**Online discussion input for Annex 3 (no position)**

**🡪 With UBE declaration**

**3. Definitions**

The following definitions shall apply in this Global Technical Regulation.

(…)

3.x. *"Usable Battery energy (UBE)"* means the energy supplied by the battery from the beginning of the test procedure used for certification until the applicable break-off criterion of the test procedure used for certification is reached.

3.x. *"Certified usable battery energy (UBEcertified)"* refers to the UBE that was determined during the certification of the vehicle.

3.x. *"Measured usable battery energy (UBEmeasured)"* means the UBE determined at the present point in the lifetime of the vehicle by the test procedure used for certification.

3.x. *"Electric Range"* refers to the 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.

3.x. *"Certified range (Rangecertified)"* refers to the electric driving range that was determined during certification of the vehicle.

3.x. *"Measured range (Rangemeasured)"* means the electric range determined at the present point in the lifetime of the vehicle by the test procedure used for certification.

(…)

**6.3.2. Verification procedure**

(…)

The **measured SOCR and measured SOCE** values shall be determined by dividing the measured values for range and usable battery energy by the certified values for range and usable battery energy, respectively, determined as described in Annex 3 to this GTR. The values shall be rounded to the [nearest whole number/first decimal place] according to paragraph 7 of this GTR, expressed in %.

In cases where UBEmeasured is higher than the UBEcertified, the SOCEmeasured shall be set to 100%. In cases where Rangemeasured is higher than the Rangecertified, the SOCRmeasured shall be set to 100%.

**Annex 3**

**Performance parameters for Part A verification procedure**

1. General

For the calculation of SOCEmeasured and SOCRmeasured according to paragraph 6.3.2. of this GTR, the measured and certified values of usable battery energy (UBE) and electric range are required:

* UBEmeasured and UBEcertified
* Rangemeasured and Rangecertified

This Annex describes the determination of these parameters in paragraph 2 (for PEVs) and paragraph 3 (for OVC-HEVs) and gives guidance which measurements need to be performed for a vehicle selected in Part A and which certified values need to be applied.

2. Performance parameters for PEVs

2.1. UBE for PEVs

2.1.1. Measured UBE values for PEVs

|  |  |
| --- | --- |
| Parameters | Explanation |
| UBEmeasured | UBE determined by the test procedure used for certification. |

2.1.2. Certified UBE values for PEVs

|  |  |
| --- | --- |
| Parameters | Explanation |
| UBEcertfied | Certified UBE is a manufacturer declaration for UBE at certification.  In case of an interpolation family concept and in case of test group concept, there should be only one declaration for the interpolation family and the test group concept. |

2.2. Range for PEVs

2.2.1. Measured Range values for PEVs

|  |  |
| --- | --- |
| Parameters | Explanation |
| Rangemeasured | Electric range determined by the test procedure used for certification. |

2.2.2. Certified Range values

|  |  |
| --- | --- |
| Parameters | Explanation |
| Rangecertified | Certified range is a manufacturer declaration for range at certification. |

3. Performance parameters for OVC-HEVs

There are two ways how to determine the performance parameters for OVC-HEVs depending on the available test procedures.

* Case 1: Charge-depleting (Type 1) test or full-charge-test and a charge-sustaining (Type 1) test (as defined e.g. in GTR 15)
* Case 2: Range (Type 1) test and a condition B (Type 1) test  
  (as defined e.g. in UN-R-101)

3.1. OVC-HEV performance parameters for Case 1

3.1.1. UBE for OVC-HEVs (Case 1)

3.1.1.1. Measured UBE values for OVC-HEVs (Case 1)

|  |  |
| --- | --- |
| Parameters | Explanation |
| UBEmeasured | UBE determined by the test procedure used for certification.  The value is calculated as follows:  where:  is the measured electric energy change of all batteries, Wh;  is the measured electric energy change of battery i, Wh;  i is the index number of the considered battery;  n is the total number of batteries;  and:  where:  is the voltage of battery i, V;  is the electric current of battery i, A;  t0 is the time at the beginning of the charge-depleting test or full-charge test, s;  tend is the time at the end of the confirmation cycle of the charge-depleting test or the charge-balanced cycle of the full-charge-test, s. |

3.1.1.2. Certified UBE values for OVC-HEVs (Case 1)

|  |  |
| --- | --- |
| Parameters | Explanation |
| UBEcertified | Certified UBE is a manufacturer declaration for UBE at certification.  In case of an interpolation family concept and in case of test group concept, there should be only one declaration for the interpolation family and the test group concept. |

3.1.2. Range for OVC-HEVs (Case 1)

3.1.2.1. Measured Range values for OVC-HEVs (Case 1)

|  |  |
| --- | --- |
| Parameters | Explanation |
| Rangemeasured | Electric range determined by the test procedure used for certification.  The value is calculated as follows:  *where:*   |  |  | | --- | --- | | *EAERmeasured* | is the measured equivalent all-electric range, km: | | *MCO2,CS* | is the measured CO2 mass emission of the charge-sustaining (Type 1) test, g/km; | | *MCO2,CD/FCT,avg* | is the measured arithmetic average CO2 mass emission of the charge-depleting (Type 1) test or full-charge-test, g/km; | | *RCDC* | is the measured length of the charge-depleting test or full-charge test, km; | |

3.1.2.2. Certified Range values for OVC-HEVs (Case 1)

|  |  |
| --- | --- |
| Parameters | Explanation |
| Rangecertified | Certified range is a manufacturer declaration for range at certification. |

3.2. OVC-HEV performance parameters for Case 2

3.2.1. UBE for OVC-HEVs (Case 2)

3.2.1.1. Measured UBE values for OVC-HEVs (Case 2)

|  |  |
| --- | --- |
| Parameters | Explanation |
| UBEmeasured | UBE determined by the test procedure used for certification.  The value is calculated as follows:  where:  is the measured electric energy change of all batteries, Wh;  is the measured electric energy change of battery i, Wh;  i is the index number of the considered battery;  n is the total number of batteries;  and:  where:  is the voltage of battery i, V;  is the electric current of battery i, A;  t0 is the time at the beginning of the range test for De or DOVC, s;  tend is the time when the break-off-criterion is reached of the range test for De or DOVC, s. |

3.2.1.2. Certified UBE values for OVC-HEVs (Case 2)

|  |  |
| --- | --- |
| Parameters | Explanation |
| UBEcertified | Certified UBE is a manufacturer declaration for UBE at certification.  In case of an interpolation family concept and in case of test group concept, there should be only one declaration for the interpolation family and the test group concept. |

3.2.2. Range for OVC-HEVs (Case 2)

3.2.2.1. Measured Range values for OVC-HEVs (Case 2)

|  |  |
| --- | --- |
| Parameters | Explanation |
| Rangemeasured | Electric range determined by the test procedure used for certification.  It is up to the manufacturer to determine either De or DOVC. |

3.2.2.2. Certified Range values for OVC-HEVs (Case 2)

|  |  |
| --- | --- |
| Parameters | Explanation |
| Rangecertified | Certified range is a manufacturer declaration for range at certification.  The declaration shall be done for either De or DOVC. |

Required amendments in case of Option 2 for e.g. GTR-15:

* Adding a declaration of UBE for OVC-HEVs and PEVs  
  🡪 Which tables and calculation schemes are affected?
* Adding a declaration of EAER for OVC-HEVs
* Adding a calculation scheme for UBE for OVC-HEVs

🡺 These amendments are not direct part of the Durability GTR but indirectly required

🡺 These inputs are required also from other regulations