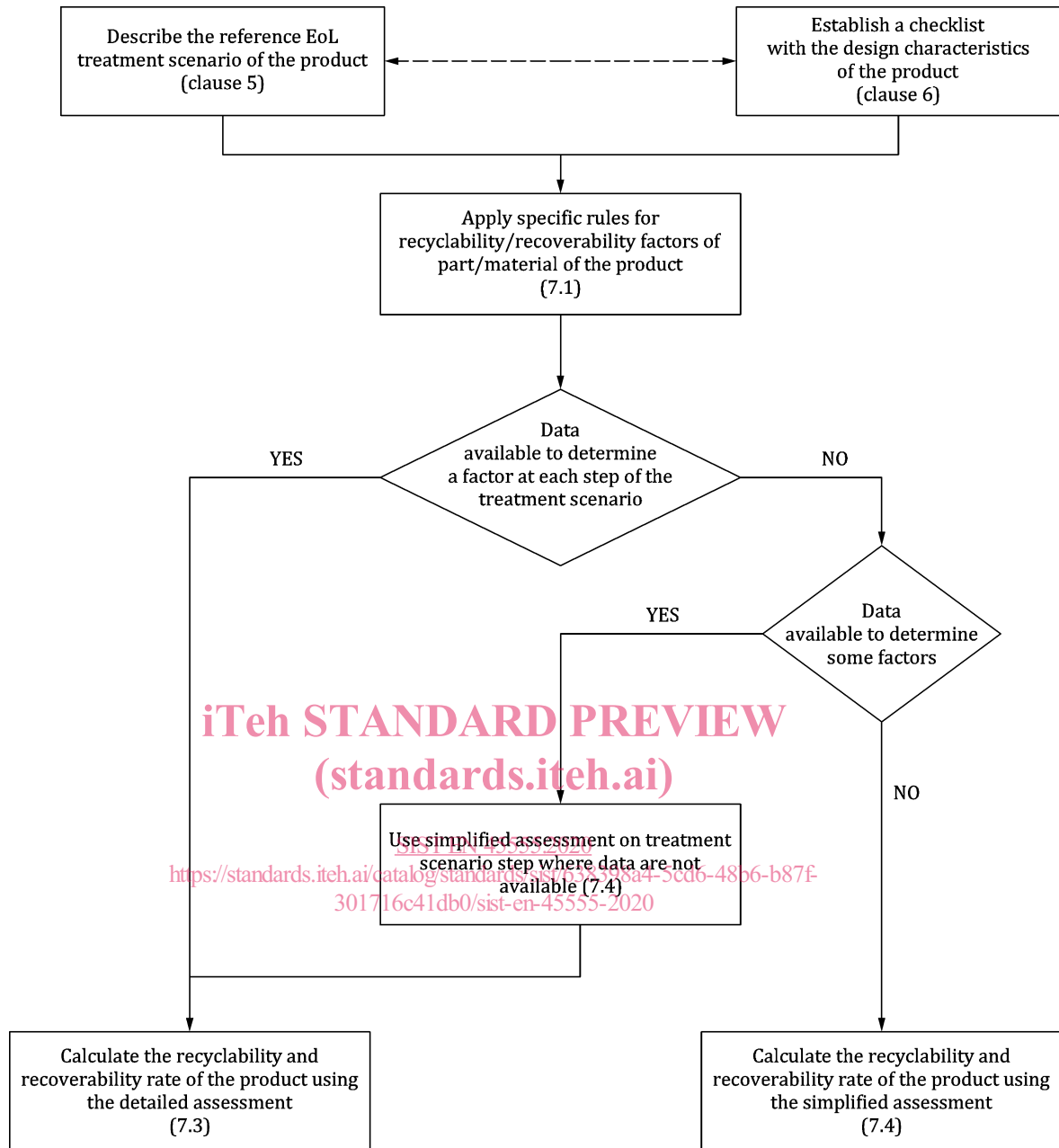


Figure 1 — Flowchart on assessing the recyclability/recoverability of an ErP

5 EoL treatment scenario

5.1 General considerations

An EoL treatment scenario is a description of the combination and sequence of processes and steps required for the EoL treatment of a product. The assessment of a product's recyclability/recoverability shall be based on only one representative EoL treatment scenario.

NOTE 1 The same reference EoL treatment scenario is applicable for the assessment of a product or its constituent parts or materials.

Losses outside of the reference EoL treatment scenario, e.g. collection, storage, transport, preparing for reuse or scavenging are not considered.