



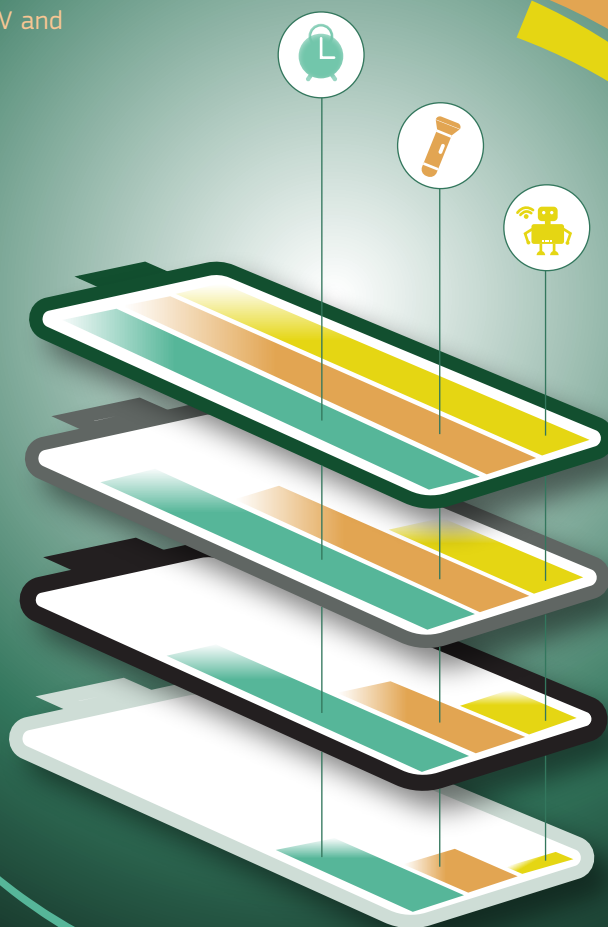
Portable Batteries of General Use: First Stakeholder Consultation Meeting and Analysis of Survey Results

Ruiz, V.; Bruchhausen, M.

2023



Administrative Arrangement JRC No
36075 between JRC, DG ENV and
DG GROW



This publication is a Technical report by the Joint Research Centre (JRC), the European Commission's science and knowledge service. It aims to provide evidence-based scientific support to the European policymaking process. The contents of this publication do not necessarily reflect the position or opinion of the European Commission. Neither the European Commission nor any person acting on behalf of the Commission is responsible for the use that might be made of this publication. For information on the methodology and quality underlying the data used in this publication for which the source is neither Eurostat nor other Commission services, users should contact the referenced source. The designations employed and the presentation of material on the maps do not imply the expression of any opinion whatsoever on the part of the European Union concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Contact information

Name: Matthias Bruchhausen

Address: Joint Research Centre, Westerduinweg 3, 1755 LE Petten, Netherlands

Email: matthias.bruchhausen@ec.europa.eu

Tel.: +31 0224 565218

EU Science Hub

<https://joint-research-centre.ec.europa.eu>

JRC132710

EUR 31464 EN

PDF ISBN 978-92-68-01352-6 ISSN 1831-9424 [doi:10.2760/410136](https://doi.org/10.2760/410136) KJ-NA-31-464-EN-N

Luxembourg: Publications Office of the European Union, 2023

© European Union, 2023



The reuse policy of the European Commission documents is implemented by the Commission Decision 2011/833/EU of 12 December 2011 on the reuse of Commission documents (OJ L 330, 14.12.2011, p. 39). Unless otherwise noted, the reuse of this document is authorised under the Creative Commons Attribution 4.0 International (CC BY 4.0) licence (<https://creativecommons.org/licenses/by/4.0/>). This means that reuse is allowed provided appropriate credit is given and any changes are indicated.

For any use or reproduction of photos or other material that is not owned by the European Union, permission must be sought directly from the copyright holders.

How to cite this report: Ruiz, V., Bruchhausen, M., *Portable Batteries of General Use: First Stakeholder Consultation Meeting and Analysis of Survey Results*, Publications Office of the European Union, Luxembourg, 2023, doi:10.2760/410136, JRC132710.

Contents

Abstract 1

Acknowledgements 2

1 Introduction..... 3

2 First meeting and methodology of the survey 4

3 Participants in the survey..... 6

4 Questions related to primary batteries..... 7

 4.1 Application tests 7

 4.2 Setting minimum requirements..... 8

5 Questions related to secondary batteries 11

 5.1 Battery chemistries 11

 5.2 Application tests 12

6 Questions related to primary and secondary batteries 13

7 Conclusions and outlook 15

References 16

List of Abbreviations and Definitions 17

List of Figures..... 18

List of Tables..... 19

Annexes 20

 Annex 1 Explanatory note sent to participants of the Stakeholder Consultation before the meeting..... 20

 Annex 2. "Portable batteries of general use" in the EU Regulation concerning batteries and waste batteries
 – Introduction..... 21

 Annex 3 "Portable batteries of general use" in the EU Regulation concerning batteries and waste batteries
 – Technical Part 26

Abstract

As part of its continued support to DG ENV in the context of the new Regulation on sustainable batteries, the Joint Research Centre, Energy Storage Unit (JRC.C.1) has organized the first stakeholder consultation on portable batteries of general use with regard to performance and durability requirements. The meeting, which took place online on the 14th of June 2022 was followed by an online survey shared with the participants at the workshop. This report summarizes the results of the online survey and the discussions that took place during the workshop itself.

While the standards use different parameters for characterizing the performance of primary and secondary portable batteries of general use, the draft Regulation foresees the same parameters for both types of battery. Stakeholders agree that this should be changed; e.g. discharge performance for primary batteries should be measured by Minimum Average Duration (MAD) for different application tests and by capacity for secondary batteries ⁽¹⁾.

Opinions on how the different application tests for primary batteries should be combined to obtain a single pass/fail criterion differ. It will require further work to decide on the approach.

⁽¹⁾ This is implemented in the political compromise reached in December 2022.

Acknowledgements

The authors of this report would like to thank all the participants to the workshop, that enable a lively discussion and fruitful exchange of ideas. Also, the comments and suggestions of Andreas Pfrang, Lucia Hegedusova, Diego Quintero, Marc Steen (all JRC.C.1) and Fabrice Mathieu (JRC.D.3) are highly appreciated.

Special thanks go to César Santos Gil (DG ENV) and Ewout Deurwaarder (DG GROW) for their continued support.

1 Introduction

The draft Regulation (European Commission, 2020) on sustainable batteries to replace the current Battery Directive 2006/66/EC (European Parliament and the Council, 2006) is currently under discussion by the co-legislators ⁽²⁾. One of the classes of batteries to be covered in the new draft Regulation are primary and secondary portable batteries of general use which are defined (by the draft Regulation) as batteries having the common formats AA, AAA, AAAA, A23, C, D, 9 V (PP3) or 4.5 V (3R12). The Joint Research Centre, Energy Storage Unit (JRC.C.1) supports DG ENV, the leading policy DG for this part of the Regulation, with scientific and technical advice within the framework of an Administrative Arrangement (JRC No 36075) between JRC, DG ENV and DG GROW.

Some of the technical requirements of the new regulation rely on harmonized standards to be referenced in the Official Journal of the European Union (OJEU). They will describe the necessary test procedures for the assessment of performance and durability. In its mandate M/579 (European Commission, 2021), the European Commission has sent a request to the European Standardization Organizations (ESOs) CEN and CENELEC to develop the necessary standards. The ESOs are committed to deliver the requested standards by 7th December 2025 following the usual standardization procedures. Some of these standards will describe the procedures needed to determine the electrochemical performance and durability parameters for portable batteries of general use listed in Annex III of the regulation. For a more in-depth analysis of the performance and durability tests already covered by IEC standards, it is recommended to read the related report (Gonella et al., 2022).

Should some requirements or tests not be covered by harmonized standards or should the harmonized standards be unduly delayed or not sufficient, the European Commission is empowered to adopt implementing acts that lay down common specifications to be used instead of harmonized standards (Article 16).

The minimum requirements for the performance and durability parameters will then be set by the European Commission by means of a delegated act. The aim of the consultation is to receive input from the different stakeholders to the setting of the minimum requirements and – if needed – the common specifications.

⁽²⁾ After the current report was drafted, the co-legislators have reached political agreement on the final text in December 2022. The main changes for portable batteries of general use compared to the Commission proposal are the inclusion of button cells in the definition (but not in the scope of Article 9), the introduction of distinct performance and durability parameters for primary and secondary batteries (Annex III) and a revised timeline.

2 First meeting and methodology of the survey

In case that the standardization process fails, the Regulation foresees, for certain requirements, as fall-back option, a mandate for the European Commission to adopt implementing acts laying down common specifications for the same purpose, Article 16 (1). Part of the preparation of the implementing acts is a stakeholder consultation. For portable batteries of general use, the stakeholder consultation, which was organized by the authors of this report, started with an online meeting on 14 June 2022.

In preparation of the meeting, the JRC had analyzed the relevant IEC/EN and ANSI standards (**Table 1**).

Table 1 List of IEC and ANSI standards pertaining to portable batteries of general use

Standard Number	Standard Title
IEC 60086-1:2021	Primary Batteries – Part 1: General
IEC 60086-2:2021	Primary Batteries – Part 2: Physical and electrical specifications
IEC 61951-2:2017	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary sealed cells and batteries for portable application – Part 2: Nickel-metal hydride
IEC 61960-3:2017	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for portable applications – Part 3: Prismatic and cylindrical lithium secondary cells, and batteries made from them
IEC 61960-4: 2020	Secondary cells and batteries containing alkaline or other non-acid electrolytes – Secondary lithium cells and batteries for portable applications – Part 4: Coin secondary lithium cells
ANSI C18.1M, Part 1:2015	American National Standard for Portable Primary Cells and Batteries with Aqueous Electrolyte-General and Specifications
ANSI C18.2M, Part1:2019	American National Standard for Portable Nickel Rechargeable Cells and Batteries – General and Specifications
ANSI C18.5M, Part 1:2020	Portable Lithium Rechargeable Cells and Batteries - General and Specifications

Source: JRC, 2022

During the meeting, the approach chosen by the JRC for setting minimum performance and durability requirements was presented and discussed with the objective to collect initial feedback and suggestions and to initiate the exchange of ideas with interested parties.

Two presentations were shown at the meeting: one describing the status of the Regulation in its current draft form with regard to portable batteries of general use and another, more technical presentation with a description of the preliminary methodology established for determining minimum requirements. The presentations are available in the Annexes 2 and 3 of this report.

The main objective of the meeting was to get feedback on the methodology proposed, and to gather new ideas and suggestions from the stakeholders. It was also clarified that this was the first meeting of a series, and particularly when the text of the Regulation becomes final, the dialogue will be continued.

The list of contacted organizations was established together with DG ENV. To be as representative as possible, associations like EPBA (industry and distributors) or BEUC (for consumer organizations) were contacted rather than individual persons, companies or similar organizations.

The following affiliations were represented at the meeting:

- RECHARGE (advanced rechargeable and lithium batteries industry association in Europe)
- EBRA (European Battery Recycling Association)
- STICHTING BATTERIJEN (Dutch Battery Association)
- STIFTUNG GRS BATTERIEN (German Foundation GRS Batteries Solidarity to protect the environment)
- BEBAT representing EUCOBAT (European association of national collection schemes for batteries)

- EPBA (European Portable Battery Association)
- VARTA (Batteries producer)
- SNRB (National Battery Recycling System of Romania)
- SAFT (Batteries producer)
- ANEC (the European consumer voice in standardisation) & BEUC (The European Consumer Organisation)
- ECOS (Environmental Coalition on Standards)

After the meeting, the participants had the opportunity to express their views in a written form by means of [an online survey](#). The questions in the survey aimed at obtaining the stakeholder views on different approaches in the draft Regulation and the IEC standards, possible simplification of the standards e.g., by harmonizing tests across chemistries or dropping application tests from the primary standards and on a means to combine the different application tests for primary batteries into a single criterion. The replies to the survey were anonymous.

This report summarizes the results of the survey and makes an attempt to draw conclusions from those answers. The survey was composed of a series of 15 questions with the possibility to select one or more replies per question. Also, and in order to frame the type of stakeholder participating in the survey, there was a question about the type of organization represented by the participants.

Overall, no reply was mandatory. In cases where participants selected several options these are listed as separate answers. The number of answers is therefore not always the same as the number of participants.

For each question, there was the opportunity to provide comments in free text. These comments are summarized in context with the question to which they belong.

In the next sections, the responses received for all the questions are presented, and where relevant also the comments received in the form of free text.

3 Participants in the survey

In total, five participants completed the survey. Since the invitations to participate in the stakeholder consultation were sent to associations, not individual persons, each contribution is considered the consolidated reply of an association rather than the view of an individual. **Figure 1** shows that most replies received were from the manufacturing sector, one response from a standardization committee and one consumer organization.

It must be emphasized that only those participants received the invitation to participate in the Survey who attended the stakeholder meeting, thus it was not an open survey. This explains the relatively low number of participants. However, they belong to the targeted focus group with relevant knowledge and expertise in the field.

Figure 1 Stakeholders participating in the survey



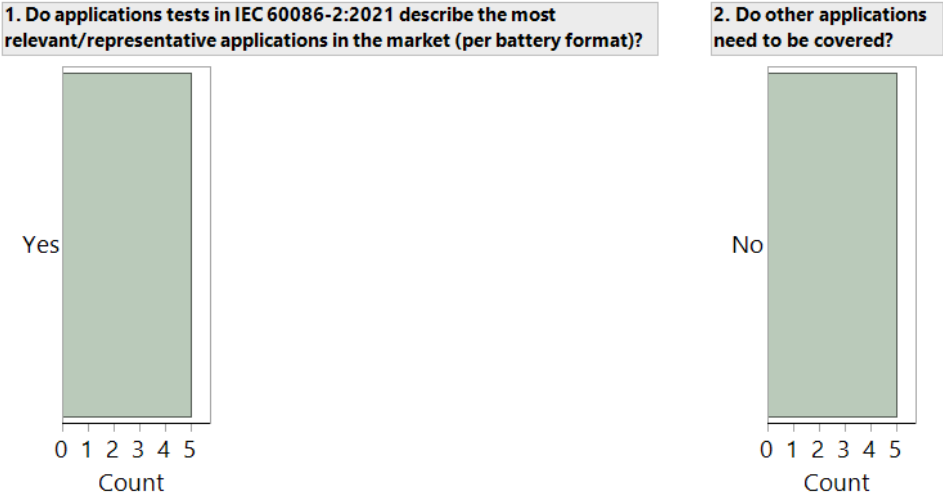
Source: JRC, 2023

4 Questions related to primary batteries

4.1 Application tests

The first set of questions was related to the application tests described in standard IEC 60086-2:2021 (IEC, 2021) for primary batteries (**Figure 2**). All the answers to the questions, as well as the additional comments given in the form of free-text, show that the application tests in the IEC standard are believed to reflect current applications and are sufficient to cover the “main battery applications” as seen by the participants.

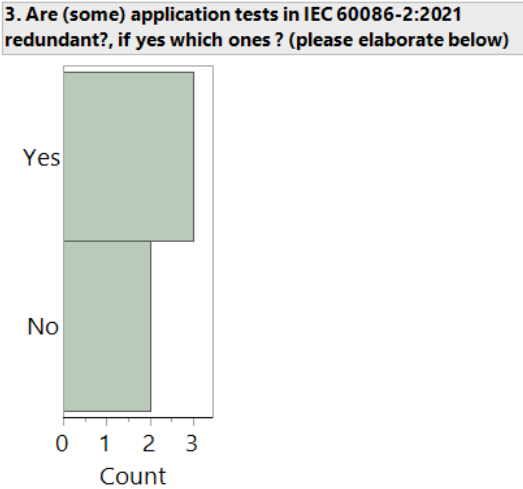
Figure 2 Coverage of current application tests in IEC 60086-2:2021



Source: JRC, 2023

There might be room to drop some application test(s) from the list of tests currently in the relevant standards, see **Figure 3**. The only example mentioned in the comments relates to the Toy and the Portable Lighting tests which are actually very similar in terms of test description and therefore they present a potential redundancy. This redundancy was already identified during the course of a preliminary gap analysis which is included in a previous report (Gonella et al., 2022) and also presented at the stakeholder consultation meeting (slide 9 in Annex 2).

Figure 3 Possible redundancy of application tests in IEC 60086-2:2021



Source: JRC, 2023

4.2 Setting minimum requirements

This series of questions for primary batteries were related to the setting of minimum requirements. The first question of this series asked how minimum requirements should be set for the various application tests. The extreme response options were that a battery needs to pass the minimum requirements for just a single application test or, on the contrary, that it must pass all application tests for a given format (current requirement in IEC standards). Intermediate response options would be the requirement to pass one low drain and one high drain application test or as final response option, a grading system where points would be awarded according to the battery's performance in the different tests, with the battery having to score a minimum number of points to demonstrate compliance.

The replies from the participants to the survey are equally distributed among the options and do not allow to identify a preference (**Figure 4-Question 4**).

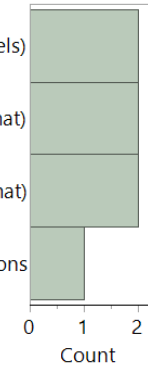
Similarly, there was no consensus on what should be the aim when defining minimum criteria in regards to the potential implication(s) (**Figure 4-Question 6**). It seems that excluding a percentage of poor performing batteries (e.g. 5%) is relevant for the participants to the survey. Also having a poor-shelf life could be penalized. In a comment received from one of the participants to the survey, it was pointed out that both "leakage" and "shelf life" are parameters relevant for primary batteries that deserve some consideration when establishing minimum requirements ⁽³⁾.

⁽³⁾ As part of the answer to question 6 "Other, please elaborate below" the following comment was received: "Performance will be the main selection criteria. It is however difficult to indicate a percentage that would be affected by the quality standard. This would require a view on the differences in quality of batteries which are currently be placed on the EU market. In addition to performance (expressed by the MAD value), Annex III also include shelf life (for which there is no IEC standard) and leakage which are of relevance for primary batteries. These elements will also have to be included in defining minimum criteria."

Figure 4 Approaches for setting the minimum requirements

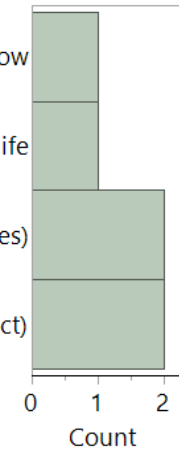
4. Which of the following options is preferable?

- Scoring or grading system: points gained for demonstrating performance in different application tests, in order to reach a minimum number of points (e.g. similar to energy labels)
- A battery needs to pass at least 1 application test (defined for its format)
- A battery needs to pass all application tests (defined for its format)
- A battery needs to pass 1 application test representative of high drain applications and 1 application test representative of low drain applications



6. When defining threshold values to define minimum criteria, what should be considered?

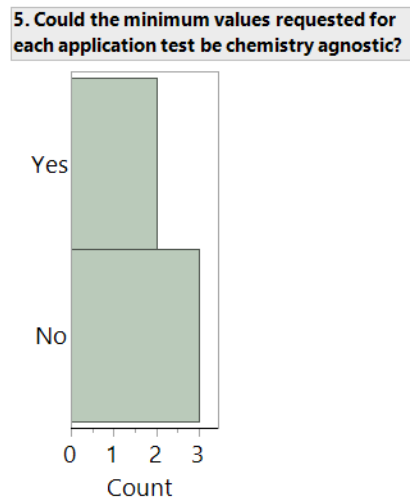
- Other, please elaborate below
- Aim at removing a certain percentage of batteries having poor shelf life
- Aim at excluding a certain percentage of (lower performing) batteries from the market (e.g. 5% worst performing batteries)
- Aim at both excluding a certain percentage of (lower performing) batteries from the market AND those having poor shelf life (combined effect)



Source: JRC , 2023

The replies to the possibility of including chemistry agnostic requirements were quite mixed (**Figure 5**). All participants answering "No" commented that different chemistries are inherently different and therefore have their specific advantages, disadvantages and therefore standards. Hence setting up minimum requirements independently of the battery chemistry, might lead to biased preferences by favouring some battery chemistries versus another chemistries. For example, one particular chemistry might be rather poor in high drain applications but display an outstanding shelf life. Thus, setting up minimum requirements would need to anticipate, and when possibly avoid, such situations.

Figure 5 Chemistry agnostic minimum requirements for primary batteries



(Note in the questionnaire: *This [situation] refers to the case where a minimum value is set independently of the electrochemical system. For example: AA batteries shall have a demonstrated minimum average duration (MAD) value towards "Toy/motor testing" higher or equal to X hours (independently of its electrochemical system)*)

Source: JRC, 2023

5 Questions related to secondary batteries

5.1 Battery chemistries

As for primary batteries, questions related to a possible chemistry agnostic approach to the setting up of minimum requirements also received mixed replies (**Figure 6** and **Figure 7**). Comments to these questions emphasized the inherent differences especially between Nickel Metal Hydride batteries (NiMH) and Lithium ion batteries (LIB), which would make it practically impossible to set requirements that allow a fair comparison between them.

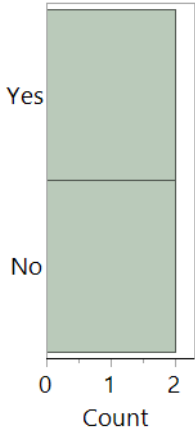
As an alternative, it might be feasible to have different sets of (nominally) chemistry agnostic minimum requirements which are tailored to implicitly cover the different chemistries of rechargeable batteries (**Figure 7**-question 9). In such a scenario, LIBs and NiMH batteries with their different strengths and weaknesses could both be acceptable because they would meet different sets of minimum criteria. This approach might be more flexible for new technologies as they would be directly covered by the Regulation, even if it does not include specific requirements for this new technology.

Regarding question 10 about the option to align the test for discharge performance for LIB and NiMH batteries, (**Figure 7**), the majority of the responses does not agree with testing of batteries under a single current. This can be due to the fact that different chemistries present varying responses to high or low drain applications. For example, the standards covering NiMH cylindrical cells (IEC 61951-2) require discharge at various constant currents and end voltages, whereas the standard covering LIB cylindrical cells (IEC 61960-3) requires discharge at a single constant current.

Different sets of minimum requirements could be matched to specific chemistries without mentioning them explicitly. Different sets of minimum requirements could cover LIBs and NiMH batteries.

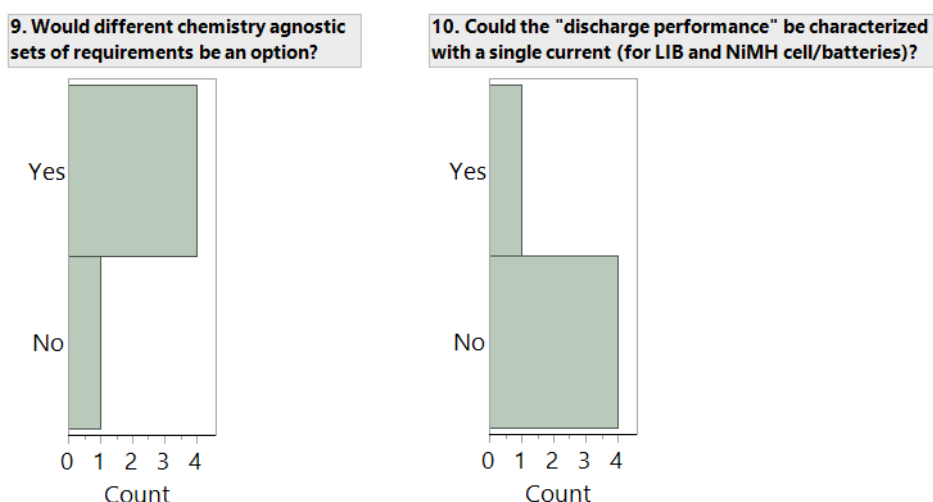
Figure 6 Chemistry agnosticism criteria for secondary batteries

8. Given that the requirements in the battery regulation will be mandatory, could they be chemistry agnostic, so that "new chemistries" would be covered also in the future? (In particular: What could be harmonized for both NiMH and LIB?)



Source: JRC, 2023

Figure 7 Alignment of requirements/test conditions for NiMH and LIB



NOTE in the questionnaire: *Would it be useful to have different sets of minimum requirements for the parameters in Annex III? E.g. a battery could compensate lower shelf life by having better discharge performance.*

NOTE in the questionnaire: *For example, current standard for NiMH cylindrical cells (IEC 61951-2) requires discharge at various rates of constant current (0.2 It, 1.0 It, 5.0 It 10.0 It) and final voltages (1.0 V, 0.9V, 0.8V, 0.7V). On the contrary, current standard for LIB cylindrical cells (IEC 61960-3) requires discharge at a single constant current (0.2 It).*

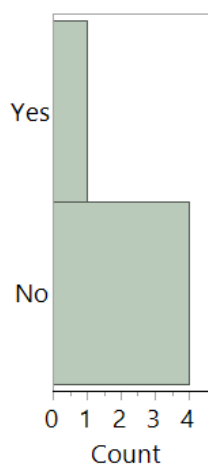
Source: JRC, 2023

5.2 Application tests

Overall, there is an agreement on the fact that application tests, as they are defined for primary batteries, are not desirable for secondary batteries (**Figure 8**-question 11). The discharge performance of secondary batteries is much less sensitive to variations in the discharge currents and idle periods.

Figure 8 Introduction of application tests for secondary batteries

11. Would it be useful to define "application tests" also for secondary batteries (currently, this might be required for rechargeable batteries as Annex III implies for "Minimum Average Duration" parameter)?



NB: The only positive response to question 11 was accompanied by a comment about low and a high drain applications rather than several very specific application tests as primary batteries have.

Note in the questionnaire: *The text of the draft Regulation reads: "Minimum average duration, minimum average time on discharge when used in **specific applications**, depending on the type of battery".*

Source: JRC, 2023

6 Questions related to primary and secondary batteries

The next question was an open question asking for suggestions on how to achieve one of the objectives of the Regulation, namely the removal of low performing portable batteries of general use from the EU market. Nothing radically different from the already discussed approaches was suggested. The answers emphasised the use of standards, a need for control/market surveillance and need for having separate parameters for characterizing the performance of primary and secondary batteries.

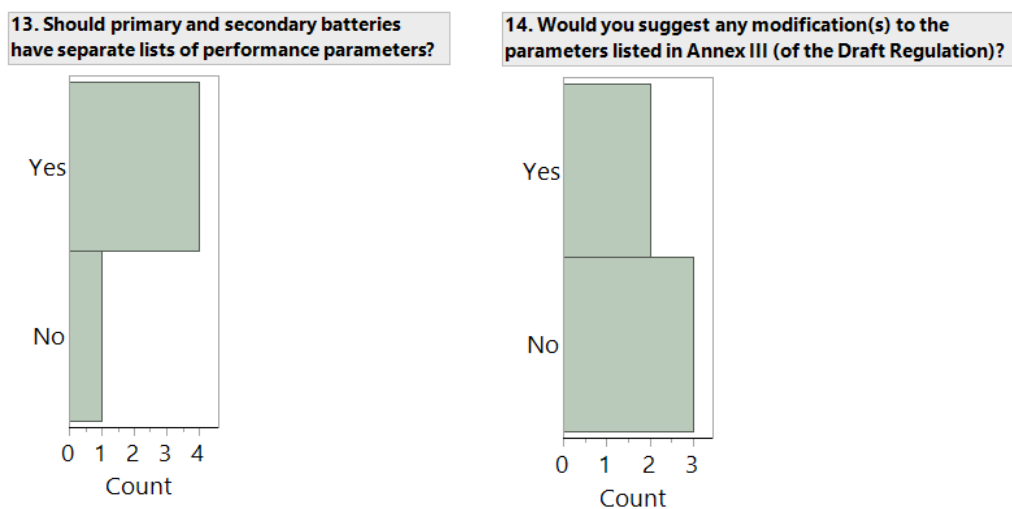
Most participants in the survey agree that primary and secondary batteries should have different sets of performance parameters (**Figure 9**-question 13), namely:

- Capacity and endurance in cycles for secondary batteries
- Minimum average duration for primary batteries.

Also, shelf life is considered more important for primary than for secondary batteries.

However, there was little feedback with concrete proposals as to which parameters to use instead of those currently listed in Annex III which apply to both, primary and secondary batteries (**Figure 9**-question 14). The comments related mostly to the "resistance to leakage" parameter in Annex III which should not be considered a performance requirement as such. According to the respondents, leakage should rather be seen as the risk of a fault because of low quality which is, implicitly, included in the other parameters, e.g. a leaking battery also has a poor shelf life and a poor service life.

Figure 9 Parameters in Annex III



(Note in the questionnaire to question 13: Primary batteries would have a set of performance & durability parameters and secondary batteries would have a separate one. Potentially some parameters could be applicable for both systems. Currently, the parameters in Annex III have the same applicability for primary and secondary batteries).

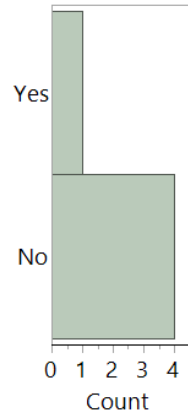
Source: JRC, 2023

Finally, most participants agreed that sustainability criteria should not be introduced through dedicated parameters in Annex III (**Figure 10**-question 15). The respondents argued in their comments to question 15 that integrating sustainability criteria would be too complex to implement in the available time. Another respondent stated that sustainability is already addressed in other parts of the draft Regulation.

This was not elaborated further, but most likely refers to Article 9(3) of the draft Regulation which sets a task for the European Commission to "assess the feasibility of measures to phase out the use of non-rechargeable portable batteries of general use in view of minimising their environmental impact based on the life cycle assessment methodology".

Figure 10 Explicit sustainability criteria

15. Should sustainability criteria be introduced in addition to performance & durability criteria?, if so which one(s)?, please elaborate in the box below



Source: JRC, 2023

7 Conclusions and outlook

The main conclusions that can be extracted from the stakeholder consultation on Portable batteries for general use are:

- As in the currently existing relevant standards, the performance of primary and secondary batteries should be characterized by different sets of parameters (Question 13). The main performance parameter for primary batteries is minimum average duration (MAD) in the various application tests, which are generally well covered in current standards (Question 1). For secondary batteries, the main capacity measured at different currents is considered a good measure for performance for a single charge. Application tests as for primary batteries are not considered necessary (Question 11).
- The number of application tests in the standards for primary batteries is considered sufficient (Question 2). There might be room for dropping some redundant tests from the final list of required parameters by the Regulation. So far, only two very similar tests were identified (Toy and the Portable Lighting tests, Question 3), but further analysis of the IEC standards for primary batteries and additional data from testing at JRC or obtained from other sources could elucidate further redundancies.
- There is no favoured approach as to how the performance of primary batteries in application tests should be counted towards meeting the minimum requirements (e.g. necessity to meet the requirements for a single application test or necessity to meet the requirements of all application tests). (Questions 4 and 6) Further analysis and discussion is needed.
- Different chemistries should generally be treated separately; it could be an option to have different sets of minimum requirements that are nominally chemistry agnostic but adopted to the different chemistries (e.g. minimum requirements for LIBs, minimum requirements for NiMH) (Question 9).

Next steps that will be undertaken in the context of the JRC support to the work on Portable batteries of general use will consist on:

- Continue the efforts relative to the in-house testing of batteries to complement a JRC database on performance and durability parameters of commercial batteries having common formats. The purpose is to have statistical representation of the population in the market.
- Analyze the data collected in the JRC database to produce a final comprehensive report building on the preliminary report (Gonella, 2022).
- Maintain contacts with relevant stakeholders for establishing a series of further consultations once the final text of the draft Regulation becomes available.

References

Bruchhausen, M.; Ruiz, A.; Gonella, S. (2022), Deliverable 3.1d: Review of standards for primary and secondary portable batteries of general use, European Commission, Petten, 2022, JRC128241

European Commission (2020), [Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation \(EU\) No 2019/1020, COM/2020/798,](#)

European Commission (2021), [COMMISSION IMPLEMENTING DECISION of 7.12.2021 on a standardisation request to the European standardisation organisations as regards performance, safety and sustainability requirements for batteries,](#) M/579

European Parliament and the Council (2006), [Directive 2006/66/EC of the European Parliament and of the Council of 6 September 2006 on batteries and accumulators and waste batteries and accumulators and repealing Directive 91/157/EEC](#)

Gonella S. et al. (2022), Gonella, S., Bruchhausen, M., Ruiz, V., [Available Data and Initial Analysis on Performance and Durability for Portable Batteries of General Use – Preliminary Scenarios for Minimum Requirements,](#) Publications Office of the European Union, Luxembourg, 2022, doi:10.2760/58194, JRC130387

IEC (2021), *IEC 60086-2:2021 Primary batteries – Part 2: Physical and electrical specifications*

List of Abbreviations and Definitions

ANEC	European Association for the Coordination of Consumer Representation in Standardization AISBL, the European consumer voice in standardisation
BEUC	Bureau Européen des Unions de Consommateurs' (European Consumer Organisation)
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
DG ENV	Directorate-General for the Environment
DG GROW	Directorate-General for Internal Market, Industry, Entrepreneurship & SMEs
EBRA	European Battery Recycling Association
ECOS	Environmental Coalition on Standards
EPBA	European Portable Battery Association
EUCOBAT	European association of national collection schemes for batteries
IEC	International Electrotechnical Commission
JRC	Joint Research Centre
LIB	Lithium Ion Battery
MAD	Minimum average duration
NiMH	Nickel Metal Hydride Battery
RECHARGE	Advanced rechargeable and lithium batteries industry association in Europe
SAFT	Batteries producer
SNRB	National Battery Recycling System of Rumania
STICHTING BATTERIJEN	Dutch Battery Association
STIFTUNG GRS BATTERIEN	German Foundation GRS Batteries Solidarity to protect the environment

List of Figures

Figure 1 Stakeholders participating in the survey.....9

Figure 2 Coverage of current application tests in IEC 60086-2:2021..... 10

Figure 3 Possible redundancy of application tests IEC 60086-2:2021 10

Figure 4 Approaches for setting the minimum requirements..... 12

Figure 5 Chemistry agnostic minimum requirements for primary batteries..... 13

Figure 6 Chemistry agnosticism criteria for secondary batteries 14

Figure 7 Harmonization of requirements/test conditions for NiMH and LIB 15

Figure 8 Introduction of application tests for secondary batteries..... 15

Figure 9 Parameters in Annex III..... 16

Figure 10 Explicit sustainability criteria..... 17

List of Tables

Table 1 List of IEC and ANSI standards pertaining to portable batteries of general use	7
---	---

Annexes

Annex 1 Explanatory note sent to participants of the Stakeholder Consultation before the meeting

The [Proposal](#) for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL concerning batteries and waste batteries, repealing Directive 2006/66/EC and amending Regulation (EU) No 2019/1020 defines “portable batteries of general use” as (Article 2 (8)):

‘portable batteries of general use’ means portable batteries with the following common formats: 4,5 Volts (3R12), D, C, AA, AAA, AAAA, A23, 9 Volts (PP3);

Furthermore, in Article 9 (2), the proposed Regulation gives a mandate to the European Commission to set minimum requirements for the performance and durability parameters listed in Annex III. These parameters are:

1. *Battery capacity, electric charge which a battery can deliver under a specific set of conditions.*
2. *Minimum average duration, minimum average time on discharge when used in specific applications, depending on the type of battery.*
3. *Shelf life (delayed discharge performance), the relative decrease of the minimum average duration after a defined period of time and specific conditions.*
4. *Endurance in cycles (for rechargeable batteries), the capacity of the battery after a pre-established number of charge and discharge cycles.*
5. *Resistance to leakage, i.e. resistance to unplanned escape of electrolyte, gas or other material (poor, good or excellent).*

The Commission through a delegated act would set such minimum requirements.

Further, in its implementing decision [M/579](#) from 7 December 2021, the European Commission requests CEN/CENELEC to draft EN standards describing the test methods necessary for determining the performance and durability of portable batteries of general use by means of these parameters. In case that no such standards would be available, Article 16 empowers the Commission to adopt implementing acts with technical specifications of equivalent effect, as a fall-back option.

The stakeholder consultation is part of the preparation of the delegated act on minimum requirements. It also touches upon the issue of test methods. We will collect your feedback during the meeting and there will be a possibility to provide feedback later.

Annex 2. "Portable batteries of general use" in the EU Regulation concerning batteries and waste batteries – Introduction



JRC activities related to the sustainable battery regulation

Kick-Off BEPA, EGVIafor2ZERO, JRC

28 June 2022



Regulation on Batteries and Waste Batteries

- 12/20 Commission Proposal, COM(2020) 798
- 12/21 Standardization request, M/579
- 03/22 Vote in the European Parliament
- 03/22 Council Position (General Approach)
- 04/22 Start of Trilogues (Council, Commission, Parliament)
- Q4/22 Agreed text expected
- Q1/23 Publication expected

2



Scope



Article 2

(7) '**portable battery**' means any battery that:

- is sealed;
- weights below 5kg; and
- is neither an EV battery nor an industrial battery nor an automotive battery;

(8) '**portable batteries of general use**' means portable batteries with the following common formats: [4,5 Volts (3R12), D, C, AA, AAA, AAAA, A23, 9 Volts (PP3)]'

3



Objectives of the Regulation

- **Aim:** Remove low performing primary and secondary "portable batteries of general use" from the EU market.
- **Need:**
 - **Test Procedures** for determining the parameters in Annex III
 - Harmonized standards
 - Implementing Acts
 - **Minimum Values** for these parameters
 - Delegated Acts

4



Test Procedures: Harmonized Standards

The Commission has issued implementing decision M/579 “on a **standardisation request** to the European standardisation organisations as regards performance, safety and sustainability requirements for batteries”

	Reference information	Deadline for the adoption
1.	European standard(s) on performance and durability aspects of portable rechargeable and non-rechargeable batteries	07 December 2025
2.	European standard(s) on performance and durability aspects of rechargeable batteries with internal energy storage	07 December 2025
3.	European standard(s) on the re-use and repurposing of rechargeable batteries with internal energy storage	07 December 2025
4.	European standard(s) on safety aspects of stationary battery energy storage systems with internal energy storage	07 December 2025

5



Test Procedures: Implementing Acts

Standardization Request

- CEN/CENELEC has accepted standardization request (7 Dec. 2021)
- Ad hoc group has submitted work programme (7 June 2022)
- Standards to be adopted by 7 Dec. 2025

Fall-back option, in the absence of harmonised standards

Article 16 (1):

“The Commission shall be empowered to adopt implementing acts laying down common specifications for the requirements set out in Articles 9, ...”

→ Commission needs to be prepared in case there would be no harmonized standards

6



Minimum Requirements: Delegated Act

Article 9

“1. From [1 January 2027], portable batteries of general use shall meet the values for the electrochemical performance and durability parameters set out in Annex III as laid down in the delegated act adopted by the Commission pursuant to paragraph 2.”

*“2. By [31 December 2025], the Commission shall adopt a **delegated act** in accordance with Article 73 to supplement this Regulation by establishing **minimum values for the electrochemical performance and durability parameters** laid down in Annex III that portable batteries of general use shall attain.”*

7



Stakeholder Consultation

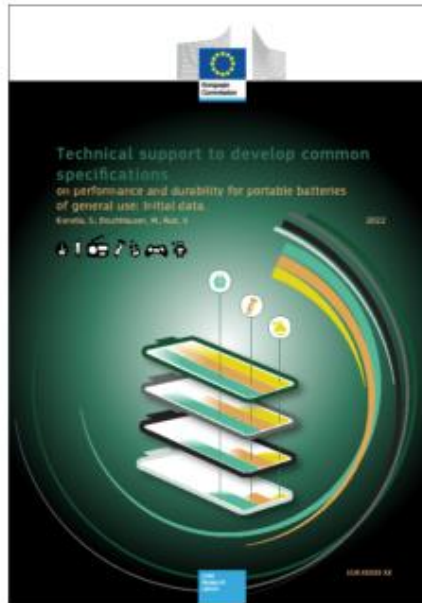
- Stakeholder consultation is a process, not a “one-off event” (timing depends on outcome of Trilogues)
 - Text of delegated/implementing act to be ready approx. 1 year before entering into force.
- Get feedback on approach/method (presented at the meeting)
- Today discussions, followed by formal feedback later via online questionnaire (will be made available after the meeting)
 - Slides will be available for download from the questionnaire

8



Draft report

- First analysis of available data
- Currently under internal review
- Will be publicly available
- Link will be provided to participants
- Feedback welcome
- As second report will be published towards the end of the process



9

Thank you



© European Union 2022

Unless otherwise noted the reuse of this presentation is authorised under the [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/) license. For any use or reproduction of elements that are not owned by the EU, permission may need to be sought directly from the respective right holders.

Batteries © Gautier22 - stock.adobe.com



10

Annex 3 “Portable batteries of general use” in the EU Regulation concerning batteries and waste batteries – Technical Part



“Portable batteries of general use” in the EU Regulation concerning batteries and waste batteries – Technical Part

Stakeholder Consultation

M. Bruchhausen, V. Ruiz
14 June 2022



Remarks

- The final text/scope of the Regulation is still unknown.
- Discussion to focus on concepts rather than technical details.
- The presentation is largely based on the original [Commission proposal](#).
- This presentation should trigger a discussion about the approach to defining test procedures and minimum requirements.
- All parameter thresholds are meant for illustration only, no decision on final parameters thresholds has been taken.

Scope



Article 2

(7) '**portable battery**' means any battery that:

- is sealed;
- weights below 5kg; and
- is neither an EV battery nor an industrial battery nor an automotive battery;

(8) '**portable batteries of general use**' means portable batteries with the following common formats: [4,5 Volts (3R12), D, C, AA, AAA, AAAA, A23, 9 Volts (PP3)]'

3



Objectives

- **Aim:** Remove low performing primary and secondary "portable batteries of general use" from the EU market.
- Performance and durability parameters listed in Annex III of the Regulation:
 - Battery Capacity
 - Minimum Average Duration (MAD) Time on Discharge in specific applications
 - Shelf life (delayed discharge performance)
 - Endurance in Cycles (secondary batteries)
 - Resistance to leakage
- **Need:**
 - **Test Procedures** for determining the parameters in Annex III
 - **Minimum Values** for these parameters

4



Annex III

1. **Battery capacity**, electric charge which a battery can deliver under a specific set of conditions.
2. **Minimum average duration**, minimum average time on discharge when used in specific applications, depending on the type of battery.
3. **Shelf life** (delayed discharge performance), the relative decrease of the minimum average duration after a defined period of time and specific conditions.
4. **Endurance in cycles** (for rechargeable batteries), the capacity of the battery after a pre-established number of charge and discharge cycles.
5. **Resistance to leakage**, i.e. resistance to unplanned escape of electrolyte, gas or other material (poor, good or excellent).

5



Methodology

- Review existing standards
 - IEC 60086 series for primary batteries
 - IEC 61951-2 (NiMH), IEC 61960-3 (LIB) for secondary batteries
- Collection of data
 - Entries (updated regularly): 376 primary and 216 secondary
 - Manufacturer datasheets
 - Consumer organizations
 - Internal testing
- Get an overview of market performance
- Set tentative limits

6



Primary Batteries

Minimum Average Duration (MAD)

IEC 60086 series



Minimum Average Duration for AA batteries

Common designation				AA	AA, FR6	AA	AA
U_n (V)				1,5	1,5	1,5	1,5
OCV max. (V)				1,68	1,83	1,73	1,73
Delayed discharge performance after 12 months (% of MAD)				90	95	80	80
Applications	Load	Daily Period	EV (V)	MAD* (initial)			
High drain application	1 500 mW 650 mW	b	1,05	40 pulses	370 pulses	No test	No test
Portable lighting (LED)	3,9 Ω	4 min on, 56 min off for 8h per day	0,9	230 min	No test	60 min	No test
Motor/toy	3,9 Ω	1 h	0,8	5 h	No test	65 min	45 min
Toy, non-motorized	250 mA	1 h	0,9	5 h	No test	No test	No test
CD, digital audio, wireless gaming and accessories	100 mA	1 h	0,9	15 h	No test	4.5 h	No test
Radio/clock	43 Ω	4 h	0,9	No test	No test	No test	22 h
Radio /clock /remote control	50 mA	1 h on, 7 h off for 24 h per day	1,0	30 h	No test	10 h	No test
High intensity lighting	1000 mW	4 min on, 11 min off for 8 h per day	1,0	No test	120 min	No Test	No test

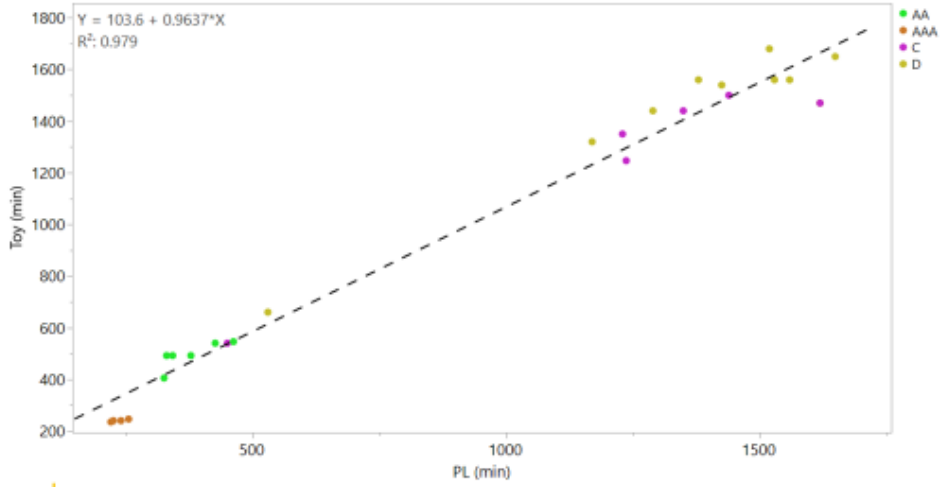
IEC 60086-2:2021

Copyright © 2021
IEC Geneva, Switzerland.
www.iec.ch



8

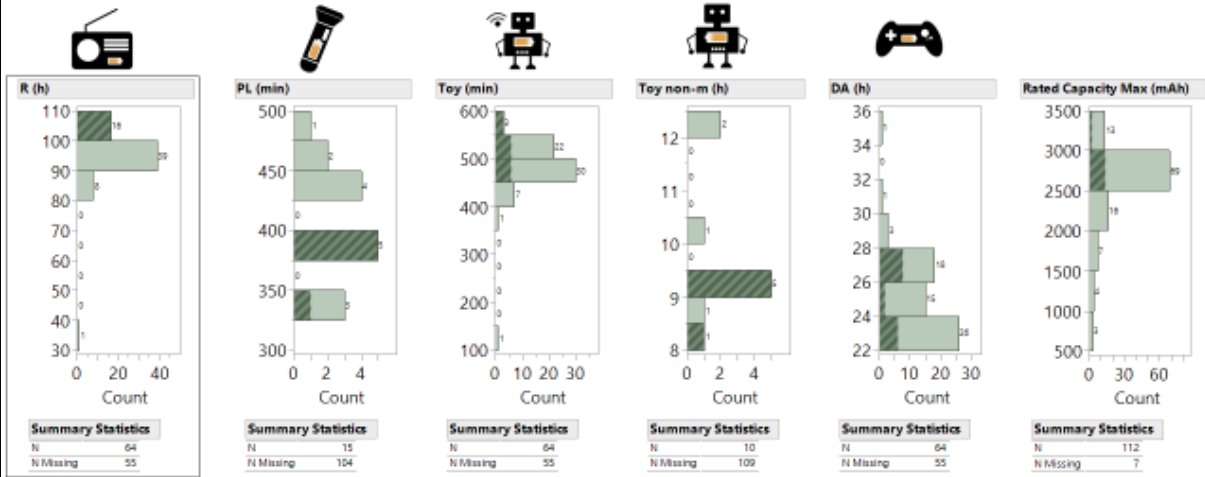
Toy vs. Portable Lighting



9



Primary AA Batteries: Application Tests



10



Questions: Applications tests

1. Do the applications tests in IEC 60086-2:2021 describe the most relevant/representative applications in the market (per battery format)?
2. Do other applications need to be covered?
3. Are some application tests redundant?

11



Approach: Setting of minimum requirements

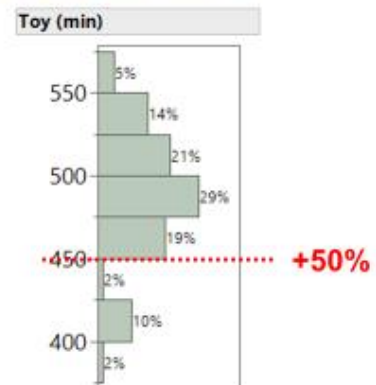
AA batteries, L chemistry



Data from public sources and internal tests



IEC 60086-2: 2021
Toy test
MAD: 300 min



Summary Statistics

Mean	489.4381
N	63
N Missing	52



12

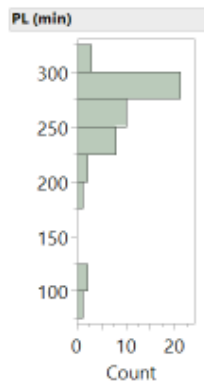
Proposed Preliminary Scenarios

- i. Low Threshold Scenario (LTS): exclude ~10% of batteries
 - ii. High Threshold Scenario (HTS): exclude ~50% of batteries
 - iii. Medium Threshold Scenario (MTS): intermediate
- Chemistry agnostic
 - Threshold values are **not** actual proposals, **for discussion only**
 - Little data in database → only 1 or 2 scenarios
 - No data in our database → LTS = MTS = HTS = IEC requirements – more data is needed

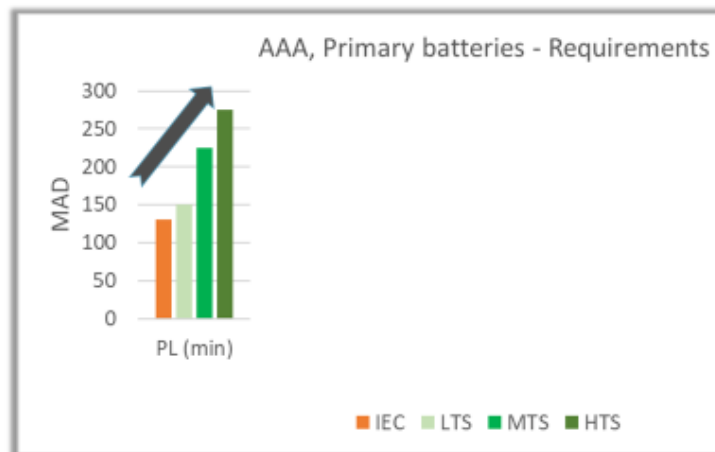
13



Proposed Preliminary Scenarios: AAA batteries



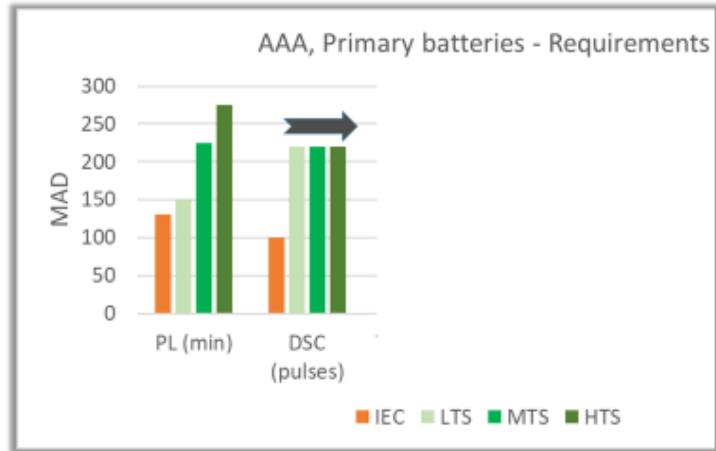
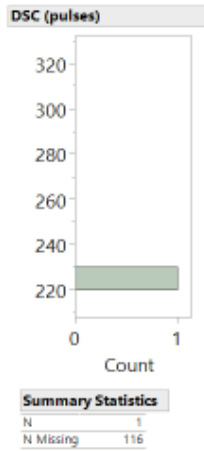
Summary Statistics	
N	48
N Missing	69



14



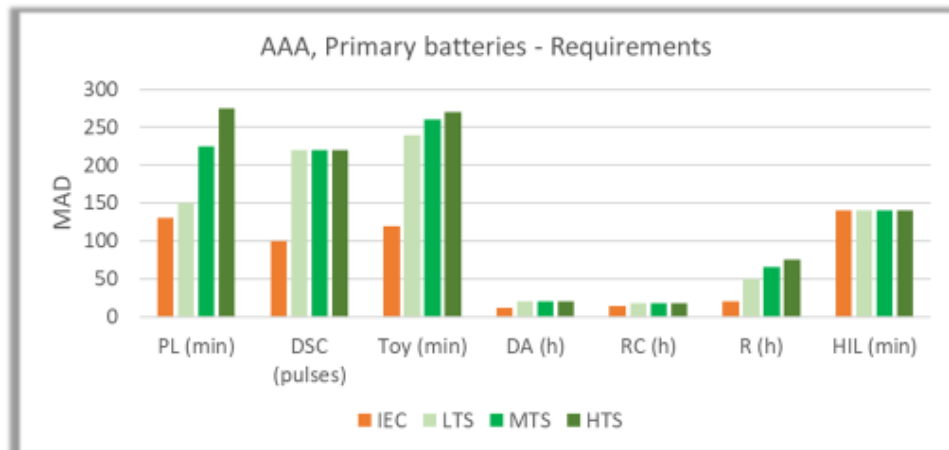
Proposed Preliminary Scenarios: AAA batteries



15



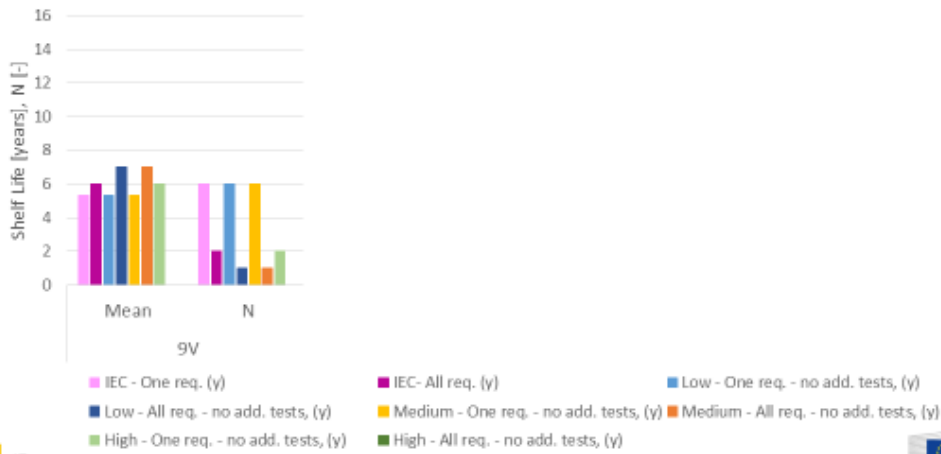
Proposed Preliminary Scenarios: AAA batteries



16



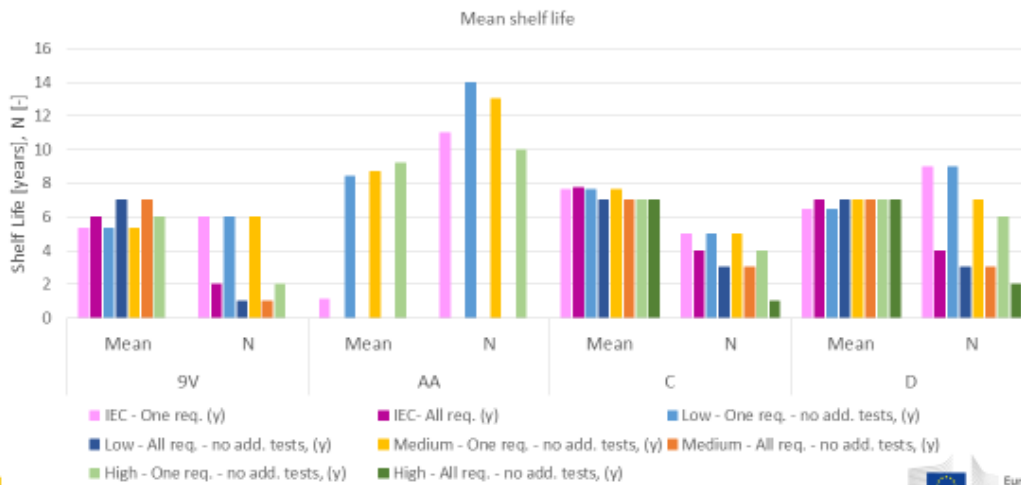
“One Requirement” vs. “All Requirements” Impact on Shelf Life



17



“One Requirement” vs. “All Requirements” Impact on Shelf Life



18



Different Requirements for different chemistries?

Electrochemical system letter				L	F	No letter	No letter
IEC designation				LR6	FR14505	R6P High power	R6S Standard
Common designation				AA	AA, FR6	AA	AA
E_n (V)				1,5	1,5	1,5	1,5
OCV max. (V)				1,68	1,83	1,73	1,73
Delayed discharge performance after 12 months (% of MAD)				90	95	80	80
Applications	Load	Daily Period	EV (V)	MAD ^a (initial)			
High drain application	1 500 mW 650 mW	a	1,05	40 pulses	370 pulses	No test	No test
Portable lighting (LED)	3,9 Ω	4 min on, 56 min off for 8h per day	0,9	230 min	No test	60 min	No test
Motor/Toy	3,9 Ω	1 h	0,8	5 h	No test	65 min	45 min
Toy, non-motorized	250 mA	1 h	0,9	5 h	No test	No test	No test
CD, digital audio, wireless gaming and accessories	100 mA	1 h	0,9	15 h	No test	4,5 h	No test
Radio/clock	43 Ω	4 h	0,9	No test	No test	No test	22 h
Radio /clock /remote control	50 mA	1 h on, 7 h off for 24 h per day	1,0	30 h	No test	10 h	No test
High intensity lighting	1000 mW	4 min on, 11 min off for 8 h per day	1,0	No test	120 min	No Test	No test

IEC 60086-2:2021

Copyright © 2021
IEC Geneva, Switzerland.
www.iec.ch



19

Questions: Minimum Requirements for MAD

Minimum requirement wrt. application tests:

- 1) A battery needs to pass **at least one** application test
- 2) A battery needs to pass **all** application tests
- 3) **Scoring system:** points for performance in different application tests; a minimum number of points required
4. Which option is preferable?
5. Could the minimum requirements be chemistry agnostic?



20

Questions: Setting Minimum Requirements

6. How to set thresholds
 - Exclude certain percentage of batteries?
 - Another criterion?
7. Would you be able/willing to share data?

21



Secondary Batteries

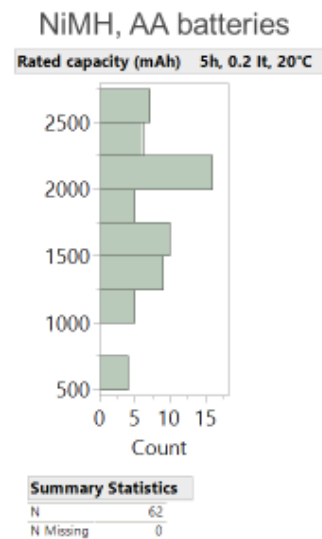
IEC 61951-2 (NiMH)

IEC 61960-3 (LIB)



Discharge Performance

- No application tests (as for primary batteries)
- No minimum requirement for (rated) **capacity**;
- NiMH (IEC 61951-2): Requirements for discharge performance: minimum discharge duration at constant current ($0,2 I_t$) for batteries and several currents ($0.2, 1, 5$ and $10 I_t$ A)
- For LIB (IEC 61960-3) no distinction between cells and batteries for discharge conditions.



23



Secondary Batteries

- Analysis is in principle more “straight forward” than for primary batteries (no application tests), but standards are less detailed
- Standards give more freedom, benchmarking is more difficult
- E.g. endurance in cycles:
 - NiMH (IEC 61951-2:2017)
 - Cycles 1-49: charge $0.5 I_t$ A, discharge $0.5 I_t$ A to 1.0 V
 - Cycle 50: charge $0.1 I_t$ A, discharge $0,2 I_t$ A to 1.0 V
 - LIB (IEC 61960-3:2017)
 - charge acc. manufacturer instructions, discharge $0.2 I_t$ A or $0.5 I_t$ A to final voltage
- Could some testing conditions / requirements be harmonized?

24



Questions: Secondary Batteries

8. Given that the requirements in the battery regulation will be mandatory, could they be chemistry agnostic, so that “new chemistries” would be covered also in the future? (In particular: What could be harmonized for both NiMH and LIB?)
9. Would different chemistry agnostic sets of requirements be an option?
10. Could discharge performance be characterised with a single current for cells and batteries (LIB and NiMH)?
11. Would it be useful to define application tests also for secondary batteries (currently required in Annex III for MAD)?

25



Questions: General

12. **Aim:** Remove low performing primary and secondary “portable batteries of general use” from the EU market.
→ How could the aim be achieved most effectively through a combination of test procedures and minimum values?
13. Do you suggest any modifications to the parameters listed in Annex III?
 - Should primary and secondary batteries have separate lists of parameters?

26



Thank you



© European Union 2022

Unless otherwise noted the reuse of this presentation is authorised under the [CC BY 4.0](https://creativecommons.org/licenses/by/4.0/) license. For any use or reproduction of elements that are not owned by the EU, permission may need to be sought directly from the respective right holders.

Table from IEC 60086-2:2021 © IEC
Batteries © Gautier22 - stock.adobe.com
AA Batteries © [Leadholder](#) Wikipedia, [CC BY-SA 3.0](https://creativecommons.org/licenses/by-sa/3.0/)

27



Annex

Proposal for a Regulation of the European Parliament and of the Council on batteries and waste batteries, amending Regulation (EU) No 2019/1020 and repealing Directive 2006/66/EC



Article 9 Performance and durability requirements for portable batteries of general use

1. From [1 January 2027], portable batteries of general use shall meet the values for the electrochemical performance and durability parameters set out in Annex III as laid down in the delegated act adopted by the Commission pursuant to paragraph 2.

2. By 31 [December 2025], the Commission shall adopt a delegated act in accordance with Article 73 to supplement this Regulation by establishing minimum values for the electrochemical performance and durability parameters laid down in Annex III that portable batteries of general use shall attain.

The Commission is empowered to adopt delegated acts in accordance with Article 73 to amend the electrochemical performance and durability parameters laid down in Annex III in view of technical and scientific progress.

In preparing the delegated act referred to in the first subparagraph, the Commission shall consider the need to reduce the life cycle environmental impact of portable batteries of general use and take into consideration relevant international standards and labelling schemes. The Commission shall also ensure that the provisions laid down by those delegated acts do not have a significant negative impact on the functionality of those batteries or the appliances into which those batteries are incorporated, the affordability and the cost for end-users and the industry's competitiveness. No excessive administrative burden shall be imposed on manufacturers of the batteries and the appliances concerned.

29



Article 9 Performance and durability requirements for portable batteries of general use

(3) By [31 December 2030], the Commission shall assess the feasibility of measures to phase out the use of non-rechargeable portable batteries of general use in view of minimising their environmental impact based on the life cycle assessment methodology. To that end, the Commission shall submit a report to the European Parliament and to the Council and consider taking the appropriate measures, including the adoption of legislative proposals.

30



Annex III *Electrochemical performance and durability parameters for portable batteries of general use*

1. *Battery capacity, electric charge which a battery can deliver under a specific set of conditions.*
2. *Minimum average duration, minimum average time on discharge when used in specific applications, depending on the type of battery.*
3. *Shelf life (delayed discharge performance), the relative decrease of the minimum average duration after a defined period of time and specific conditions.*
4. *Endurance in cycles (for rechargeable batteries), the capacity of the battery after a pre-established number of charge and discharge cycles.*
5. *Resistance to leakage, i.e. resistance to unplanned escape of electrolyte, gas or other material (poor, good or excellent).*

31



Article 16 *Common specifications*

1. The Commission shall be empowered to adopt implementing acts laying down common specifications for the requirements set out in Articles 9, 10, 12, 13, 59(5)(a) or tests referred to in Article 15(2), where: (a) those requirements or tests are not covered by harmonised standards or parts thereof, the references of which have been published in the Official Journal of the European Union; or
(b) the Commission observes undue delays in the adoption of requested harmonised standards, or considers that relevant harmonised standards are not sufficient; or
(c) the Commission has decided in accordance with the procedure referred to in Article 11(5) of Regulation (EU) No 1025/2012 to maintain with restriction or to withdraw the references to the harmonised standards or parts thereof by which those requirements or tests are covered.

Those implementing acts shall be adopted in accordance with the examination procedure referred to in Article 74(3).

32



Article 16 Common specifications

2. Batteries which are tested following common specifications or parts thereof shall be presumed to be in conformity with the requirements set out in Articles 9, 10, 13 and 59(5)(a) to the extent that those requirements are covered by those common specifications or parts thereof, and, if applicable, to the extent that the minimum values established for those requirements are attained.

3. Batteries which are in conformity with common specifications or parts thereof shall be presumed to be in conformity with the requirements set out in Article 12 to the extent that those requirements are covered by those common specifications or parts thereof.

33



Article 73 Exercise of the delegation

1. The power to adopt delegated acts is conferred on the Commission subject to the conditions laid down in this Article.

2. The power to adopt delegated acts referred to in Articles 6(2), 7(1), (2) and (3), 9(2), 10(3), 12(2), 17(4), 27(3), 39(6), 55(4), 56(4), 57(6), 58(3) and 70(2) shall be conferred on the Commission for a period of five years from [date of entry into force of this Regulation]. The Commission shall draw up a report in respect of the delegation of power no later than nine months before the end of the five-year period. The delegation of power shall be tacitly extended for periods of an identical duration, unless the European Parliament or the Council opposes such extension no later than three months before the end of each period.

34



Article 73 Exercise of delegation

3. *The delegation of power referred to in Articles 6(2), 7(1), (2) and (3), 9(2), 10(3), 12(2), 17(4), 27(3), 39(7), 55(4), 56(4), 57(6), 58(3) and 70(2) may be revoked at any time by the European Parliament or by the Council. A decision to revoke shall put an end to the delegation of the power specified in that decision. It shall take effect the day following the publication of the decision in the Official Journal of the European Union or at a later date specified therein. It shall not affect the validity of any delegated acts already in force.*

4. *Before adopting a delegated act, the Commission shall consult experts designated by each Member State in accordance with the principles laid down in the Interinstitutional Agreement of 13 April 2016 on Better Law-Making.*

35



Article 73 Exercise of delegation

5. *As soon as it adopts a delegated act, the Commission shall notify it simultaneously to the European Parliament and to the Council.*

6. *A delegated act adopted pursuant to Articles 6(2), 7(1), (2) and (3), 9(2), 10(3), 12(2), 17(4), 27(3), 39(6), 55(4), 56(4), 57(6), 58(3) and 70(2) shall enter into force only if no objection has been expressed either by the European Parliament or the Council within a period of two months of notification of that act to the European Parliament and the Council or if, before the expiry of that period, the European Parliament and the Council have both informed the Commission that they will not object. That period shall be extended by two months at the initiative of the European Parliament or of the Council.*

36



GETTING IN TOUCH WITH THE EU

In person

All over the European Union there are hundreds of Europe Direct centres. You can find the address of the centre nearest you online (european-union.europa.eu/contact-eu/meet-us_en).

On the phone or in writing

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

- by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),
- at the following standard number: +32 22999696,
- via the following form: european-union.europa.eu/contact-eu/write-us_en.

FINDING INFORMATION ABOUT THE EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website (european-union.europa.eu).

EU publications

You can view or order EU publications at op.europa.eu/en/publications. Multiple copies of free publications can be obtained by contacting Europe Direct or your local documentation centre (european-union.europa.eu/contact-eu/meet-us_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1951 in all the official language versions, go to EUR-Lex (eur-lex.europa.eu).

Open data from the EU

The portal data.europa.eu provides access to open datasets from the EU institutions, bodies and agencies. These can be downloaded and reused for free, for both commercial and non-commercial purposes. The portal also provides access to a wealth of datasets from European countries.

The European Commission's science and knowledge service

Joint Research Centre

JRC Mission

As the science and knowledge service of the European Commission, the Joint Research Centre's mission is to support EU policies with independent evidence throughout the whole policy cycle.



EU Science Hub
joint-research-centre.ec.europa.eu

 @EU_ScienceHub

 EU Science Hub - Joint Research Centre

 EU Science, Research and Innovation

 EU Science Hub

 EU Science



Publications Office
of the European Union