

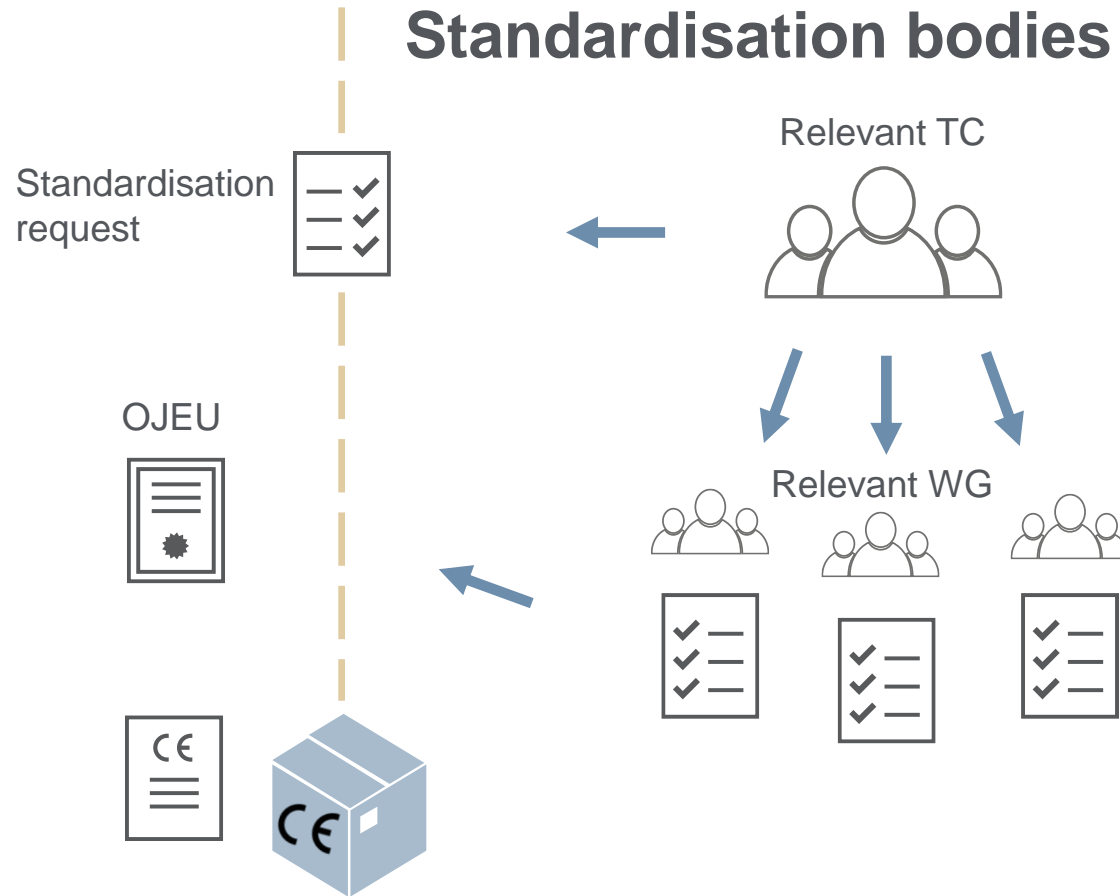
Material efficiency standards related to Ecodesign



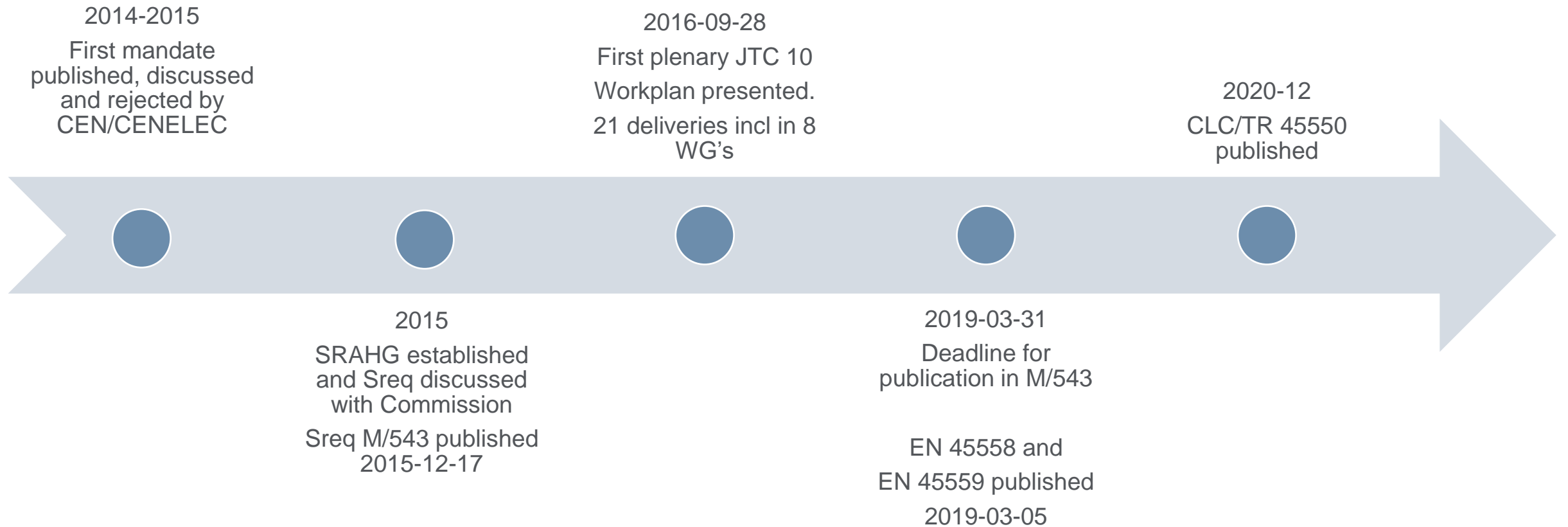
How EU regulation and standards works together.....

CE marking in general

EU Commission



How it all started



M/543

Article 2

Establishment of the work programme

CEN, Cenelec, and ETSI shall prepare the joint work programme indicating deliverables, responsible technical bodies and a timetable for the execution of the work programme with the deadlines set out in Annex II. CEN, Cenelec and ETSI shall submit the joint work programme to the Commission no later than six months from the notification of the request by the Commission and provide the Commission with access to an overall project plan.

When establishing the work programme, CEN, Cenelec, and ETSI shall consider the following aspects: relevance, acceptability, credibility, easiness and robustness (RACER) and consistency between Ecodesign implementing measures and other relevant standards. The joint preliminary work programme should also take into account changes in technology and technological changes on the availability of components or assemblies.

CEN, Cenelec and ETSI may decide how many European standardisation deliverables are needed in order to execute the request referred to in Article 1.

1. Objectives for the standardisation work

This standardisation request is 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

European standards prepared on the basis of this standardisation request shall take into account the aspects listed in the first subparagraph. They shall also cover aspects such as, upgrade-ability, ability to extract key components for reuse, repair, recycling and treatment; calculation of recycled and re-used content in products; methods to identify components by e.g. their environmental impact; reporting formats; reusability, recyclability and recoverability indices.

These standards shall be general in nature. They may be cited together with product-specific or product group harmonised standards¹ as defined in point 27 of Article 2 of Directive 2009/125/EC, where relevant implementing measures set eco-design requirements for material efficiency aspects.

Where adoption of European standards is not yet feasible the European standardisation organisations may consider adopting European standardisation deliverables.

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2 DESCRIPTION OF THE REQUIREMENTS FOR THE REQUESTED DELIVERABLES

2.1 General requirements

The requested standards shall be based on reliable, accurate and reproducible procedures and methods, which take into account the generally recognised state of the art. In the development of these standards, the principle of technology neutrality should be observed, as far as possible.

Where possible, standards shall be applicable to all products covered by Directive 2009/125/EC and cover defined parameters to be measured and/or calculated. Where it is not possible to develop standards covering all products under the scope of Directive 2009/125/EC then the specific product(s) covered shall be clearly identified.

2.2 Requirements concerning the content of requested deliverables

The requested deliverables shall as far reasonably practicable deal with the following topics:

- Definition of parameters and methods relevant for assessing durability, upgradability and ability to repair, re-use and re-manufacture of products;
- Provision of guidance on how standardisation deliverables for assessing durability, upgradability and ability to repair and re-manufacture of products can be applied to product-specific standards;
- Ability to access or remove certain components, consumables or assemblies from products to facilitate repair or remanufacture or reuse;
- Reusability/recyclability/recoverability (RRR) indexes or criteria, preferably taking into account the likely evolution of recycling methods and techniques over time;
- Ability to access or remove certain components or assemblies from products to facilitate their extraction at the end-of-life for ease of treatment and recycling;
- Method to assess the proportion of re-used components and/or recycled materials in products;
- Use and recyclability of Critical Raw Materials to the EU, listed by the European Commission²;
- Documentation and/or marking regarding information relating to material efficiency of the product taking into account the intended audience (consumers, professionals or market surveillance authorities).

Other requirements may be introduced in agreement between the relevant ESOs and the European Commission.

The adopted deliverables shall as far as possible specify:

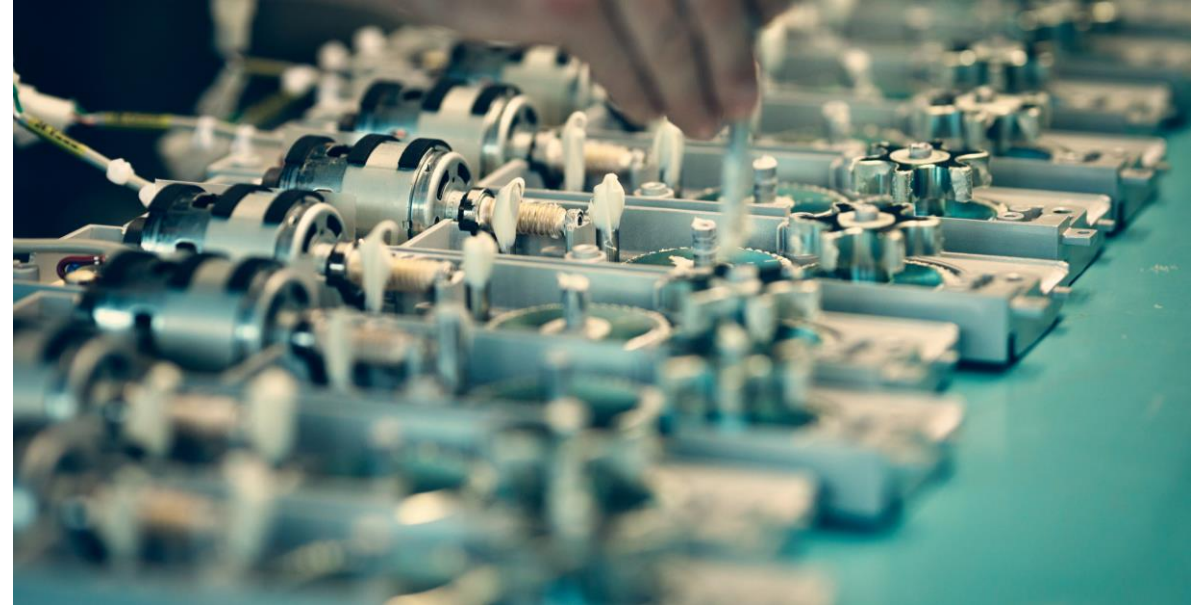
- Selection of parameters to be evaluated;
- Calculation methods;
- Test methods;
- Definition of reference tables (or guidance on how to build representative and quality-assured tables);
- Definition of reporting formats
- Description of the means for communicating information regarding products.

Recommended reference documents that could be considered during standardisation work are given in point 3.

The deliverables.....

- CLC/TR 45550 Definitions related to material efficiency
- EN 45552 General method for the assessment of the durability of energy-related products
- EN 45553 General method for the assessment of the ability to remanufacture energy-related products
- EN 45554 General method for the assessment of the ability to repair, reuse and upgrade energy-related products
- EN 45555 General methods for assessing the recyclability and recoverability of energy-related products
- EN 45556 General method for assessing the proportion of reused components in energy-related products
- EN 45557 General method for assessing the proportion of recycled material content in energy-related products
- EN 45558 General method to declare the use of critical raw materials in energy-related products
- EN 45559 Methods for providing information relating to material efficiency aspects of energy-related products

- NWI 45560 Method to achieve circular designs of products



WG 2 EN 45552 Durability

- Published March 2020
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
 - CLC TC 59x Performance of household and similar electrical appliances
 - CEN TC 109 Central heating boilers using gaseous fuels
 - CLC TC 116 Safety and environmental aspects of motor-operated electric tools
 - ECOS have proposed a durability scoring system
- DEFINITIONS:

3.1.1.1 durability < of a part or a product >

ability to function as required, under defined conditions of use, maintenance and repair, until a limiting state is reached

Note 1 to entry: The degree to which maintenance and repair are within the scope of durability will vary by product or product-group.

Note 2 to entry: The user of this document has to define the criteria for the transition from limiting state to end-of-life (EoL). For more information see [Figure D.1](#).

Note 3 to entry: Durability can be expressed in units appropriate to the part or product concerned, e.g. calendar time, operating cycles, distance run, etc. The units should always be clearly stated.

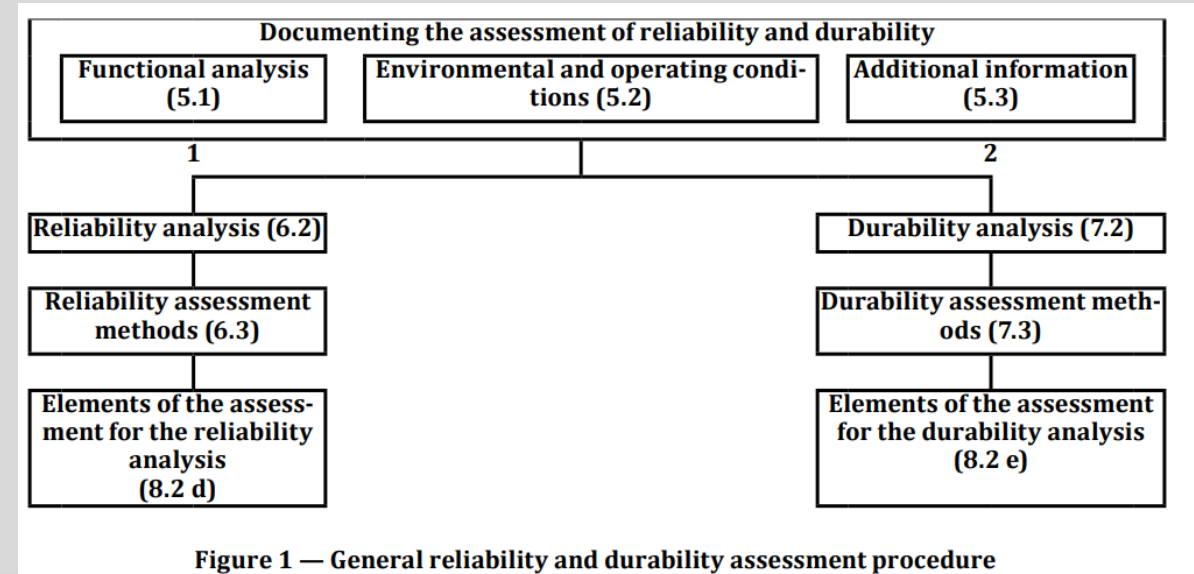


Figure 1 — General reliability and durability assessment procedure

WG 2 EN 45552 Durability

- Published March 2020
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
 - CLC TC 59x Performance of household and similar electrical appliances
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- DEFINITIONS:

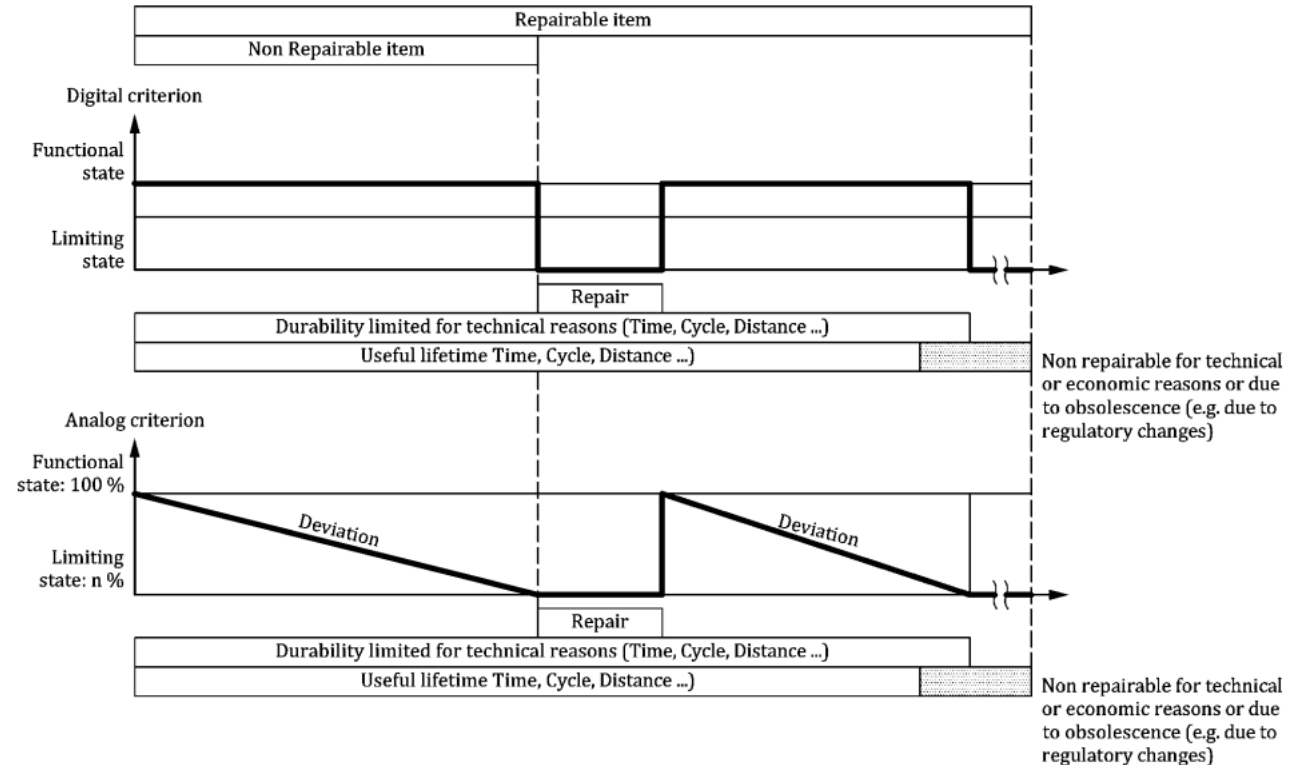
3.1.1.1 durability < of a part or a product >

ability to function as required, under defined conditions of use, maintenance and repair state is reached

Note 1 to entry: The degree to which maintenance and repair are within the scope of durability of product or product-group.

Note 2 to entry: The user of this document has to define the criteria for the transition from limiting state of-life (EoL). For more information see [Figure D.1](#).

Note 3 to entry: Durability can be expressed in units appropriate to the part or product concerned, time, operating cycles, distance run, etc. The units should always be clearly stated.



3.1.1.2 reliability

probability that a product functions as required under given conditions, including maintenance, for a given duration without limiting event

Note 1 to entry: The intended function(s) and given conditions are described in the information for use provided with the product.

Note 2 to entry: Duration can be expressed in units appropriate to the part or product concerned, e.g. calendar time, operating cycles, distance run, etc. The units should always be clearly stated.

WG 4 EN 45553 Remanufacture

- Published July 2020
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
Revision agreed
 - include “Refurbishment”
- DEFINITIONS:

3.1.1 remanufacturing
industrial process which produces a product from used products or used parts where at least one change is made which influences the safety, original performance, purpose or type of the product

Note 1 to entry: The product created by the remanufacturing process may be considered a new product when placing on the market. Refer to the EU Blue Guide [1] for additional information.

Note 2 to entry: Refurbishing is a similar concept to remanufacturing except that it does not involve changes influencing safety, original performance, purpose or type of the product. It is not covered by this standard.

3.1.2 part
hardware, firmware or software constituent of a product

[SOURCE: EN 45554:2020, 3.1.1]

Table 1 — Link between the remanufacturing process steps and product attributes

Product Attribute	Remanufacturing Process Step						
	Inspection	Disassembly	Cleaning	Reprocessing	Assembly	Testing	Storage
Ability to be identified	X					X	X
Ability to locate access points and fasteners		X			X		
Accessibility of parts		X	X	X	X	X	
Ability to be disassembled/ assembled		X			X		X
Wear and damage resistance during the remanufacturing process steps	X	X	X	X	X	X	X

WG 4 EN 45553 Remanufacture

- Published July 2020
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
Revision agreed
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Table 1 — Link between the remanufacturing process steps and product attributes

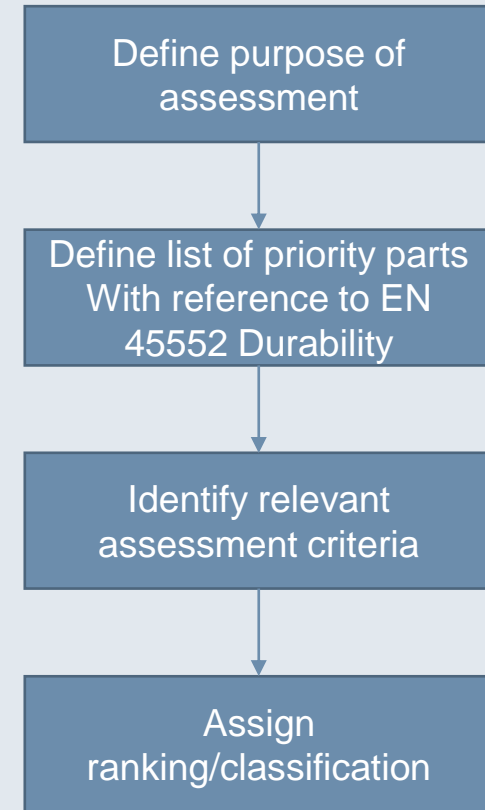
Product Attribute	Remanufacturing Process Step						
	Inspection	Disassembly	Cleaning	Reprocessing	Assembly	Testing	Storage
Ability to be identified	X					X	X
Ability to locate access points and fasteners		X			X		
Accessibility of parts		X	X	X	X	X	

- Methodical approach
 - First step: Finding clarification on the definition of refurbishing
 - Finalized Q4 2021
 - Result:
 - *Industrial process to return a used product(s) to its original requirements or to improve a used product(s) within the limits of its original requirements.*
 - Both processes describe an industrial process
 - Both have used product(s)/parts as source material
 - The difference solely lies within the “depth” of the work conducted to the product -> return vs. produce

X
X

WG 3 EN 45554 Ability to repair, reuse & upgrade

- Published February 2020
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
 - None at the moment but repairability scores are popping up across Europe and across product families.
- Examples of assessment criteria with ranking/classifications are described in Annex A



WG 3 EN 45554 Ability to repair, reuse & upgrade

- Published February 2020
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS
 - None at the moment for repairability score product families.
- Examples of assessment described in Annex A

A.4.3 Fasteners and connectors

The number of fasteners and their visibility can be used as a proxy for the time needed to repair or upgrade a product, or can be included in the calculation of disassembly depth (see section A.4.2). For the assessment of fasteners, important criteria are the reversibility and the reusability of fasteners. Fasteners can be closely interlinked to the assessment of necessary tools and skills for repair, reuse or upgrade.

NOTE When fasteners are mentioned in this subclause, they also include connectors.

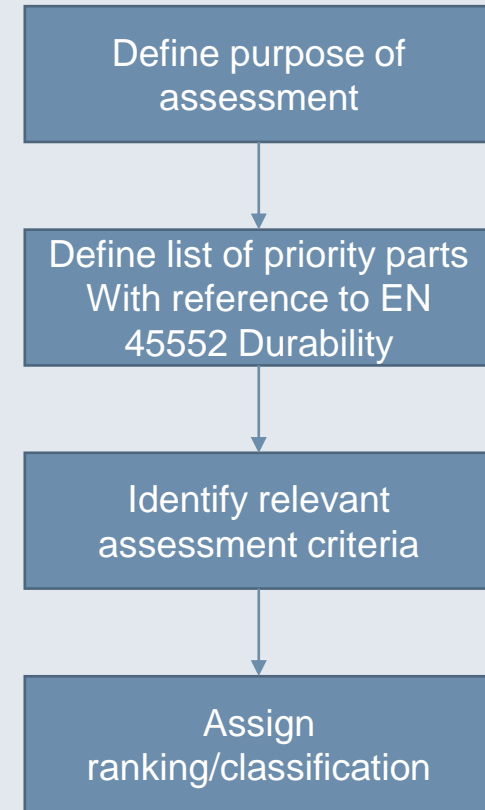
The following types should be considered for the classification of fasteners:

Table A.1 — Classification of fastener types

Category Description	Class
Reusable	A
Removable	B
Neither removable nor reusable	C

The various classes of fasteners are described below:

- **Reusable (Class A):** An original fastening system that can be completely reused, or any elements of the fastening system that cannot be reused are supplied with the new part for the repair, reuse or upgrade process.
- **Removable (Class B):** An original fastening system that is not reusable, but can be removed without causing damage or leaving residue which precludes reassembly (in case of repair or upgrade) or reuse of the removed part (in case of reuse) for the repair, reuse or upgrade process.
- **Neither removable nor reusable (Class C):** An original fastening system that is not removable and not reusable, as defined above, for the repair, reuse or upgrade process.



WG 3 EN 45554

Ability to repair, reuse & upgrade

A.4.6 Skill level

Repairing a faulty product requires a certain technical skill of the person who performs the repair. This comprises the ability to identify and localize the fault, to access the faulty part within the product, handle the tools safely and manage any risk to the product, the environment and the operator. As a consequence, certain repair operations can only be feasible for certain skill level categories.

The skill levels can be classified as shown in Table A.5 below.

Table A.5 — Classification of skill level

Category Description	Class
Layman	A
Generalist	B
Expert	C
Manufacturer or authorized expert	D
Not feasible with any existing skill	E

The various skill level categories are described below:

- **Layman (Class A):** If a repair, reuse or upgrade process can be carried out by a person without any specific repair, reuse or upgrade experience or related qualifications, the process is categorized as feasible for a layman.
- **Generalist (Class B):** If a repair, reuse or upgrade process cannot be carried out by layman (class A) but can be carried out by a person with a general knowledge of basic repair, reuse or upgrade techniques and safety precautions, the process is categorized as feasible for a generalist.

- **Expert (Class C):** If a repair, reuse or upgrade process cannot be carried out by a person in the above categories but can be carried out by a person with specific training and/or experience related to the product group concerned, the process is categorized as feasible for an expert.
- **Manufacturer or authorized expert (Class D):** If a repair, reuse or upgrade process cannot be carried out by a person in the above categories, but can be carried out by the manufacturer or a person who is directly trained and audited by the manufacturer, the process is categorized as feasible for a manufacturer or its authorized expert.
- **Not feasible with any existing skill (Class E):** If a repair, reuse or upgrade process cannot be carried out by a person in the above categories the process is categorized as not feasible with any existing skill.

WG 5 EN 45555 Recyclability and recoverability

- Published November 2019
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
 - Agreed to look at a horizontal assessment of recyclability for WEEE products
- DEFINITIONS:

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]

3.1.6 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]

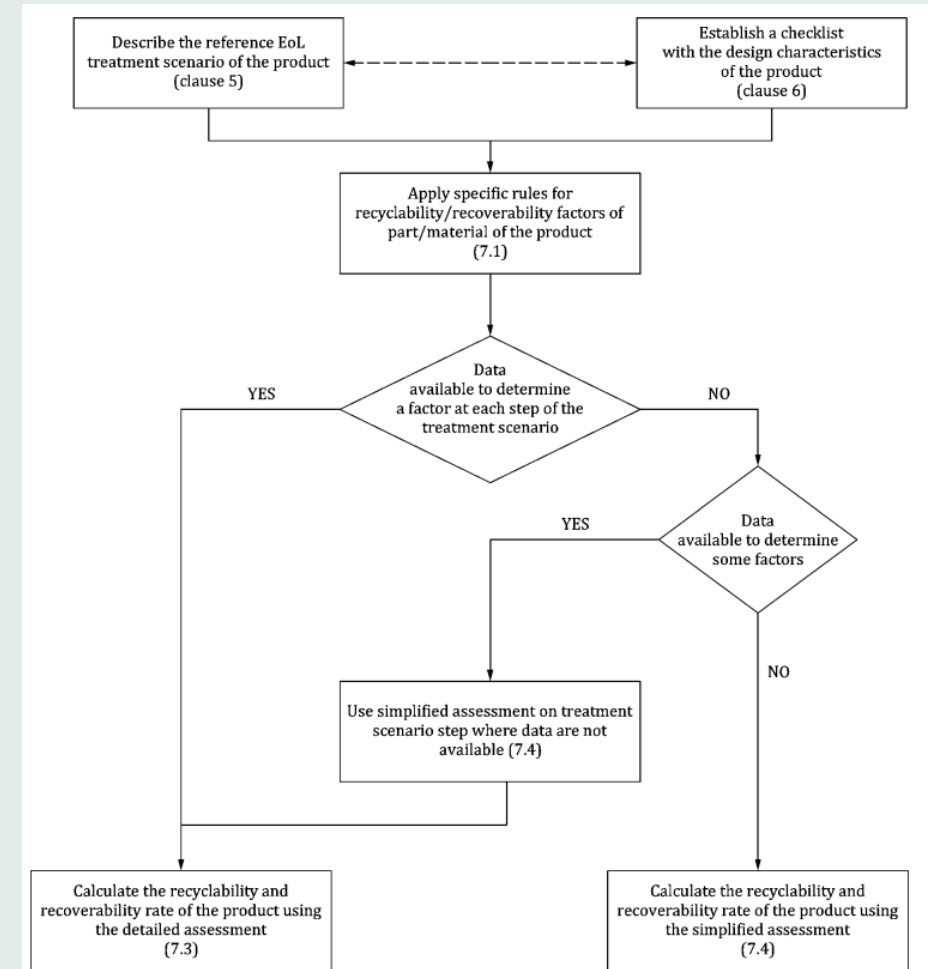


Figure 1 — Flowchart on assessing the recyclability/recoverability of an ErP

WG 4 EN 45556 Proportion of reused components

- Published June 2019
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
 - None but standard have been pushed to IEC level
 - IEC version of the standard will be accepted in July

4.2.2 Proportion of reused components by mass on product level

The following formula shall be applied to obtain the proportion of reused components by mass on a product level:

$$R_{pm} = \left(\frac{\sum_k m_{re-k}}{m_{tot}} \right) \times 100 \%$$

where

m_{re} is the mass of the used components or groups of components in the assessed product

m_{tot} is the total mass of the product

R_{pm} is the proportion of reused components by mass of the product

NOTE 1 All masses are expressed in the same unit.

NOTE 2 Components mass based calculation is easy to apply consistently across different products within a product group.

NOTE 3 In some cases, the mass of a component or a group of components does not correlate to its economic value or environmental impact.

WG 4 EN 45556 Proportion of reused components

- Published June 2019
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
 - None but standard have been pushed to IEC level
 - IEC version of the standard will be accepted in July

4.2.3 Proportion of reused components by number on product level

The following formula shall be applied to obtain the proportion of reused components by number on a product level:

$$R_{pn} = \left(\frac{\sum_k n_{re_k}}{n_{tot}} \right) \times 100 \%$$

where

n_{re} is the number of the used components or groups of components in the assessed product

n_{tot} is the total number of components in the product

R_{pn} is the proportion of reused components by number of the product

NOTE 1 Assessment based on the number of components can be applied consistently across different products in a product-group.

NOTE 2 It is essential that at a product or product-group level, a common way to identify and count components and groups of components are defined.

NOTE 3 In some cases, the number of components or a groups of components do not correlate to their economic value or environmental impact.

WG 4 EN 45556 Proportion of reused components

- Published June 2019
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
 - None but standard have been pushed to IEC level
 - IEC version of the standard will be accepted in July

4.2.4 Proportion of reused components by mass balance

The following formula shall be applied to obtain the proportion of reused components by mass balance over the defined period of time:

$$R_{bm} = \left(\frac{m_{bt}}{n_{units} \times m_{units}} \right) \times 100 \%$$

where,

m_{bt} is the total mass of used components or groups of components used in the defined period of the products

n_{units} is number of units in the defined period

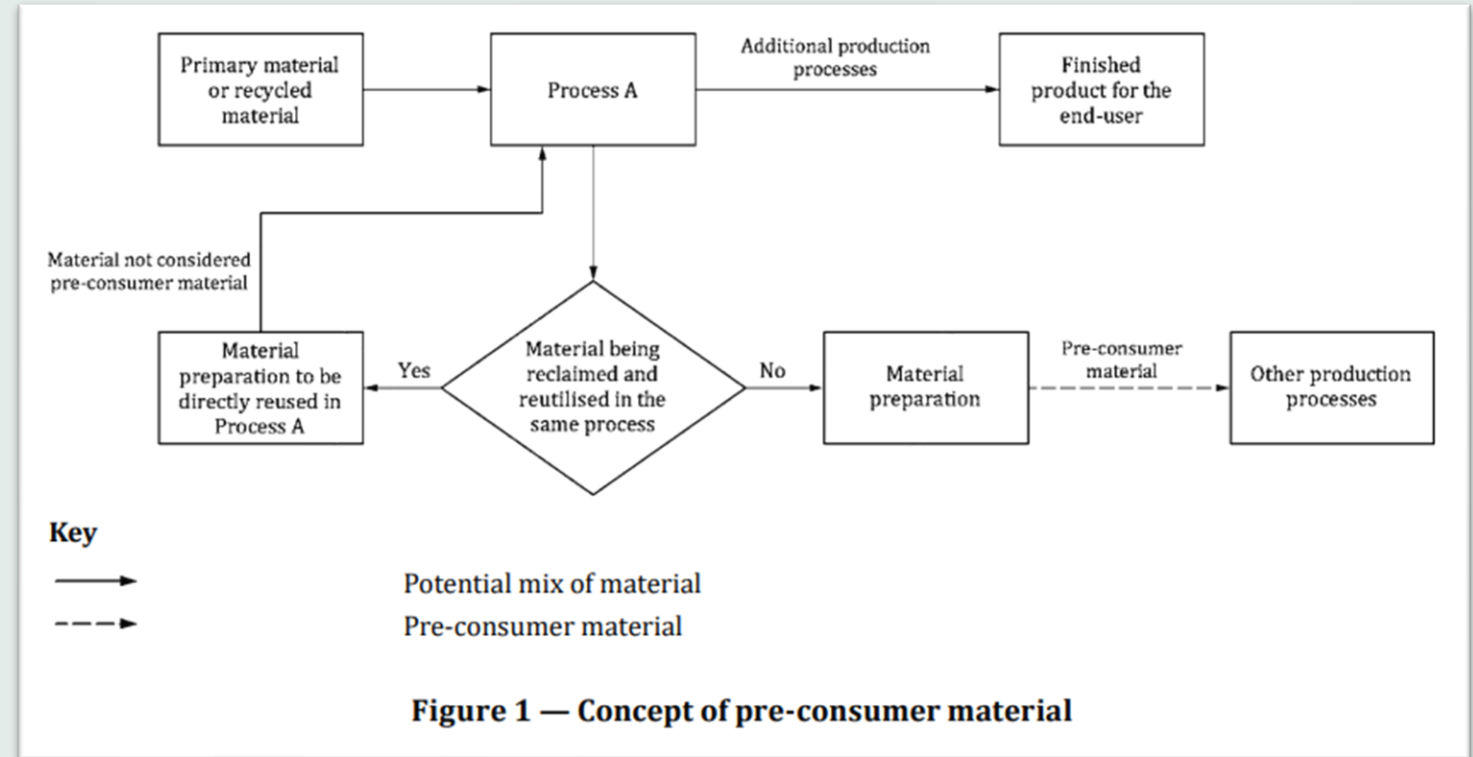
m_{units} is the mass per unit

R_{bm} is the total proportion of reused components by mass in the defined period for the assessed products

Different products can require different forms to obtain the total mass of reused components, depending on e.g. the complexity of the business, weight of the product, number of products handled in the accounted period. The user of this document shall determine the most suitable approach to evaluate the total mass of reused components in the defined period and document the chosen approach accordingly.

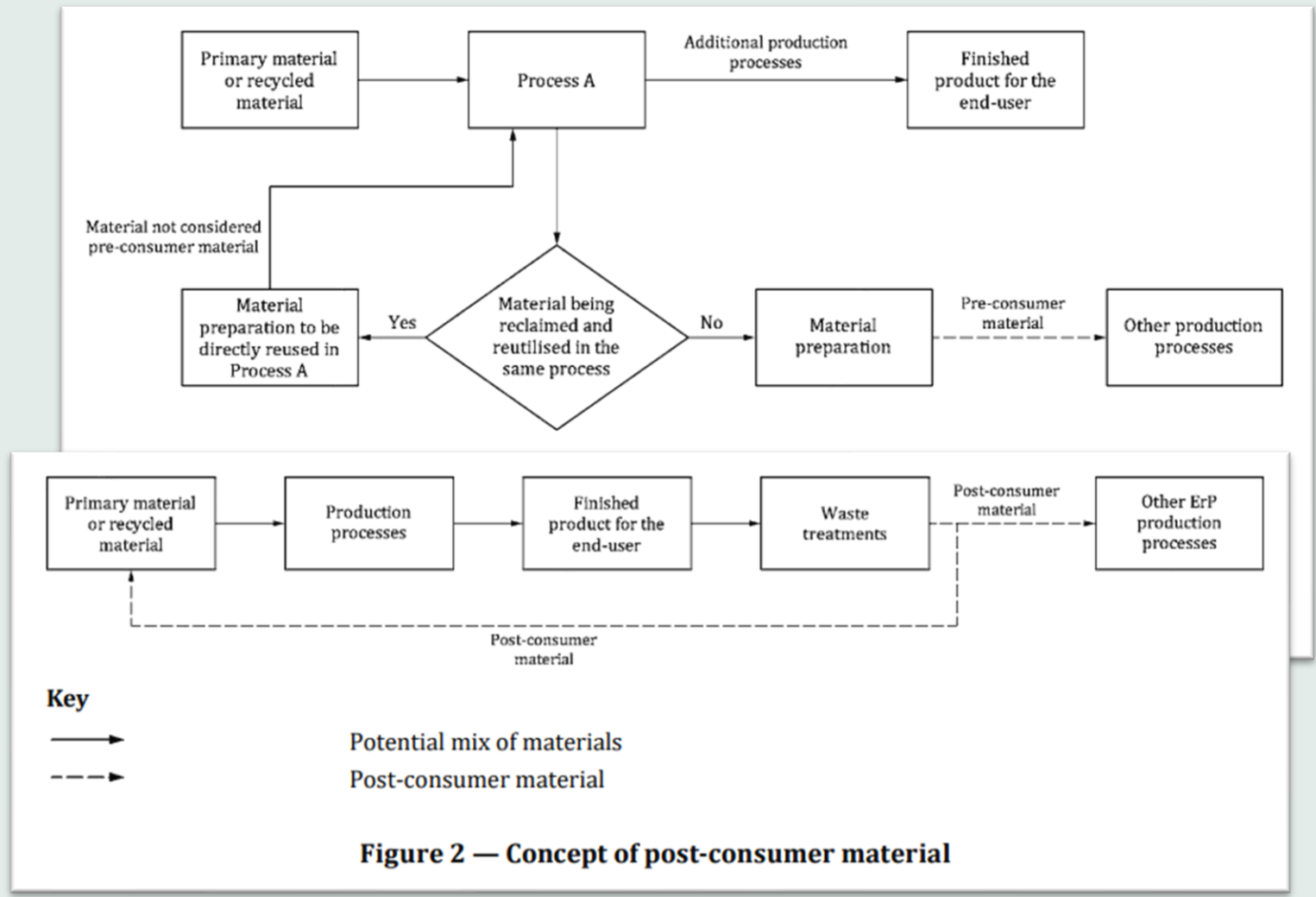
WG 5 EN 45557 Recycled material content

- Published April 2020
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
 - It is agreed to try to improve traceability of recycled content. ECOS have proposed some principles for discussion.
 - We have discussed plastic, metals and glass



WG 5 EN 45557 Recycled material content

- Published April 2020
- SCOPE: ErPs and a general method
Product specific standards must be developed
- WORK IN PROGRESS:
 - It is agreed to try to improve traceability of recycled content. ECOS have proposed some principles for discussion.
 - We have discussed plastic, metals and glass



WG 6 EN 45558 Use of critical raw materials

- Published March 2019
- SCOPE: ErPs and a horizontal method
Can be applied directly
- WORK IN PROGRESS:
Awaiting Commission approval of the first annex ZZ for servers and data storage

5 Assessing and declaring the use of CRMs

5.1 Regulated CRMs

For regulated CRMs, a material declaration shall be provided. It should be prepared as specified in the applicable legislation.

The material declaration content shall meet the requirements specified in EN IEC 62474 for the applicable CRMs.





The declaration of regulated CRMs should be carried out according to the requirements and thresholds specified in applicable legislation. Typical requirements are:




- reporting of the name of the substance or substance group, as described in legislation;
- reporting the amount of the substance or substance group, as described in legislation;
- reporting the location of the substance in the product, if described by legislation;
- exemptions, if applicable.

NOTE The use of standards for such declarations helps ensure consistent and cost-effective flow of information throughout the supply chain.

- EN IEC 62474 is a digital format for full material declarations or substances declarations
- ISO IEC 82474 will cover all products based on the same methodology and format

CEN CLC JTC 10 Overview

	CLC TR 45550 Terms and definitions
	EN 45552 Durability
	EN 45553 Repair, reuse and upgrade
	EN 45554 Remanufacturing EN 45556 Reused components

	EN 45553 Recyclability and recoverability EN 45557 Recycled content
	EN 45558 CRM EN 45559 Data and information
	prEN 45560 Circular design

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