



PROMPT

Premature Obsolescence Multi-Stakeholder Product Testing Program

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Contributing Partners

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1 Executive summary

Standards are needed to improve the reliability and repairability of products, for consumers and the planet. In fact, the absence of suitable standards has been one of the key barriers so far to the inclusion of material efficiency requirements in Ecodesign measures. Reliability and repairability are high on the EU agenda and PROMPT is therefore a timely project that can feed into this legislative and standardisation initiatives.

PROMPT is an EU-funded multi-stakeholder project has researched reasons why products fail or are discarded too soon, and developed testing criteria to assess how likely products are to last longer without failure (reliability), be easier to repair (reparability) and be used for longer when working well (behavioural obsolescence). The project focused on electrical and electronic products, notably on washing machines, televisions, smartphones and vacuum cleaners.

In this deliverable we put forward guidelines for standardisation experts working on material efficiency. These are based on project learnings while developing product-specific testing programmes for assess the durability of products, and exchanges with project partners within a diverse consortium which brings together consumer organisations, academics and repair businesses. The recommendations focus both on horizontal and product-specific aspects focused on the 4 key PROMPT products: washing machines, smartphones, vacuum cleaners and televisions.

2 Introduction

Longer lasting products are needed for both consumers and the planet, and common standards have an important role to play in the transition to more durable products. In fact, the absence of suitable standards has been one of the key barriers so far to the inclusion of material efficiency requirements, such as reliability and reparability in Ecodesign measures.

As part of the European Green Deal and its latest Circular Economy Action Plan¹, The European Commission has announced quite a bold ambition to “make sustainable products the norm”, notably through a new version of Ecodesign framework, through the recent proposal for Ecodesign for Sustainable Products Regulation (ESPR)². It aims to broaden the scope of Ecodesign to include material efficiency requirements across the board – beyond the historic focus on energy efficiency – and apply to almost all products on the market. Such ambition has created a momentum to work further on standards in sustainable consumption and production, with strengthened product durability and reparability as key objectives. In fact, the European Commission's 2022 Standardisation Strategy³ specifically states that the introduction of sustainability requirements under Ecodesign and the ESPR will require the development of standards for the European market. Improving durability and reparability of products will require a comprehensive approach: improve design, but also information and consumer rights. In this direction, the EU is working on additional policy initiatives, notably the proposal for a Directive for Empowering Consumers for the Green Transition ([ECGT](#)), ‘Common rules promoting the repair of goods’, so-called “[Right to Repair](#)” initiative, and a Directive on [Green Claims](#).

PROMPT is a timely project to feed into this legislative and standardisation initiatives. The EU-funded multi-stakeholder project researched reasons why products fail or are discarded too soon, and developed testing criteria to assess how likely products are to last longer without failure (reliability), be easier to repair (reparability) and be used for longer when working well (behavioural obsolescence). The project focused on electrical and electronic products, notably on washing machines, televisions, smartphones and vacuum cleaners. Based on insights from PROMPT's findings and efforts to develop a durability test programme, we put forward a series of recommendations for standardisation experts working on material efficiency.

¹ [‘A new Circular Economy Action Plan For a cleaner and more competitive Europe’](#), European Commission, 2020.

² Proposal for an Ecodesign for Sustainable Products Regulation. This proposal is currently being discussed at the European Parliament and Council. European Commission's [proposal text](#).

³ European Commission's [2022 EU Strategy on Standardisation](#).

3 Guidelines for standardisation experts

Based on learnings from the PROMPT project, we outline a series of recommendations, starting with horizontal or general guidelines to follow when drafting material efficiency related standards. Next, we focus on product-specific aspects for the four key electrical and electronic products analysed within the project: washing machines, televisions, smartphones and vacuum cleaners.

3.1 Horizontal

3.1.1 Harmonising terminology: Reliability, reparability, durability...

First, we highlight the importance of setting the right basis when developing material efficiency standards, starting with harmonised terminology. The CEN-CENELEC Joint Technical Committee on Energy-related products –‘Material Efficiency Aspects for Eco-design’ (CEN/CLC/JTC 10) has developed the following horizontal standards to assess product durability, reparability and reusability:

- EN 45552:2020 ‘General method for the assessment of the durability of energy-related products’
- EN 45554:2020 ‘General methods for the assessment of the ability to repair, reuse and upgrade energy-related products’

PROMPT differentiates reliability and repair as key aspects within durability, following definitions developed in these standards, and we recommend harmonising these terms across related standardisation technical committees at European level and consistency with EU legislation. It is important to avoid that different interpretations are given to the same terms in different sectors and standardisation bodies. The work done in CEN CENELEC SABE Circular Economy Topic Group (CE-TG) will also help in this respect and will need to be considered by standardisers in the Ecodesign area and beyond.¹

EN 45552:2020 and EN 45554:2020 key definitions for material efficiency:

- Durability: *“ability to function as required, under defined conditions of use, maintenance and repair, until a limiting state is reached”*
- Reliability: *“probability that a product functions as required under given conditions, including maintenance, for a given duration without a limiting event”, where a limiting event means “occurrence which results in a primary or secondary function no longer being delivered”*
- Repair: *“process of returning a faulty product to a condition where it can fulfil its intended use”*

PROMPT examines user and market factors leading to premature obsolescence, including instances where products may be replaced while still functioning. Examples of this would be users wanting to upgrade to a TV with a larger screen size, or a good deal for a getting a new smartphone after an ended subscription. To accommodate for this type of obsolescence within standardised definitions, we suggest emphasising in the EN 45552:2020 and EN 45554:2020 definition of “useful lifetime” this user and market factors as the text currently mentions only “technical” and “economical” reasons.

¹ [CEN CENELEC SABE Circular Economy Topic Group](#). One of the main objectives of the SABE CE-TG is to gather and harmonise existing terminology relevant to the circular economy.

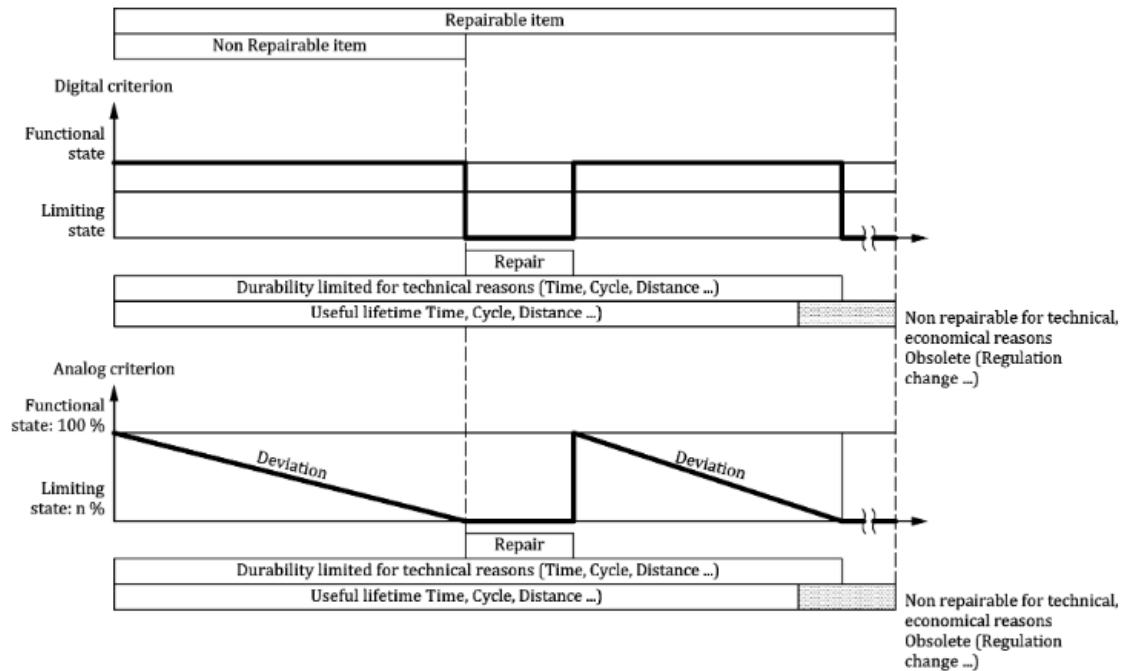


Figure C.1 — Relations between functional state, limiting state, repair and durability

Figure 1. Relations between durability, functional state, limiting state, repair and durability, as defined in EN45554.

3.1.2 Horizontal durability and reparability standards: The precedents. What could be improved?

PROMPT has relied significantly on terminology and approaches from the EN45552 and EN45554 standards when developing our testing programme. Based on PROMPT findings and development of a material efficiency testing programme, we suggest three recommendations for consideration to fine-tune the existing standards in future revisions and New Work Items:

- Highlight overlaps between design features. PROMPT identified a large overlap in design features and principles aiming to facilitate diagnosis, repair and maintenance. Therefore, small changes in design features could significantly improve at the same time these three key elements to durability.
- Easier disassembly so that it takes less time. Design should facilitate disassembly so that it takes less time and not just less steps. The EN 45554 standard and some Ecodesign-related policy documents often refer to “number of steps” as the method to assess ease of disassembly. However, PROMPT experts highlight limitations to this method. For example, there might be just one or two steps needed to open up a product, but each step be very cumbersome. This is why we recommend instead measuring the *time* needed to disassemble.
- Explore introducing thresholds. Several critical criteria responsible for product reparability (e.g., spare part price, safety, spare part availability) could make repair unfeasible if they exceed certain thresholds (high spare part price, too low safety), even if other criteria are fulfilled. Therefore, a limiting factor should be implemented in these criteria during a testing program to accurately represent the product’s reparability. The current standard EN 45554 and existing scoring systems do not fully take this into account.

3.1.3 Towards a more 'circular ready' design, what should this look like in practice? Recommendations for a new standard underway.

JTC10 also recently started working on the draft standard prEN 45560 "Method to achieve circular designs of products". We welcome this initiative, and we provided already some comments formally to the dedicated Working Group 8 based on PROMPT findings. Some key observations to the current text include:

- Narrow scope. We note that the scope of the standard may be narrower than Ecodesign, focusing strictly on product design elements. There are however key elements to ensuring products last longer and can be easier to repair, and closely linked to design, such as a long spare part availability period or banning software pairing, that risk being out of the scope. This type of criteria is increasingly included within Ecodesign product-specific measures, and we suggest to JTC10 that they are also considered within the scope of circular design.
- It is not all about performance: importance of product appearance. When discussing reliability and maintenance, we suggest explicitly emphasising on the standard the importance of product appearance. For example, signs of wear and tear can lead consumers to perceive the product as less valuable even if it is still able to perform its technical function.

3.1.4 Testing should reflect consumer use.

Product testing conditions should reflect as closely as possible the average use by consumers. This is paramount to provide appropriate information to consumers and set Ecodesign requirements and standards. Testing conditions that do not reflect real use could result in misleading promises to consumers. ANEC monitors CENELEC TC59X WG22 "Ad hoc Group Consumer Relevant Testing (CRT)" and would like to highlight some recommendations based on PROMPT findings:

- Drop tests should better reflect consumer use: Free fall/drop test standard IEC 60068-2-31: indicates that smartphones resistance to drops should be tested over a steel surface. However, stone may be more representative of daily use, simulating a drop on the street. In fact, PROMPT findings show that smartphones perform way worse when dropped over stone compared to steel, emphasising the importance of adjusting the standard to a more representative and differentiating testing protocol.
- The reliability of components should be tested inside the product: Even if there are certain components that fail more often, testing the component itself outside the usage of the machine is not efficient on its own. This is because it is not subject to the same conditions or stress when used in the product. It can also be a combination of different components that fail together rather than just one. A key example is batteries. PROMPT made use to test batteries inside the product, for instance for smartphones, to consider the battery management system of the devices, which can have an effect on the reliability results.

Another key element to flag when discussing misleading testing claims for consumers is the threat of anti-circumvention. The standardisation subgroup CLC TC 59X WG 6-05 on anti-circumvention in the context of vacuum cleaners is to play the role of a collecting forum for consumers, consumer organizations and NGOs to collect some level of indication of 'cheating devices' or other forms of circumvention. Anti-circumvention when it comes to material efficiency could lead to consumers distrusting the trustworthiness of claims linked to durability and repair. Further recommendations when it comes to compliance are described below in 3.1.5.

3.1.5 Clear guidelines for conformity assessment within regulations or by Market Surveillance Authorities.

With the new version of Ecodesign to expand the scope of products on the market that are durable and repairable, market surveillance authorities in Member States will need to conduct more tests on these material efficiency requirements. Clear guidelines are needed for requirements and assessment of their conformity.

It is recommended that tolerances and verification methods and values are developed determined within regulations or by MSAs themselves. Whilst many MSAs currently may lack all the necessary capacity to do this, we can anticipate that the development of EU Testing Facilities under (EU)2019/1020¹ will provide this level of assistance.

3.1.6 Explore the standardisation of parts for some products.

The standardisation of certain product components could provide opportunities to enhance repairability, for example making it easier to access the parts and reducing their cost due to economies of scale. In general, it is recommended to standardize parts which have the same function across all manufacturers, and which at the same time do not have a significant distinguishing performance nor an aesthetic need.

PROMPT identified the pumps and motors of washing machines as well as the battery for vacuum cleaners as good candidates for standardisation. The technological progress of these products is slower than that of TV and phones, therefore whenever possible it would be recommended to design with standardised parts.

3.2 Product-specific

A transition to more durable products also requires robust material efficiency standards at the product-specific level. These can be a reference for developing Ecodesign product-specific requirements and for product testing technicians to have standardised testing methods rather than developing them from scratch. They can also provide a basis for manufacturers to provide comparable durability information to consumers, for example defining average use scenarios.

PROMPT focused on 4 key consumer products (Smartphones, Televisions, Washing Machines and Vacuum Cleaners) using existing standards and testing protocols as reference. The project has identified clear gaps in standards for these products¹. When testing the durability of these four products, the project identifies clear need for improvement.

3.2.1 Washing machines

Washing machines are commonly subjected to endurance tests by consumer organisations. These tests consist of various washing cycles approximately corresponding to the number performed during the expected lifetime of the machine. There are no reliability tests for specific failure causes or components. Washing machine tests also require a high effort in time and budget. The following learnings were identified while developing the PROMPT testing programme for this product:

- Standards to test the reliability of the door sealing and the aging of electronics are needed, as they had to be developed from scratch by PROMPT experts.

¹ PROMPT paper '[Current State of Durability Assessment for Four Consumer Product Groups](#)'

- The cyclization test is technically not demanding but intense in terms of time, human resources, and consumables. A special testing programme integrated in every washing machine could at least reduce the number of operators needed.

The CLC TC 59X WG23 “Material efficiency of household and similar electrical appliances” is currently focussing on washing machines, with the development a whole product durability standard through prEN50731:2022 “Material Efficiency - Household and similar electrical appliances — Durability – Measurement method for the assessment of the reliability of washing machines for household use.” Through this product sustainability standard, the WG is trying to create a methodology that would not only measure reliability of washing machines, but that could potentially also set the path forward for developing a further catalogue of such standards. That is a priority for CLC TC59X as reliability and durability requirements will be introduced in the legislation. The main testing procedure will take the form of an endurance test on the entire washing machine consisting of washing cycles followed by multiple repeats of rinse and spin, much of which can be automated. Additionally, tests on individual components such the door lock, detergent dispenser etc. are under consideration.

PROMPT has given input to the WG23 so far, highlighting that: a) clear instructions should indicate what to inspect and how regularly to inspect the washing machine throughout the testing process (initial and final inspection) and b) the test sequencing and some testing parameters should be clarified to improve the accuracy of the test procedure while reducing the cost of testing. For example, defining average temperature and spin speed for the calibration test; reducing the number of different washing cycles or defining general characteristics of the load to broaden the range of load that can be used.

3.2.2 Smartphones

The European Commission has developed the first ever Ecodesign rules for smartphones¹. These rules are an important precedent for durability, given that both reliability and repairability requirements will be introduced for these products. The timeline for a Standardisation Request is unclear.

Based on the work done by the PROMPT consortium to develop a testing programme for smartphones, we highlight the following challenges:

- When it comes to scratch resistance, the Ecodesign rules establish the Mohs method to test scratch resistance and we have demonstrated that it is not a good methodology due to the uncontrollable force and shape of the indenter. This leads to a very imprecise method that is also not reproducible. Further research is needed to develop a suitable standard to measure scratch resistance.
- Ecodesign rules require smartphones to resist only 45 drops over steel. PROMPT identifies clearly how this threshold is too low and it will not change the market.
- Testing the battery degradation is not trivial and needs a standard that specifies clearly the methodology to obtain comparable results among models. The following should be considered:
 - Discharging cycle should be as similar possible to all devices.
 - The devices should be isolated from wireless connections to avoid software updates during the testing
 - Defining a feasible cycle from 100% to 5% (close to a full cycle but allows automatization) instead from 100% to 0% (because doesn't allow automatization and then is not feasible to test).

¹ At the time of drafting of this deliverable the Ecodesign rules for smartphones are still a Draft Implementing Act going through scrutiny period by the European Parliament and Council. Full text of requirements [here](#). ANEC and BEUC have provided feedback throughout the process.

- Consider not only the degradation of the battery but also the real autonomy (hours) after a simulation of 5 years use (1000 cycles) to establish the rule of pass/no pass.
- Reboot the phone at least every 100 cycles.
- Use a real cycle (real use scenario and not an intensive one) to measure the remaining capacity.
- Charge and discharge the phones several times (at least 10) before measuring the reference time at origin.
- Charge the phone beyond the 100% sign on the display (30 more minutes) or until the power deliver to smartphone is indeed 0W.

3.2.3 Vacuum cleaners

On vacuum cleaners, the main standardisation group is the CLC TC 59X WG06 “Surface cleaning appliances”. In 2022-2023, its main priority was to review the comments on IEC 62885-2 2nd edition, which will feed into the mirroring draft European standard FprEN 60312:2017/A11;2022, “Vacuum cleaners for household use - Part 1: Dry vacuum cleaners - Methods for measuring the performance”.

Based on PROMPT work developing a testing programme for vacuum cleaners, we recommend:

- **Developing further performance and material efficiency requirements for robot / battery powered vacuum cleaners.** Ecodesign rules for vacuum cleaners are expected to introduce requirements on batteries of cordless vacuum cleaners.
 - Design recommendations for longer lasting¹ to adopt strong lifetime/durability and material efficiency requirements for all vacuum cleaners:
 - Minimum battery and motor lifetime requirements should be put forward, as well as requirements on easy and quick battery removability and interchangeability.
 - Spare parts related to motor failure, including carbon brushes, should be made available to professional repairers. The possibility to easily access and replace carbon brushes reportedly doubles the motor lifetime.
 - Hose and handle should also be made available to consumers. For example, upright vacuum cleaners are simple machines without complicated electronics, and any layperson can solve several typical problems themselves. Vacuum cleaners with a removable handle without electronics in it are also a good example for repair cases which can be conducted by laypeople themselves.
 - The minimum period for making spare parts available should be based on the expected lifetime of vacuum cleaners (about 8 years) and there should be no differentiation between corded and cordless vacuum cleaners and robot vacuum cleaners, which consumers expect to last for the same amount of time.
 - For smart vacuum cleaners, software and security updates should always be free of charge and provided for long periods of time to ensure that the lifetime of vacuum cleaners is not cut short because of security concerns.
 - On performance vs material efficiency: it should not one or the other, requirements for both should be developed. The IEC SC59F JWG10 was set up to work on a new part of the general floor cleaning appliances standard IEC 62885-X that should cover battery related items, in collaboration with a new sub-WG of CLC/TC59X/WG06 created in 2022. Developing thorough test procedures for the battery lifecycle test and providing meaningful

¹ For more detail you can read ANEC/BEUC comments to the [latest consultation for the revision of Ecodesign rules for vacuum cleaners](#).

information to the consumer are crucial to ensure a certain quality of performance, accuracy of energy use and to avoid misuse or early disposal.

- **More consumer-relevant nozzle endurance tests:** following PROMPT outcomes of nozzle endurance test (no problems found whereas consumers do report nozzle defects), to develop a more consumer relevant endurance test for motorized nozzles (getting stuck under furniture, getting stepped upon, etc).

Note on motor lifetime test:

- We welcome that Ecodesign requirements for vacuum cleaners set a minimum criterion for motor lifetime (500 hours). ANEC also welcomes that their recommendation for the related standard EN 60312-1:2017/A11:2022 has been integrated: the specific number of hours does not need to be specified in the standard, given that the standard should define tests, not requirements. The text recommends the operational motor life-time to be ended after 500 hours. Since the standard should define tests, not requirements, the number of hours could be left out, but it has been pointed out that this figure is here because it correlates with safety tests. We are concerned that the stated figure could in practice act as guidance for new EU legislation. And thus prevent requirements for higher life-time values. In the WG it was agreed that an explanatory note would be added about the 500 hours, stating why the value was chosen and that the test can be continued beyond 500 hours if so desired.

3.2.4 Televisions

No durability standards were found to test televisions which meant PROMPT had to develop tests from scratch for this product group. The CENENEC TC100X focuses on electronic displays including TVs but so far has focused only on energy efficiency. Material efficiency standards are still lacking and should be developed, possibly within CLC TC100X.

Priority parts identified for TVs include the display panel / screen, mainboard, power supply and software issues.