DEFACTO - battery DEsign and manuFACTuring Optimisation through multiphysic modelling

D8.12 Report on the contribution to standardization (III)

Date: December 2023

This deliverable describes the activities carried out in relation to the Subtask T8.5.2: Contribution to the ongoing and future standardization developments (M7-M48). It covers the activities developed from M31 to M48.

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 875247.

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Project details

Project acronym	DEFACTO	**Start / Duration**	*01/01/2020 (48 months)*
Topic	LC-BAT-6	**Call identifier**	*H2020-LC-BAT-2019-2020*
Type of Action	Research and Innovation Action (RIA)	**Coordinator**	*CIDETEC*
Contact persons	*Elixabete Ayerbe*		
Website	**www.defacto-project.eu**		

Deliverable details

Number	***D8.12***		
Title	*Report on the contribution to standardization (III)*		
Work Package	*WP8*		
Dissemination level	Public	**Nature**	*Report*
Due date (M)	M48	**Submission date (M)**	*M48*
Deliverable responsible	**UNE**	**Contact person**	***José Antonio Jiménez Caballero jjimenez@une.org***

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Reviewer(s)	All partners	All partners	Partner	
Final review and quality approval	Elixabete Ayerbe	CID	Project Coordinator	*eayerbe@cidetec.es*

Document History

Date	Version	Name	Changes
11/12/2023	V0	José A. Jiménez (UNE)	First draft
18/12/2023	V1	José A. Jiménez (UNE)	New subclause 3.2 added

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Contents

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1 Introduction

This deliverable contains a description of the activities carried out between M31 and M48 related to Subtask T8.5.2: Contribution to the ongoing and future standardization developments (M7-M48).

Subtask T8.5.2 covers two aspects:

- The utilization of the standardization as a dissemination tool to the market stakeholders. This aspect is covered in Clause 3.
- The inclusion of the outcomes of the project in new or future standards, external to the consortium that can be easily used by the EU or international industry and research. This aspect is covered in Clause 4.

It also contains a specific clause on the standards used in the project, see Clause 5.

2 Acronyms and abbreviations

CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
EU	European Union
UNE	Spanish Association for Standardization
CWA	CEN/CENELEC Workshop Agreement
ISO	International Organization for Standardization
IEC	International Electrotechnical Commission

3 Dissemination activities

For the context in which these activities take place, see chapters 4 and 5 of the Deliverable D8.10 Report on the contribution to standardization(I).

3.1 Webinar "The importance of standardized data in battery R&D projects"

On 2023-02-21, the DEFACTO project organised the online webinar THE IMPORTANCE OF STANDARDIZED DATA IN BATTERY R&D PROJECTS. Three DEFACTO project partners participated in the webinar, CIDETEC Energy Storage, the Spanish Association for Standardization (UNE) and Sustainable Innovations.

During the webinar, UNE gave a presentation covering the following topics:

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- The role of standardization within the project;
- Standardization landscape in the battery sector;
- ISO/IEC standards for batteries for electric vehicles;
- Standardization system as a tool for dissemination;
- Generation of new standards.

See detailed presentation in Annex A.

The information in this presentation is very interesting for other R&D projects in the battery sector that do not have a specific task on standardization.

3.2 Collaboration with New Energy and Industrial Technology Development Organization (NEDO) – Japan

UNE has been contacted by Mitsubishi UFJ Research and Consulting Co., Ltd. looking for cooperation with a research project on the strategic use of standardization in national projects commissioned by New Energy and Industrial Technology Development Organization (nedo.go.jp), of the government of Japan. NEDO is a Japanese national research and development agency that creates innovation by promoting technological development necessary for the realization of a sustainable society. They believe that for the research and development results to be effectively implemented into society, projects must incorporate appropriate standardization activities from an early stage. To better understand how this can be done, they would like to learn from the strategic standardization activities conducted by European research and development projects like DEFACTO.

UNE has completed a questionnaire describing the standardisation activities developed within the DEFACTO project and the processes followed during its development, and a meeting has been held with the project manager on 2023-12-20.

4 Contribution to standardization

For the context in which these activities take place, see chapters 4 and 6 of the Deliverable D8.10 Report on the contribution to standardization(I).

The activities described in this clause are related to the Specific Objective SO7 “Contribution to new standardisation in the batteries sector, especially regarding shortened validation of cell endurance (measurement of functionalities, ageing and safety…) and cell production” and KPI14 “At least 2 proposals for new standardization submitted”.

4.1 Development of the proposal in CEN/CENELEC

For previous work on this task, see the deliverable *D8.11 Report on the contribution to standardization (II)*.

The kick off meeting of the CEN-CENELEC Workshop on 'Definition of parameters required for modelling of the material, cell and manufacturing process behaviour for battery cells for the automotive market' was held on 2022-06-28.

The workshop was finally formed by the following entities:

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- SK (Republic of Korea)
- CERTH (ETHNIKO KENTRO EREVNAS KAI TECHNOLOGIKIS ANAPTYXIS) (Greece)
- DLR (DEUTSCHES ZENTRUM FUER LUFT - UND RAUMFAHRT EV) (Germany)
- PSA Automobiles SA (France)
- CIDETEC Energy Storage (Spain)
- CEA (COMMISSARIAT A L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES) (France)
- UPM (UNIVERSIDAD POLITECNICA DE MADRID) (Spain)
- Leclanché GMBH (Germany)

The workshop has been joined by two entities external to the consortium, a major Asian battery manufacturer and a major European automobile manufacturer, two companies within the target market of the DEFACTO project results.

In addition to the kick-off meeting, the workshop held one more meeting on 2023-01-27. See Annex B for the minutes of both meetings. The rest of the work for the development of the two CWAs has been done by correspondence.

On the first drafts of the CWA documents, based on the deliverable *D.2.1 "Report on the definition of parameters required for modelling and description of the validation protocol"* of the DEFACT project, the following changes have been made on CWA 18059-2:2023:

- A new Annex A containing the description of the processes that are being followed within the DEFACTO project to force and characterize various ageing mechanisms in cells has been added;
- A new Table A.2: Experiments to determine degradation mechanisms has been added.

Once consensus was reached on both documents among the workshop participants, the drafts were submitted to a public consultation process on the CEN/CENELEC website, starting on 2023-07-27. No comments were received from external parties and therefore the documents approved at the workshop were considered approved.

The documents have been published by CEN/CENELEC on 2023-12-06 as follows:

- CWA 18059-1:2023 Definition of parameters required for modelling of the material, cell and manufacturing process behaviour for battery cells for the automotive market - Part 1: Data required for modelling the material, cell and manufacturing process for cells for the automotive market;
- CWA 18059-2:2023 Definition of parameters required for modelling of the material, cell and manufacturing process behaviour for battery cells for the automotive market - Part 2: Experiments and characterisation techniques for data required for modelling cells.

Once published, the documents of the European standardisation bodies CEN/CENELEC can be purchased through the national member organisations. In the case of CWAs documents developed in European R&D projects receiving public funding, UNE has a policy of paying the CEN/CENELEC fee to make these documents available free of charge, as a measure to ensure maximum dissemination of the knowledge generated in the projects.

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5 Standards used in the project

5.1 Relevance of the use of standards in R&D projects

As indicated in the description of task T8.5 "Standardization activities" of the Grant Agreement, in R&D projects it is important to know and use the standards that apply in each market to ensure compatibility and interoperability with what already exists in the market and to increase the confidence of potential customers in the product developed in the project. Additionally, standards are used to demonstrate regulatory compliance worldwide and especially in the European Union. The identification of the standards applicable to the DEFACTO project was performed between M1-M6 and is reflected in deliverable *D8.9 "Report on the standardization landscape and applicable standards"*.

5.2 IEC 62660 Secondary lithium-ion cells for the propulsion of electric road vehicles

The *IEC 62660 Secondary lithium-ion cells for the propulsion of electric road vehicles* standard is the reference for testing the performance, reliability and safety of lithium-ion cells for the propulsion of electric road vehicles. It has its equivalent European standard in EN IEC 62660. It consists of the following parts:

Standard reference	Title	Scope
IEC 62660-1:2018	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 1: Performance testing	IEC 62660-1:2018 specifies performance and life testing of secondary lithium-ion cells used for propulsion of electric vehicles including battery electric vehicles (BEV) and hybrid electric vehicles (HEV). This document specifies the test procedures to obtain the essential characteristics of lithium-ion cells for vehicle propulsion applications regarding capacity, power density, energy density, storage life and cycle life. This document provides the standard test procedures and conditions for testing basic performance characteristics of lithium-ion cells for vehicle propulsion applications, which are indispensable for securing a basic level of performance and obtaining essential data on cells for various designs of battery systems and battery packs.

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Standard reference	Title	Scope
IEC 62660-2:2018	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 2: Reliability and abuse testing	IEC 62660-2:2018 specifies test procedures to observe the reliability and abuse behaviour of secondary lithium-ion cells and cell blocks used for propulsion of electric vehicles including battery electric vehicles (BEV) and hybrid electric vehicles (HEV). This document specifies the standard test procedures and conditions for basic characteristics of lithium-ion cells for use in propulsion of battery and hybrid electric vehicles. The tests are indispensable for obtaining essential data on reliability and abuse behaviour of lithium-ion cells for use in various designs of battery systems and battery packs. This document provides standard classification of description of test results to be used for the design of battery systems or battery packs.
IEC 62660-3:2016	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 3: Safety requirements	IEC 62660-3:2016 specifies test procedures and the acceptance criteria for safety performance of secondary lithium-ion cells and cell blocks used for the propulsion of electric vehicles (EV) including battery electric vehicles (BEV) and hybrid electric vehicles (HEV). This International Standard intends to determine the basic safety performance of cells used in a battery pack and system under intended use, and reasonably foreseeable misuse or incident, during the normal operation of the EV. The safety requirements of the cell in this standard are based on the premise that the cells are properly used in a battery pack and system within the limits for voltage, current and temperature as specified by the cell manufacturer (cell operating region). The evaluation of the safety of cells during transport and storage is not covered by this standard.

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Standard reference	Title	Scope
IEC TR 62660-4:2017	Secondary lithium-ion cells for the propulsion of electric road vehicles - Part 4: Candidate alternative test methods for the internal short circuit test of IEC 62660-3	IEC TR 62660-4:2017(E) provides the test data on the candidate alternative test methods for the internal short circuit test according to 6.4.4.2.2 of IEC 62660-3:2016. The internal short circuit test in this document is intended to simulate an internal short circuit of a cell caused by the contamination of conductive particle, and to verify the safety performance of the cell under such conditions. This document is applicable to the secondary lithium-ion cells and cell blocks used for propulsion of electric vehicles (EV) including battery electric vehicles (BEV) and hybrid electric vehicles (HEV). This document does not cover cylindrical cells.

This standard is certified by the world's main certification entities.

On 2023-07-28 the new Regulation (EU) 2023/1542 of the European Parliament and of the Council of 12 July 2023 concerning batteries and waste batteries was published. This new European regulation will use European standards to demonstrate compliance with its technical requirements. The European Commission has asked the European standardization organizations to develop the necessary standards for this regulation and the IEC 62660 standard is a candidate to become a harmonized European standard.

The DEFACTO project has used the battery electric vehicles (BEV) and hybrid electric vehicles (HEV) life cycle test profiles of the IEC 62660 standard for the development, validation and parametrization of simulation tools.

The IEC 62660 standard is important for the market that the results of the DEFACTO project are targeting and will also be important from a regulatory point of view in the European Union.

6 Conclusions

All the objectives related to standardization included in the Grant Agreement have been achieved, namely:

- Already existing standards have been used for facilitating the compatibility of the project outcomes with the current market practices (Subtask 8.5.1);
- Standardization has been used as a means of project dissemination (Subtask T8.5.2);
- Two new CWAs have been developed for increasing the impact of the project and contribute to the transfer of the knowledge generated within the project to the industry and society (Subtask T8.5.2, Specific Objective SO7 and Key Performance Indicator KPI14).

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Annex A Presentation “Standardization in DEFACTO project”

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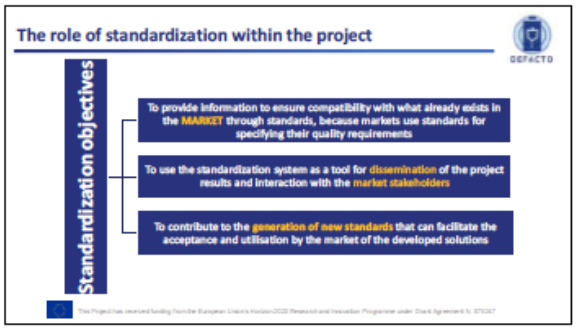

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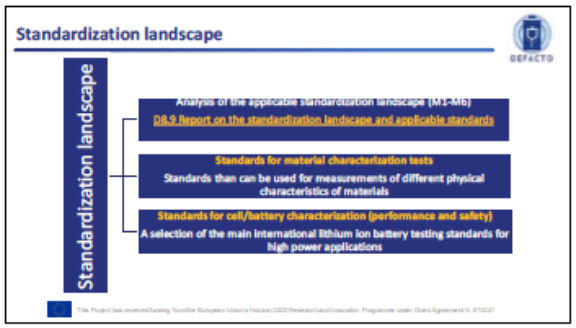

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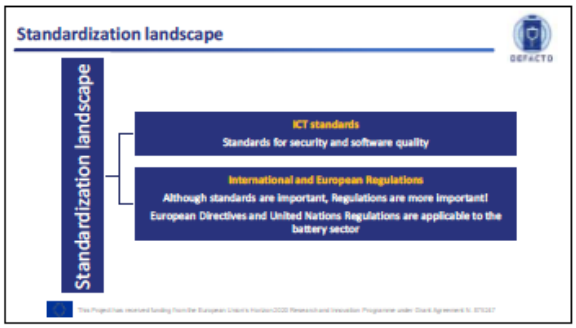

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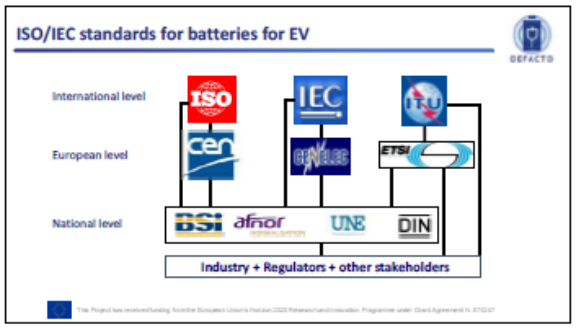

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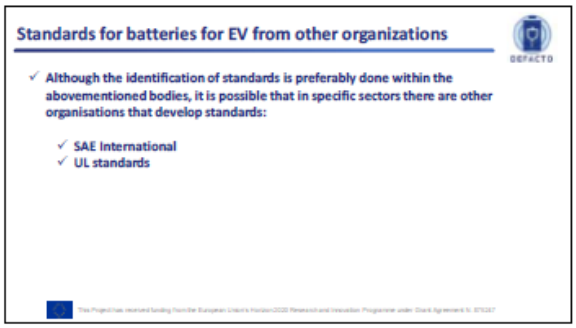

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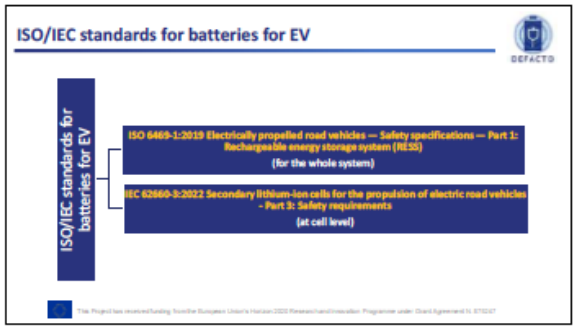

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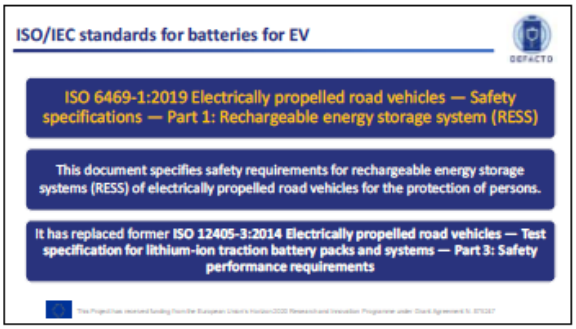

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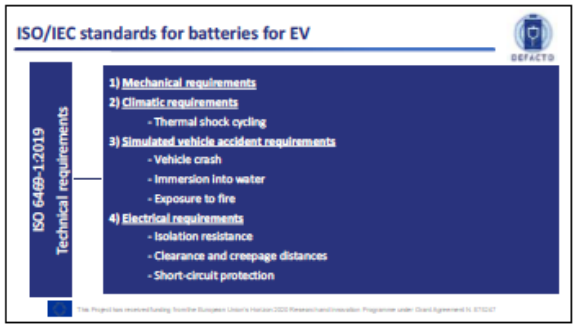

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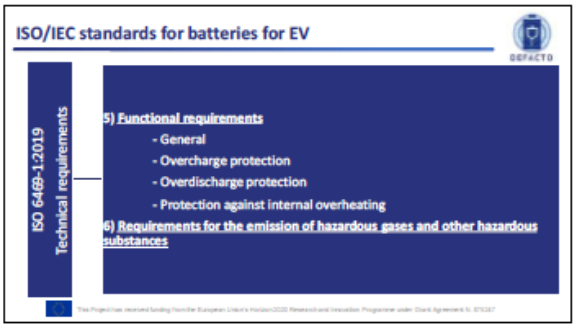

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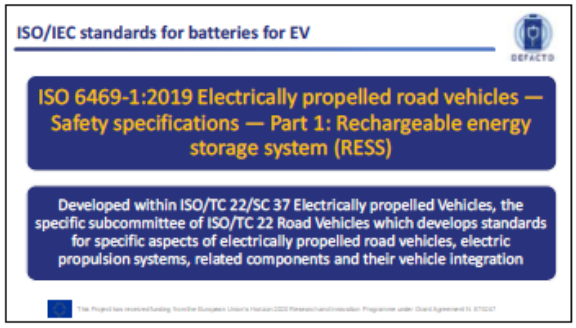

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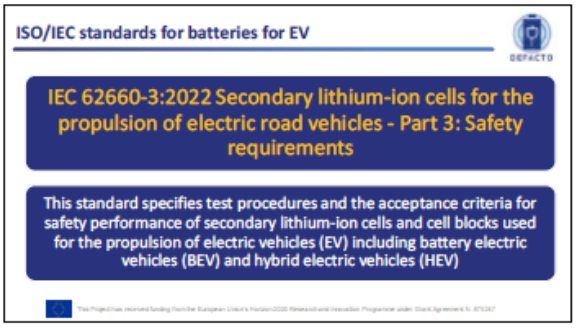

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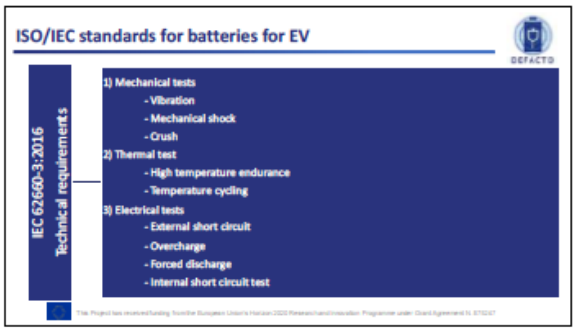

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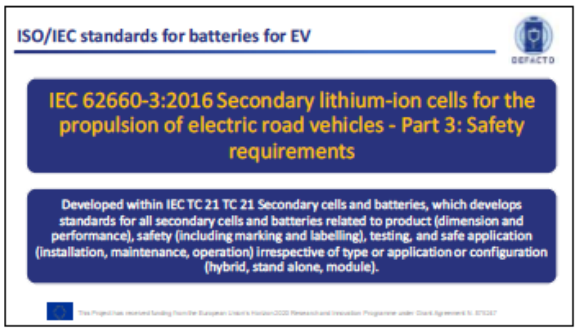

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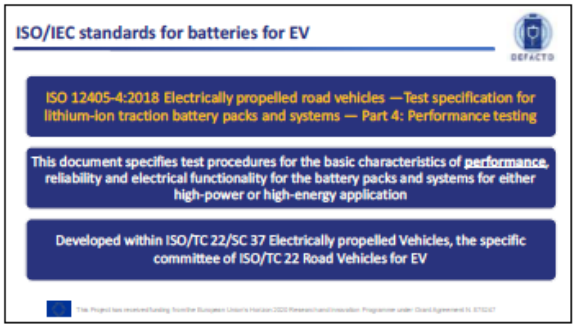

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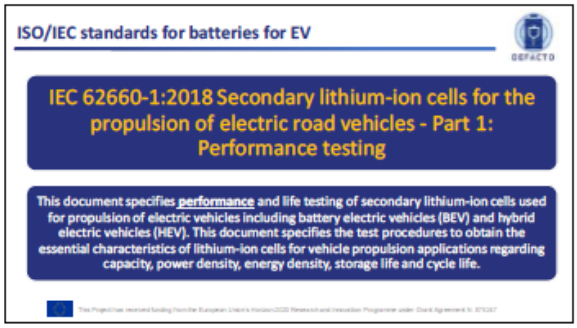

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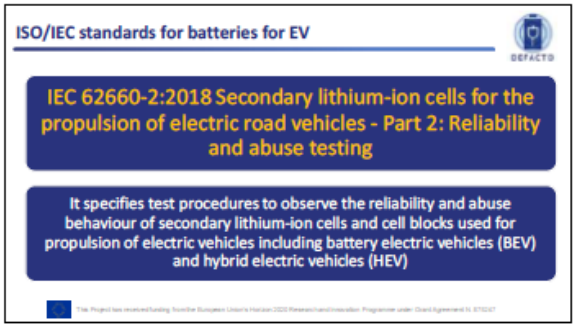

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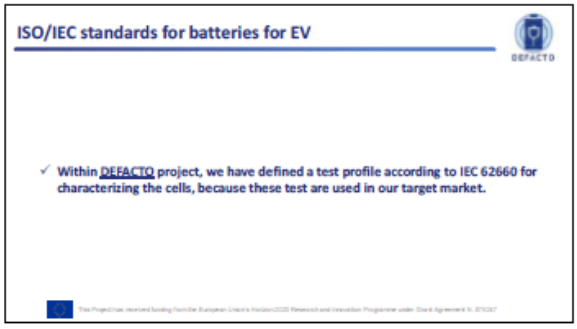

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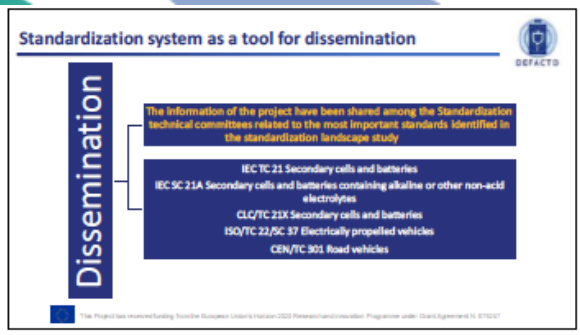

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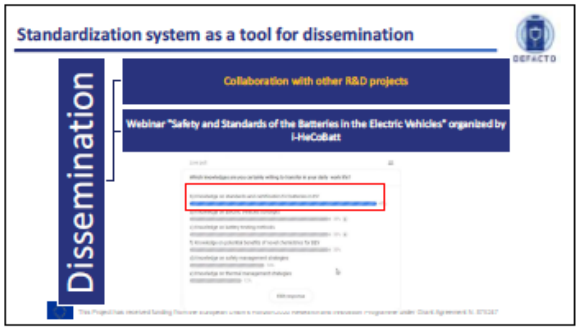

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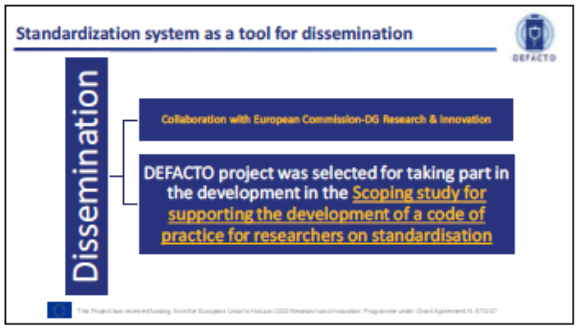

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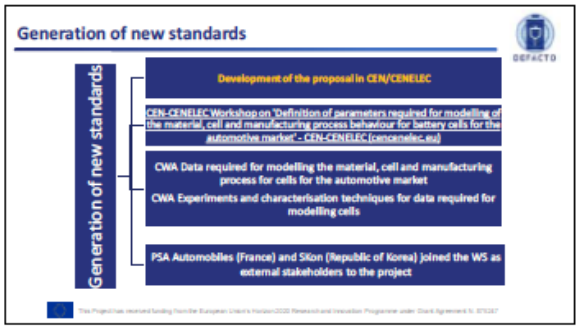

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Annex B Minutes of the CEN/CENELEC DEFACTO Workshop

B.1 Minutes of the kick-off meeting

2022-07-01

Minutes of the kick-off meeting of CEN/CENELEC/WS "Definition of parameters required for modelling of the material, cell and manufacturing process behaviour for battery cells for the automotive market"

2022-06-28 13:00h

Venue: Virtual meeting

Agenda

1. **Opening of the meeting**
   Elixabete Ayerbe – CIDETEC - Workshop proposer

Mrs. Elixabete Ayerbe presents the DEFACTO project, https://defacto-project.eu/, the European research project proposer of this WS.
Mr. Gérald Crepeau asks whether the deliverables of the project are public. Mrs. Ayerbe responds that some are public and others are confidential. Mr. Crepeau asks whether the reduction in development time is at the battery or cell level. Ms. Ayerbe responds the reduction in development time is at cell level. Mr. Crepeau asks whether additives in the electrolyte have an effect in the battery lifetime. Ms. Ayerbe responds the project if focused on the modelling of the electrolyte filling process of the cell rather than the impact of additives on lifetime.

2. **Roll call of participants**

A brief round of introductions is made. The attendees at this meeting are:

Marc-Antoine Carreira da Cruz, CEN/CENELEC, Belgium
Ohjun Kwon, SKon, Republic of Korea
Jana Kumberg, Leclanché GMBH, Germany
María Yáñez, CIDETEC, Spain
Benjamin Kellers, DLR, Germany
Elixabete Ayerbe, CIDETEC, Spain
Alexander Kube, DLR, Germany
Martin Lautenschlaeger, DLR, Germany
Gérald Crepeau, PSA Automobiles SA, France
Fernando Varas, UPM, Spain
Benoit Mathieu, CEA, France
Nickolas Vlachos, CERTH, Greece

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Minkwon Choi, SKon, Republic of Korea
Subin Lee, SKon, Republic of Korea
Jose Antonio Jimenez Caballero, UNE, Spain

3. Adoption of the agenda

The agenda is adopted without modifications.

4. Introduction on CENELEC and on the Workshop concept

Mr. Marc-Antoine Carreira presents the concept of a CEN/CENELEC Workshop and the differences with the usual standardization process. A CEN/CENELEC workshop is a rapid way of drafting prenormative documents avoiding the strict and time-consuming process that is followed in standards development, and very suitable for research projects. A CWA developed withing a CEN/CENELEC WS can be the basis for a future proposal for a new standard. CWAs have to follow the IPR policy of CEN/CENELEC, which means the final document has to be purchased through the national members of CEN/CENELEC, in general. Mr. Jiménez Caballero indicates that it is a policy of UNE to make freely downloadable the CWAs developed using public funding, so UNE will pay the fee for making these CWAs freely available for everyone.

5. General presentation of the Workshop
Benoit Mathieu – CEA

Mr. Benoit Mathieu presents the content of the deliverable D.2.1. Report on the definition of parameters required for modelling and description of the validation protocol.
Mr. Gérald Crepeau asks for the exact content of the CWAs. Mr. José Antonio Jiménez explains the CWAs will be based on this deliverable D.2.1. The project DEFACTO is a huge project with a lot of deliverables as explained by Mrs. Ayerbe in the first presentation, but the CWAs will be limited to the topics covered by deliverable D.2.1.
Mr. Crepeau asks if quick charge has been considered for ageing. Mrs. Ayerbe responds it has been considered. Mr. Crepeau asks if more content can be added to the CWAs. Mr. Jiménez Caballero responds that the deliverable D.2.1 is only the base document for the CWAs, but it can of course be modified if agreed by the experts' members of this WS.

6. Election and appointment of Workshop Chair
Confirmation of the Secretariat

Mrs. Elixabete Ayerbe is unanimously appointed as chairperson.
UNE is unanimously confirmed as secretariat.

7. Project Plan

a. Discussion and review of comments received

Mr. José Antonio Jiménez reports he has received no comments on the project plan which has been available on CEN/CENELEC website since May the 24th and presents it briefly.
Mr. Gérald Crepeau suggests that the regulation UN GTR No.22 (In-vehicle Battery Durability for Electrified Vehicles) (published 19/04/2022) can be added

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to the section where other regulations are mentioned. The suggestion is accepted and this new regulation will be added to the final version of the project plan.

b. Adoption of the Project Plan (by consensus)

The project plan is adopted with the abovementioned addition.

8. Any other business

Nothing.

9. Next meeting, future actions and their assignment

Mr. José Antonio Jiménez will prepare a clean version in Word format of the deliverable D.2.1 as soon as possible and it will be distributed among the experts of the WS for commenting.
The date of the next meeting will be fixed later.

10. Closure of the meeting

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B.2 Minutes of the first plenary meeting

2023-02-06

CEN/CENELEC/WS "Definition of parameters required for modelling of the material, cell and manufacturing process behaviour for battery cells for the automotive market"

Secretariat: Mr. José Antonio JIMÉNEZ CABALLERO
Asociación Española de Normalización – UNE
Tf: +34 618 56 63 46
Calle de Génova, 6 - 28004 Madrid

2023-01-27 11:00h-12:00h (CET)

Venue: Virtual meeting

Agenda

1. Opening of the meeting
Elixabete Ayerbe (Chairperson) opens the meeting and thanks the participants for their attendance.

2. Roll call of participants
A brief round of introductions is made. The attendees at this meeting are:

- Elixabete Ayerbe, Chairperson, CIDETEC
- Alexander Kube, DLR
- Luca Schneider, Leclanché
- María Yañez Díaz, CIDETEC
- Fernando Varas Mérida, Universidad Politécnica de Madrid
- Gérald Crepeau, PSA Automobiles
- Benjamin Kellers, DLR
- Martin Lautenschläger, DLR
- Nickolas Vlachos, CERTH
- Benoit Mathieu, CEA
- Jose Antonio Jimenez Caballero, UNE

3. Adoption of the agenda
The agenda is adopted without modifications.

4. Approval of the Kick off meeting minutes
The minutes of the kick off meeting were distributed on 2022-07-11, no proposal for corrections have been received by the secretariat.

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The minutes are approved.

5. Discussion on comments received

The secretariat has received comments on the first drafts of the CWA from PSA and DLR.
Gérald Crepeau (PSA) begins explaining his comments, related to the addition to the CWAs a section explaining the ageing of a cell (from Deliverable D6.3 of the INVADE PROJECT (European Union's Horizon 2020)) and also a new column in the Table 1 of CWA2 to explain for each experiment to determine data for modelling for what ageing mechanism could be useful. Elixabete Ayerbe responds it is possible, but that we need some time to study it with the rest of the project partners. The secretary replies that there is no hurry, the CWAs must be published by the end of the project but there is enough time. The aim is to have the study ready in about two months.
Next the comments from DLR are reviewed. They are all editorial comments and are accepted.

6. Any other business

Void.

7. Next meeting

The next meeting will be scheduled when the results of the study on the new column to be added are available.

8. Closure of the meeting

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