Japan Comments for Battery Durability GTR EVE42

8. January.2021

JAPAN comments for EVE-41-05x GTR after drafting meeting

Definition

"State of health" (SOH) means the measured or estimated state of a specific performance metric of a vehicle or REESS at a specific point in its lifetime, expressed as a percentage of the performance that was determined when certified or new.

"State of certified energy" (SOCE) means the SOH of a REESS installed in a vehicle, where the performance metric is usable battery energy (UBE) as defined according to the test procedure applicable at certification.

"State of certified range" (SOCR) means the SOH of a REESS installed in a vehicle, where the performance metric is the pure electric ~~driving~~ range for PEV or equivalent all-electric range for OVC-HEV as defined according to the test procedure applicable at certification.

"Usable battery energy" (UBE) is the ~~usable~~ REESS energy determined by the applicable ~~range~~ test procedure from the beginning of the procedure until the ~~applicable~~ break-off criterion during charge depleting test~~for determining electric range~~.

"range" refers to the applicable electric driving range that would be determined by the range test procedure used for certification of the vehicle, if the test was performed at the present point in the lifetime of the vehicle and the originally installed battery. For pure electric vehicles (PEVs), the

« capacity ».

Japan
In Japan, GTR#15 3 phase Type I test will be applicable as the test procedure. In the EU, GTR#15 4 phase Type I test is also assumed to be applicable. Japan would like to confirm if CPs can select the applicable test procedures in each region or country.

Safoutin, Mike
Updated name to match acronym

Japan
Definition should take into account OVC-HEVs

Safoutin, Mike
UBE is not generically defined in GTR No. 15, but in Annex 8 it is described as usable REESS energy determined from the beginning of the applicable procedure until a break-off criterion. For example see 4.4.2.1.1. and 4.4.2.2.1 of Annex 8

Japan
Definition should take into account OVC-HEVs

Monitor requirements

The manufacturer shall update the values of SOCR/SOCE with sufficient frequency as to maintain the necessary degree of accuracy during all normal vehicle operation. In case of abnormal use of the vehicle, the monitor may distinguish cases that would not allow the monitor to evaluate correctly and put a warning on the confidence on the values to be read.

<Comment> :
Does "the necessary degree of accuracy" here means that it depends on the algorithms, namely it depends on the OEM?
If not so, is the appropriate increments of SOCE/SOCR, e.g., 1%, needed comparing to the accuracy of the 5% above?

For the purposes of consumer information, the OEM shall make easily available to the owner of the vehicle the most recently determined value of the SOCE monitor.

<Comment> : **This modification was proposed by Japan in the EVE-39-04.**
<Proposal to modify the current draft text >
For the purposes of consumer information, the OEM shall make easily available to the owner of the vehicle the most recently determined value of the SOCC monitor via, but not limited to, the followings:
(i)dashboard indicator
(ii)infotainment system
(iii)remote access (Utilization of mobile-phone applications

Battery Performance Requirements : proposed MPR @ EVE 41 using the TEMA model

BEV:

[80] % after 100.000 km and 5 years
[70] %after 160.000 km and 8 years

PHEV:

[90] % after 100.000 km and 5 years
[80] % after 160.000 km and 8 years

＜Comments＞

(1) The followings were new elements added at EVE 41.
i) Geo-tab data was shown.
ii) Part B decision was changed to “Backstop concept” from” Fleet average.”
iii) The treatment of reserve was proposed;

(2) Japan requests to provide information regarding Geo-Tab data, in the concrete analysis of information related to battery degradation, such as the battery temperature information, SOC distribution, and battery input/output power distribution. These information is considered to be an important factor in determining MPR, including the Backstop concept.

(3) In order to evaluate the degradation of the battery, it should be compared under non-reserve conditions.
If the reserves are separated for PEVs and PHEVs, the concept of reserve should be clearly presented in terms of CO2 impact, user benefits, etc. Larger reserve values leading higher MPR have disadvantages such as increased battery weight and decreased lifetime EV range.
Therefore, Japan at this moment has a doubt “assumption which there is always reserve” can appropriately address the purpose of eliminating substandard batteries. It would be alternative ideas that reserve is not be used for setting MPR, or that, if higher MPR values are selected in anticipation of “there is basically reserve”, user benefits rather than merely checking battery degradation and the effect on total CO2 performance should be considered.

(4) Japan expects that IWG continues discussion on these.

Battery Performance Requirements

The CPs shall define Minimum Performance Requirements (MPRi) for both certified battery energy and certified range for batteries installed inside a vehicle. Vehicles falling under the categories of OVC-HEVs and PEVs shall meet the Minimum Performance Requirements in Tables 1 and 2 below. The MPRs may differ depending on the type of vehicle and propulsion.

<Comment> :
Japan understands that this table doesn't mean CPs need to define both 5- and 8-year MPR and that CPs may exempt the one of the useful life requirements.
In addition, Japan believes "5- and 8-years" here means each maximum period (harmonic consideration), e.g., MPR values for 8-years can be used at 7 years, according to inspection periods in each CP.

Table 1: Battery Energy based MPR

Passenger cars	OVC-HEV	PEV
5 years or 100.000 km, whichever comes first	[90%]	[80%]
8 years or 160.000 km, whichever comes first	[80%]	[70%]

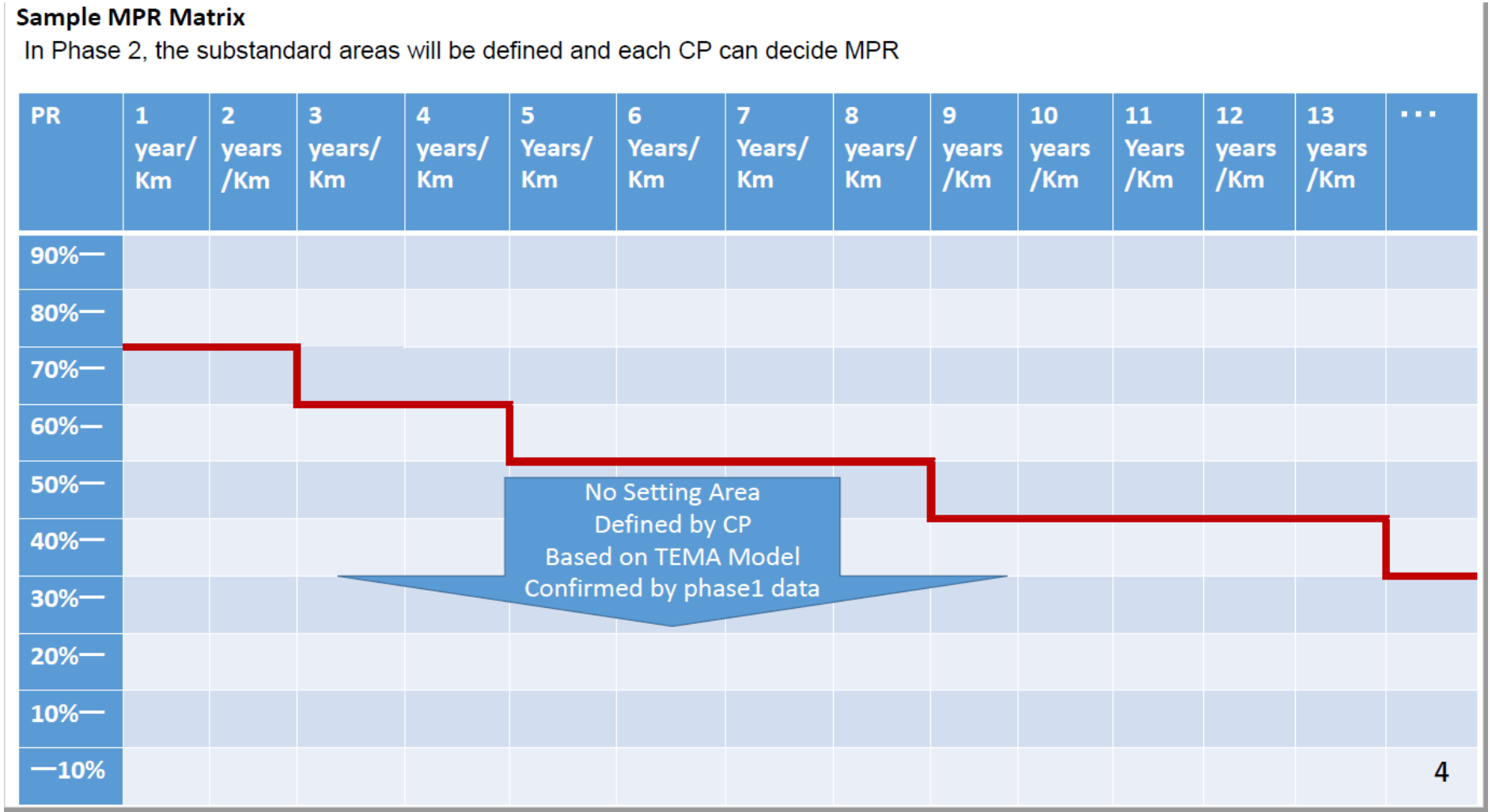
MPR Matrix Concept

This was proposed by Japan in the EVE40 (EVE 40 -03e) for phase 2.

add a "placeholder" Annex 2, titled "RESERVED: Annex X/MPR matrix", containing text.] such as [In Phase 2, the substandard areas will be defined and each CP can decide MPR]

Sample MPR Matrix

In Phase 2, the substandard areas will be defined and each CP can decide MPR



Family Definition

Two families are proposed,

Part A: Monitor Family

a) Algorithm for SOH calculation, including software version*
b) Sensor configuration (for sensors used in the SOH calculation)
c) Type of ~~battery (or cell?)~~
d) Battery management system (BMS)*
e) Type of vehicle (PEVs or OVC-HEVs)

*The monitor family may be extended in the case of a different algorithm or BMS if there is sufficient evidence that the performance of the monitor will not be affected.

Part B: Battery Durability Family

<Comment>
Thank you for your understanding and adopting Japan's proposal.
Cell should be used because different capacities can be defined as the same family.
The definition in WLTP is proposed to be unified by "type of cell".

Part A criteria

１）Tolerance for Phase 1 to be set at 5%
２）Tolerance only in one direction
３） Verification statistic
Another possibility is the table from current Reg. 83,
which is based on International Standard ISO 8422:1991:

<Comment>

1) Since one-direction and a tolerance of 5% are generally equal to the Japanese proposal, Japan will accept them.

2) Please clarify the intent of the proposal for “Another possibility of the table from current Reg. 83. “

3) Basically, there should be no problem with vehicle selection, but Japan wants to check if such vehicle selection works through conducting some case studies according to the legislative text.

Part B Criteria：

Max. [5%] of all measured vehicles are allowed to be below the MPR level
(backstop criterion in Phase 1 only)
If below [5%], then it is a Part B pass.
Minimum number of vehicles: 500;
if less than 500, extreme vehicles should be excluded by vehicle survey.

＜Comments＞

As a matter of concern, the distribution on the lower side of the SOCE includes a large number of severely used vehicles.
Need to discuss NUI, which was concluded that Fleet Average judgement does not need NUI.

Japan would like to ask or confirm the following points.

1. **Did you add this condition for the case where less than 500 units of the vehicle of the same battery durability family will be sold?**
2. **Is it correct that the vehicle survey will not be conducted for more than 500 units?**
3. **How to deal with survey in case of OTA data collection?**

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Corrective measures for the monitor:

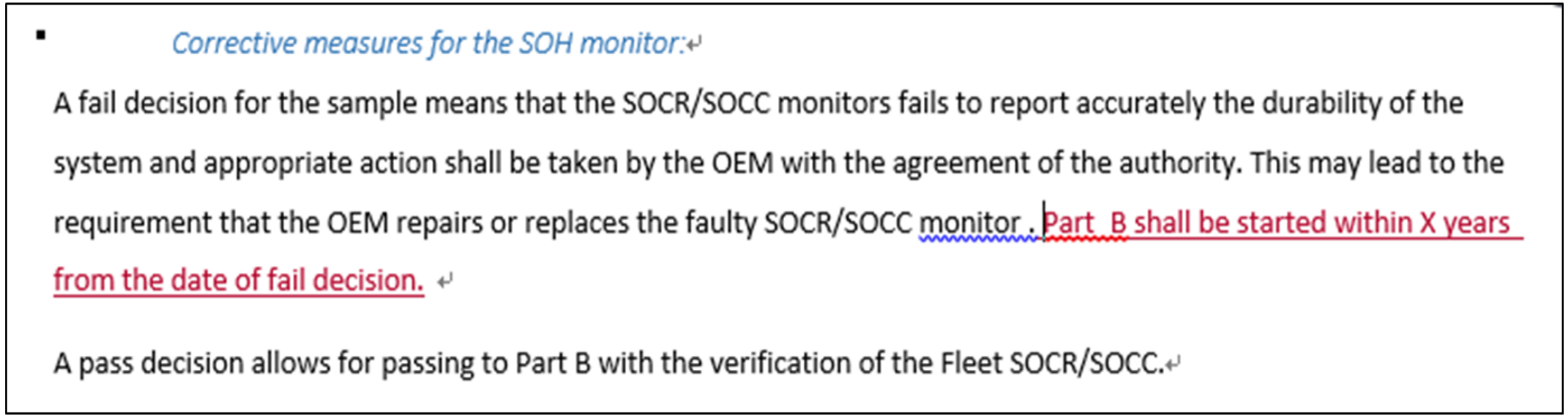
A fail decision for the sample means that the monitors fail to report accurately the durability of the system and appropriate action shall be taken by the OEM with the agreement of the authority. This may lead to the requirement that the OEM brings all vehicles in the same monitor family in conformity by repairing or replacing the faulty monitor including the relevant sensors or applying software measures.

Part B shall be started within [x] years from the date of fail decision.

<Comment> :

When failure continues in Part A, it is not necessary to shift to Part B. No description of penalties.

Japan made a presentation at EVE 40 (EVE 40 -03e)



- *Corrective measures for the SOH monitor:*

A fail decision for the sample means that the SOCR/SOCC monitors fails to report accurately the durability of the system and appropriate action shall be taken by the OEM with the agreement of the authority. This may lead to the requirement that the OEM repairs or replaces the faulty SOCR/SOCC monitor . Part B shall be started within X years from the date of fail decision.

A pass decision allows for passing to Part B with the verification of the Fleet SOCR/SOCC.