



EU-Commission

JRC Contribution to EVE IWG:

*In-vehicle battery durability e-HDVs capacity
fade draft test procedure*

58th meeting of the GRPE Informal Working Group
Electric Vehicles and the Environment (EVE)

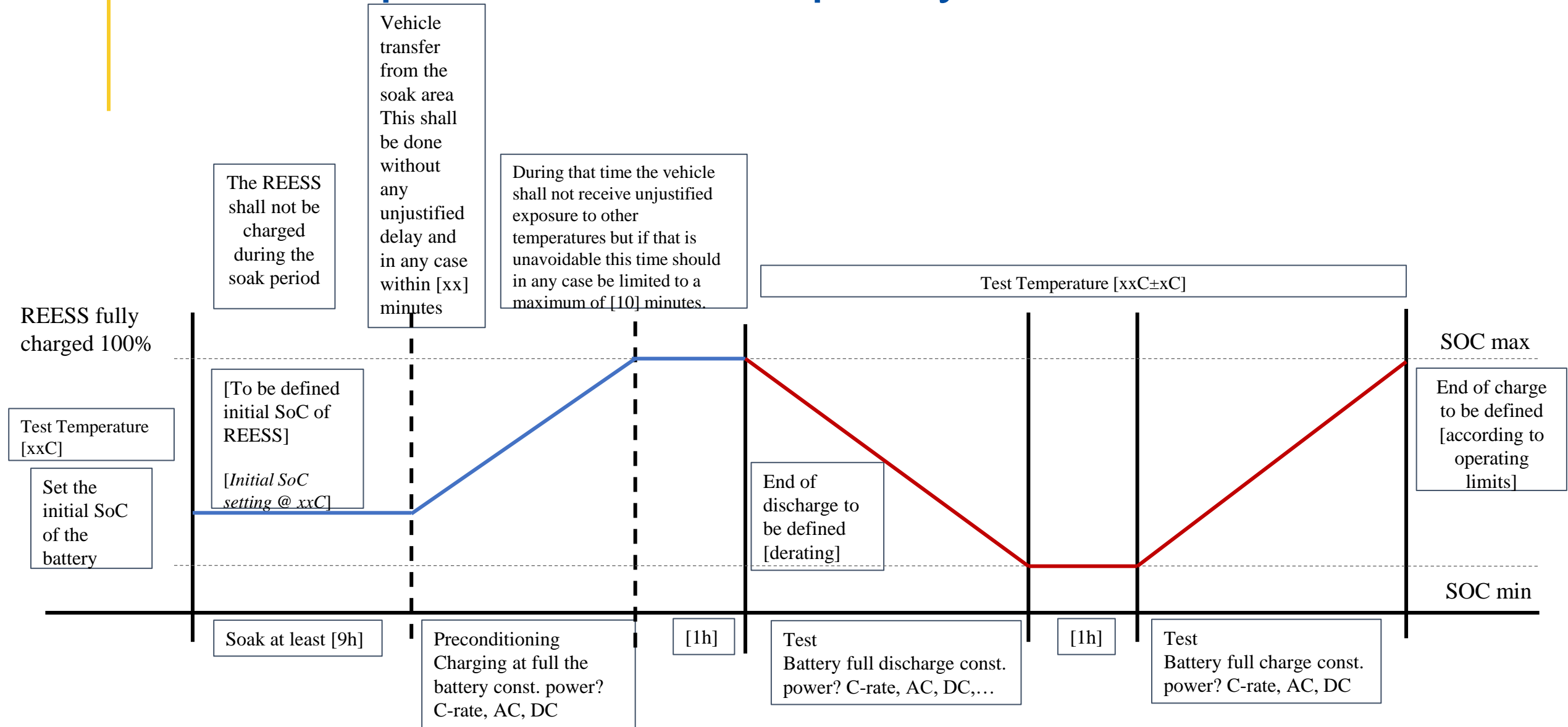
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Web-meeting, November 21st -22nd, 2022

Presentation Summary

- Draft test procedure for battery capacity fade in e-HDVs

Draft test procedure for capacity fade in e-HDVs





Methods for battery in field aging determination

Constraints

- Measurement shall produce accurate, reproducible results
- Impact of in service test on customer shall be kept as low as possible
- Special equipment could be used for testing, since only a limited number of tests have to be performed in field

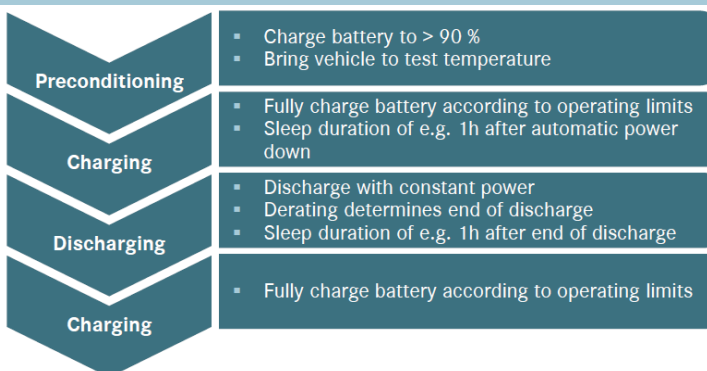
Solution strategy

	Battery testbench	Bidirectional charger	Road driving
No vehicle disassembly to reduce impact on customer		✓	✓
Minimize wear and risk of damaging	✓	✓	
Controlled environment to get reproducible results	✓	✓	

Suggestions:

A test pulse (full charge/discharge cycle) should be applied via charging port. This can be done with a bidirectional charging unit.

Proposed test cycle



Suggestions:

- Test temperature should be between 15 and 25 °C in order to reduce testing effort
- Charging should be done without any special measures to achieve good comparability with field operation
- Few vehicle tests inside of boundary conditions should represent fleet

Measured values

The following values could be derived from testing data:

- Total usable energy at constant power
- Full cycle efficiency
- Accuracy of remaining energy prediction
- Battery reference capacity (assumption: single cell voltages and OCV curves are available)
- Accuracy of SoH determined by BMS

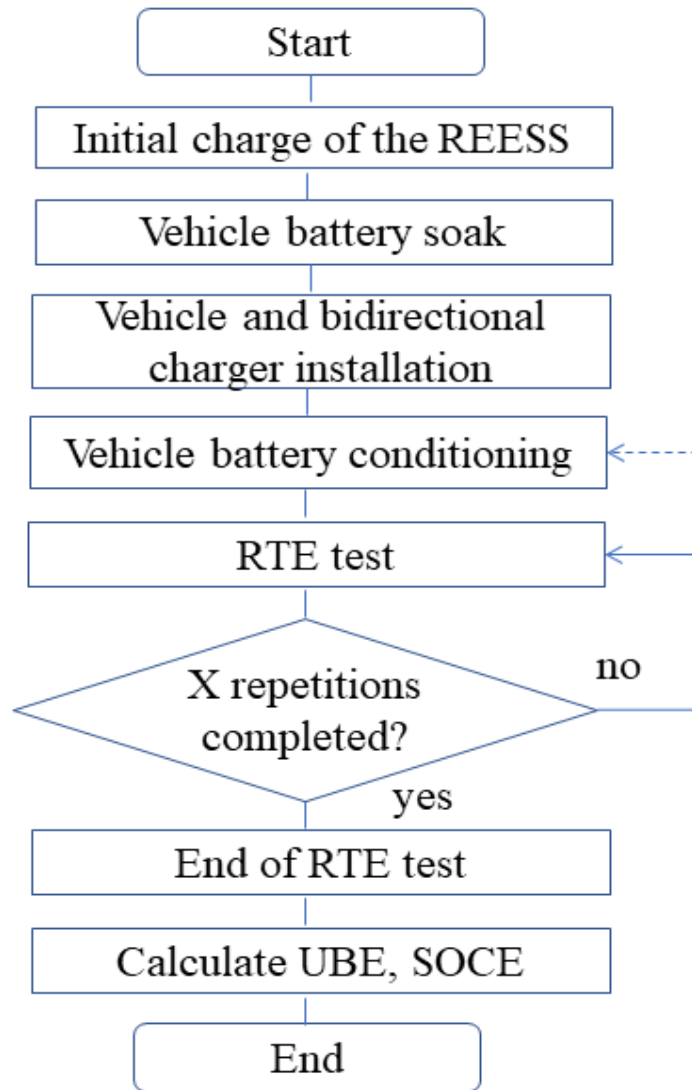
The more accurate BMS SoH is, the lower the number of vehicle tests needed to judge field behavior may be.

Boundary conditions that qualify vehicle for testing:

- Cell temperature** normally distributed with average temperature at $Y^{\circ}\text{C}$ and variance $<Z$
- Average SoC** normally distributed with average value $Y^{\%}$ and variance $<Z^{\%}$
- Depth of discharge (DoD)**: share of cycles with $\text{DoD} > Y^{\%}$ must be below $Z^{\%}$

$Y, Y^*, Y^{**}, Z, Z^*, Z^{**}$ = values of variables tbd.

Draft test procedure for capacity fade in e-HDVs



Thank you for the attention

Q&A

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