
WLTP UNR Development (based on WLTP-28-09e)

Proposals in discussion within WLTP Sub Group EV



Note: Evidence to be provided to SG EV until 16.10.19

Further scrutiny required until/decision on October 16th



Proposals for amendment

Update/amendment to include extrapolation for OVC-HEVs

Intention of the proposal:

- Extrapolation is defined for OVC-HEVs but to avoid mistakes in the extrapolation two additional aspects need to be considered, to ensure that the extrapolation is right and correct
 - By extrapolation below VL, the amount of CD-cycles need to be identical between VL and the extrapolated vehicle below VL; if VL was not able to drive CD in pure electric operation, also no pure electric operation for the extrapolated vehicle below VL allowed
 - By extrapolation above VH, the amount of CD-cycles need to be identical between VH and the extrapolated vehicle above VH; if VH was able to drive CD in pure electric operation until SoC_{min} , also pure electric operation for the extrapolated vehicle above VH required

Feedback during meeting on October 9th 2019:

- Further evidence on necessity needed → to be provided for web-audio on October 16th
- JPN and EC stated that not necessary to include it now, can be done later

Latest version: [190930 WLTP-GTR-Proposals EV extrapolation OVC-HEVs.pdf](#)

Draft text included in document: [191013 Extrapolation OVC-HEV interpolation extrapolation PEV.docx](#)

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

Supported and shall go into UNR WLTP first edition

Further discussion in web-audio before October 21st, discussion of further proceeding

Not supported



Proposals for amendment

Update/amendment to include extrapolation for PEVs

Intention of the proposal:

- No extrapolation defined for PEVs
- Proposals adds this option and defines a value up to which an extrapolation shall be allowed

Feedback during meeting on October 9th :

- JPN and EC support the proposed concept but is not able to support the “3Wh/km” because of lack of evidence
- JPN in addition asks for also adding an absolute interpolation range for PEVs (similar to the CO₂ range for HEVs)

Agreed further proceeding:

- For October 16th: providing additional text regarding absolute interpolation range
- Support on the concept; text to be inserted in working document of UNR WLTP [square brackets]

Old version: [190930 WLTP-GTR-Proposals EV extrapolation PEVs.pdf](#)

Updated version and draft text included in document: : [191013 Extrapolation OVC-HEV interpolation extrapolation PEV.docx](#)

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

- Supported and shall go into UNR WLTP first edition
- Further discussion in web-audio before October 21st, discussion of further proceeding
- Not supported



Proposals for amendment

Update/amendment of OVC-HEV and PEV family (on charge electric energy converter)

Intention of the proposal:

- The interpolation family criteria are including the electric energy converter between recharge-plug-in and REESS
- A vehicle, which is identical in all interpolation family criteria except of the onboard-charger, would need to be split into two separate families which means to separate measurements
- These two separate measurements are caused by a component which has only influence on the recharged energy E_{AC} (DC energy consumption, fuel consumption, CO_2 are identical), so you are doing the same measurement procedure twice just to measure the recharged energy with a different device
- Proposal describes that the measurements with the less efficient charger can cover the measurements with the more efficient charger(s) as less efficient charger is the “worst case” in case of the recharged energy E_{AC}

Feedback during meeting on October 9th:

- Proposal can be supported by EC and technical services in EU; JPN needs to further scrutinize
- Wording of proposal need to be reworked: be more clear and easier to understand

Old version: [190930 WLTP-GTR-Proposals EV family criteria vehicle charger.pdf](#)

Updated version: not available yet...when available, link to document will be posted here

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

- | | |
|-------------------------------------|--|
| <input type="checkbox"/> | Supported and shall go into UNR WLTP first edition |
| <input checked="" type="checkbox"/> | Further discussion in web-audio before October 21 st , discussion of further proceeding |
| <input type="checkbox"/> | Not supported |



Proposals for amendment

Update/amendment of the wording of nominal voltage

Intention of proposal:

- Nominal voltage is a fixed voltage value which is not taking care of the voltage decrease of a REESS
- For PEV test procedures, nominal voltage is not allowed at all; but still for the CD-test of an OVC-HEV
- Proposal limits the application of nominal voltage to the CS-conditions of an OVC-HEV and to the low voltage REESSs of PEVs and OVC-HEVs under CD conditions
- For low voltage REESS, nominal voltage application should be allowed in any case as these REESS are small and the voltage decrease over SoC is small

Feedback during meeting on October 9th :

- EC supports the proposal
- JPN need to further scrutinize and come back with feedback in web-audio on October 16th; if required: bilateral exchange between ACEA EV (which prepared proposal) and JPN either via web-audio or e-mail

Latest version: [190903 ACEA TF EV proposal nominal voltage with comment and changes.docx](#)

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

- | | |
|-------------------------------------|--|
| <input type="checkbox"/> | Supported and shall go into UNR WLTP first edition |
| <input checked="" type="checkbox"/> | Further discussion in web-audio before October 21 st , discussion of further proceeding |
| <input type="checkbox"/> | Not supported |



Proposals for amendment

Update/amendment of calculation formula of $M_{CO_2,weighted}$, $FC_{weighted}$, $EC_{AC,weighted}$, EAER

Intention of the proposal:

- Weighted CO₂ mass emission is currently based on declared CS CO₂ and measured CD CO₂ mass emission
- In case of a “golden” measurement of the CD-test during type approval, the manufacturer runs into the risk that a vehicle measured by a third party is not matching the “golden” measurement
- Solution is to use in case of the weighted CO₂ mass emission also the declared value of the CD CO₂ mass emission
- Following equations need to be adjusted in addition: $FC_{weighted}$, $EC_{AC,weighted}$, EAER

Feedback during meeting on October 9th:

- JPN supports the proposal but will have a final check until October 16th
- EC support the proposal but will have a final check until October 16th
- It need to be taken care within the transitional provisions that this change is only affecting future type approvals

Latest version: [190903 M Co2 weighted Annex 6 7 8 for declared value implementation.docx](#)

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

Supported and shall go into UNR WLTP first edition

Further discussion in web-audio before October 21st, discussion of further proceeding

Not supported



Proposals for amendment

Update/amendment of adjustment of phase specific range values of PEVs

Intention of the proposal:

- In case of PEVs, there is currently no alignment of the phase specific PER range values based on the ratio between declared total cycle value and measured total cycle value
- Currently, it is not allowed to align the phase values (see paragraph 1.2.4.3. of Annex 6)
- Proposal is adding this with the intention that the phase specific values fit to the total cycle values (see table A8/10 and A8/11)

Feedback during meeting on October 9th :

- EC/JPN: Proposal sounds reasonable, but needs to be checked why paragraph 1.2.4.3. of Annex 6 has been inserted into Amd#1 of GTR#15
- Further scrutiny until October 16th, discussion and decision on further proceeding on October 16th

Latest version: [190903 M Co2 weighted Annex 6 7 8 for declared value implementation.docx](#)

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

- | | |
|-------------------------------------|--|
| <input type="checkbox"/> | Supported and shall go into UNR WLTP first edition |
| <input checked="" type="checkbox"/> | Further discussion in web-audio before October 21 st , discussion of further proceeding |
| <input type="checkbox"/> | Not supported |



Proposals for amendment

Update/amendment of Annex 8, Appendix 4, Paragraph 2.2.3. (Charging)

Intention of the proposal:

- The end-of charge-criterion has currently no reference to the soaking time
- Proposal is adding this reference

Feedback during meeting on October 9th :

- EC and technical services in EU stated that the proposal needs to be reworked
- The end of charge criterion does not need to be linked to the soaking time as charging is not only done during soaking but also after the test and end of charge could be reached before the minimum required soaking time
- ACEA TF EV will prepare an updated proposal for October 16th
- Drafting Coordinator: remove “either” in paragraph 2.2.3.1. (editorial) – agreed by the group that this word not belongs there

Old version: topic described in [190926 Drafting Input for SG EV 1443](#) (but also see next slide)

Updated version: not available yet...when available, link to document will be posted here

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

Supported and shall go into UNR WLTP first edition

Further discussion in web-audio before October 21st, discussion of further proceeding

Not supported



Proposals for amendment

Update/amendment of Annex 8, Appendix 4, Paragraph 2.2.3. (Charging)

Annex 8, Appendix 4 (Charging)	Proposal:
<p>Current text:</p> <p>2.2.3. Application of a normal charge</p> <p>Normal charging is the transfer of electricity to an electrified vehicle with a power of less than or equal to 22 kW.</p> <p>Where there are several possible methods to perform a normal AC charge (e.g. cable, induction, etc.), the charging procedure via cable shall be used.</p> <p>Where there are several AC charging power levels available, the highest normal charging power shall be used. An AC charging power lower than the highest normal AC charging power may be selected if recommended by the manufacturer.</p> <p>2.2.3.1. The REESS shall be charged at an ambient temperature as specified in paragraph 2.2.2.2. of Annex 6 either with the on-board charger if fitted.</p> <p>In the following cases, a charger recommended by the manufacturer and using the charging pattern prescribed for normal charging shall be used if:</p> <ul style="list-style-type: none">(a) No on-board charger is fitted, or(b) The charging time exceeds the soaking time defined in paragraph 2.7. of Annex 6. <p>The procedures in this paragraph exclude all types of special charges that could be automatically or manually initiated, e.g. equalization charges or servicing charges. The manufacturer shall declare that, during the test, a special charge procedure has not occurred.</p> <p>2.2.3.2. End-of-charge criterion</p> <p>The end-of-charge criterion is reached when the on-board or external instruments indicate that the REESS is fully charged.</p>	<p>2.2.3. Application of a normal charge</p> <p>Normal charging is the transfer of electricity to an electrified vehicle with a power of less than or equal to 22 kW.</p> <p>Where there are several possible methods to perform a normal AC charge (e.g. cable, induction, etc.), the charging procedure via cable shall be used.</p> <p>Where there are several AC charging power levels available, the highest normal charging power shall be used. An AC charging power lower than the highest normal AC charging power may be selected if recommended by the manufacturer <u>and by approval of the responsible authority.</u></p> <p>2.2.3.1. The REESS shall be charged at an ambient temperature as specified in paragraph 2.2.2.2. of Annex 6 either with the on-board charger if fitted.</p> <p>In the following cases, a charger recommended by the manufacturer and using the charging pattern prescribed for normal charging shall be used if:</p> <ul style="list-style-type: none">(a) No on-board charger is fitted, or(b) The charging time exceeds the soaking time defined in paragraph 2.7. of Annex 6. <p>The procedures in this paragraph exclude all types of special charges that could be automatically or manually initiated, e.g. equalization charges or servicing charges. The manufacturer shall declare that, during the test, a special charge procedure has not occurred.</p> <p>2.2.3.2. End-of-charge criterion</p> <p>The end of charge criterion is reached when the on board or external instruments indicate that the REESS is fully charged.</p> <p>The end of charge criteria corresponds to a charging time of <u>6 hours</u> <u>except if a clear indication is given to the driver by the on-board or external instruments that the battery is not yet fully charged.</u></p> <p>The charging time shall not exceed the soaking time defined in paragraph 2.7. of Annex 6.</p>



Proposals for amendment

Adding a procedure for OVC-FCHVs

Intention of the proposal:

- No procedure in GTR which describes how to test an OVC-FCHV
- Proposal is adding the text portions which are describing this procedure
- OVC-FCHV procedure is based on the procedure for OVC-HEVs, replacing CO₂ by H₂

Feedback during meeting on October 9th :

- JPN supports concept; further internal scrutiny on H₂ flowmeter measurement before October 16th
- EC supports the proposal but also needs further internal discussion before October 16th
- Manufacturer stated that the proposed concept is not touching the reference method and candidate method approach which is already in force in GTR#15. This will not be addressed in this proposal
- Final decision on further proceeding in web-audio on October 16th

Latest version: [190611 Proposal OVC FCHVs first draft.docx](#); [190611 Test procedure for OVC-FCHV's explanation slides.pdf](#)

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

- Supported and shall go into UNR WLTP first edition
- Further discussion in web-audio before October 21st, discussion of further proceeding
- Not supported



Proposals for amendment

Adding a definition for NOVC-FCHVs and OVC-FCHVs*

Intention of proposal:

- No definition in GTR for NOVC-FCHVs and OVC-FCHVs*
- Proposal is adding these definitions which are at least required for NOVC-FCHVs which are already in the GTR

Feedback during meeting on October 9th:

- JPN supports the proposal to add the definition(s)
- EC supports the proposal to add the definition(s)

Latest version: [190611 Proposal OVC FCHVs first draft.docx](#); [190611 Test procedure for OVC-FCHV's explanation slides.pdf](#)

* Definition for OVC-FCHVs only required if procedure for these vehicles is going into the UN R WLTP

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

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| <input checked="" type="checkbox"/> | Supported and shall go into UNR WLTP first edition |
| <input type="checkbox"/> | Further discussion in web-audio before October 21 st , discussion of further proceeding |
| <input type="checkbox"/> | Not supported |



Proposals for amendment

Exempt humidity measurement for PEVs, NOVC-FCHVs and OVC-FCHVs*

Intention of proposal:

- Humidity measurement and tracking important in the context of pollution emission measurement
- In case of PEVs, NOVC-FCHVs and OVC-FCHVs*, no pollutant emission need to be measured as there are no pollutant emissions, so proposal is to exempt humidity measurement for those vehicles

Feedback during meeting on October 9th:

- JPN supports the proposal
- EC supports the proposal

Draft text proposal for UNR: <to be provided>

* OVC-FCHVs only required if procedure for these vehicles is going into the UN R WLTP

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

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| <input checked="" type="checkbox"/> | Supported and shall go into UNR WLTP first edition |
| <input type="checkbox"/> | Further discussion in web-audio before October 21 st , discussion of further proceeding |
| <input type="checkbox"/> | Not supported |



Proposals for amendment

Alternative option for COP testing of PEVs

Intention of proposal:

- JAMA is proposing an alternative method (option) to the existing COP procedure (first cycle of the PEV test procedure for DC energy consumption confirmation) as in current procedure, vehicle is coming out of the test with a high SoC because procedure is starting with a fully charged battery and only one cycle is being driven
- If vehicle is shipped by plane, there is a requirement to have a maximum SoC of 30% which means that for those vehicles, the manufacturer needs to discharge the REESS down to this level
- Alternative procedure is following the same methodology like the existing procedure but starting with lower SoC and therefore avoiding this discharge of the REESS after the first cycle

Feedback during meeting on October 9th:

- General concern on timeline; for the web-audio on October 16th, further evidence and draft text to be provided
- Final decision on proceeding in web-audio on October 16th

Presentation describing proposal: [PEV Test Procedure for COP_JAMA.pdf](#)

Draft text proposal for UNR: <to be provided>

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

- Supported and shall go into UNR WLTP first edition
- Further discussion in web-audio before October 21st, discussion of further proceeding
- Not supported



Proposals for amendment

COP-procedure for OVC-HEVs: REESS preconditioning in case of complete CD-test

Intention of proposal:

- A REESS mounted into a new car first needs to learn where its SoC boundaries are; this needs at least a discharge and charge event but best is to ask the manufacturer recommendation (see run-in for PEVs according to Annex 8)
- Without this “preconditioning”, the full battery capacity would not be available for the COP-test ($EC_{AC,CD}$ in COP would be greater than $EC_{AC,CD}$ in Type Approval and vehicle would fail, but would pass with preconditioning)
- Proposal adds the requirement of a run in case of the complete CD-test during COP;
- Alternatively, a REESS preconditioning factor may be determined and provided by the manufacturer for this vehicle family/category

Feedback during meeting on October 9th :

- Further discussion on this topic in web-audio on October 16th
- Final decision on proceeding on October 16th

Presentation describing proposal: [191010 COP OVC-HEV CD-test REESS preconditioning requirement.pptx](#)

Covered in Draft text proposal for UNR: [191010 - Draft UNR WLTP CoP requirements-v1_JPN Nick MaN.docx](#)

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

Supported and shall go into UNR WLTP first edition

Further discussion in web-audio before October 21st, discussion of further proceeding

Not supported



Proposals for amendment

COP-procedure for OVC-HEVs: REESS preconditioning in case of complete CD-test

5.3.1.1. Charge-Depleting Type 1 test procedure

The vehicle shall be tested according to the charge-depleting Type 1 test procedure as described in paragraph 3.2.4. of Annex B8. During this test, the electric energy consumption $EC_{AC,CD}$ shall be determined according to step 9 of Table A8/8 of Annex B8. Preconditioning of the traction REESS is required and shall be done according to manufacturer's recommendation. In agreement and with approval of the responsible authority, preconditioning of the REESS may be omitted and a REESS preconditioning factor may be used determined and provided by the manufacturer.



Proposals for amendment

COP-procedure for OVC-HEVs: REESS preconditioning in case of complete CD-test

Current agreement within WLTP Sub Group EV on electric consumption verification of OVC-HEV

Additions in red

Homologation	COP Test		
ICE operation in first cycle @CD condition	Test Cycle	Values to be evaluated (individual veh. values)	
No	CD-Test	EC_AC_CD	Preconditioning of REESS required: According to OEM recommendation or application of determined PreCo-factor*
	First Cycle only	EC_DC_first	
Yes	CD-Test	EC_AC_CD	Preconditioning of REESS required: According to OEM recommendation or application of determined PreCo-factor*

*PreCo-Factor = Reflecting the effect of a REESS which is not preconditioned and therefore has not its full capacity



Proposals for amendment

Option to omit performing tests for the CO₂ correction factor determination (Annex 8 App. 2)

Intention of the proposal:

- If manufacturer can foresee that a vehicle is not able to fulfill the criterion a and criterion b for the measurements required for the correction factor determination, manufacturer might be allowed to skip the testing – in agreement with the responsible authority
- A conservative correction factor will be determined by the responsible authority based on the evidences given by the manufacturer (explanations, etc.) and by measurements on a representative vehicle

Feedback:

- New proposal
- Not discussed yet
- No feedback available yet

Proposal: [191011 REESS CO₂ correction factor - option of a conservative factor without test.docx](#)

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

- Supported and shall go into UNR WLTP first edition
- Further discussion in web-audio before October 21st, discussion of further proceeding
- Not supported



Proposals for amendment

Option to omit performing tests for the CO₂ correction factor determination (Annex 8 App. 2)

2.2. The correction coefficients shall be determined from a set of charge-sustaining Type 1 tests according to paragraph 3. of this appendix. The number of tests performed by the manufacturer shall be equal to or greater than five.

The manufacturer may request to set the state of charge of the REESS prior to the test according to the manufacturer's recommendation and as described in paragraph 3. of this appendix. This practice shall only be used for the purpose of achieving a charge-sustaining Type 1 test with opposite sign of the $\Delta E_{\text{REESS,CS}}$ and with approval of the responsible authority.

The set of measurements shall fulfil the following criteria:

- (a) The set shall contain at least one test with $\Delta E_{\text{REESS,CS,n}} \leq 0$ and at least one test with $\Delta E_{\text{REESS,CS,n}} > 0$. $\Delta E_{\text{REESS,CS,n}}$ is the sum of electric energy changes of all REESSs of test n calculated according to paragraph 4.3. of this annex.
- (b) The difference in $M_{\text{CO}_2,\text{CS}}$ between the test with the highest negative electric energy change and the test with the highest positive electric energy change shall be greater than or equal to 5 g/km. This criterion shall not be applied for the determination of $K_{\text{fuel,FCHV}}$.

(...)

If the set of at least five tests does not fulfil criterion (a) or criterion (b) or both, the manufacturer shall provide evidence to the responsible authority as to why the vehicle is not capable of meeting either or both criteria. If the responsible authority is not satisfied with the evidence, it may require additional tests to be performed. If the criteria after additional tests are still not fulfilled, the responsible authority shall determine a conservative correction coefficient, based on the measurements.

The manufacturer may omit to perform the set of at least five tests by giving evidence in advance of the testing that the vehicle is not capable of meeting criterion (a) or criterion (b) or both. If the responsible authority is satisfied with the evidence, it shall determine a conservative correction coefficient, based on the evidences and measurements given by the manufacturer on a representative vehicle.



Proposals for amendment

CO2 correction factor determination (Annex 8 App. 2) – Drafting issue in §4.1.1.3.

Intention of the proposal:

- Removing redundant text in paragraph 4.1.1.3., no content change
- KCO2 is mentioned in the formula and in the legend below the formula
- Text see next slide
- Task for the drafting coordinator?

Feedback:

- New proposal
- Not discussed yet
- No feedback available yet

Proposal: [191014 based on Amendment 5 REESS energy change-based correction procedure.docx](#)

Decision of SG EV and IWG WLTP (28th WLTP-meeting, Bern, September 2019):

- Supported and shall go into UNR WLTP first edition
- Further discussion in web-audio before October 21st, discussion of further proceeding
- Not supported



Proposals for amendment

CO2 correction factor determination (Annex 8 App. 2) – Drafting issue in §4.1.1.3.

- 4.1.1.3. If the correction of the charge-sustaining CO₂ mass emission is required according to paragraph 1.1.3. of Appendix 2 to this annex or in the case that the correction according to paragraph 1.1.4. of Appendix 2 to this annex was applied, the CO₂ mass emission correction coefficient shall be determined according to paragraph 2. of Appendix 2 to this annex. The corrected charge-sustaining CO₂ mass emission shall be determined using the following equation:

$$M_{\text{CO}_2,\text{CS}} = M_{\text{CO}_2,\text{CS,nb}} - K_{\text{CO}_2} \times EC_{\text{DC,CS}}$$

where:

- $M_{\text{CO}_2,\text{CS}}$ is the charge-sustaining CO₂ mass emission of the charge-sustaining Type 1 test according to Table A8/5, step No. 3, g/km;
- $M_{\text{CO}_2,\text{CS,nb}}$ is the non-balanced CO₂ mass emission of the charge-sustaining Type 1 test, not corrected for the energy balance, determined according to Table A8/5, step No. 2, g/km;
- $EC_{\text{DC,CS}}$ is the electric energy consumption of the charge-sustaining Type 1 test according to paragraph 4.3. of this annex, Wh/km;
- K_{CO_2} is the CO₂ mass emission correction coefficient according to paragraph 2.3.2. of Appendix 2 to this annex, (g/km)/(Wh/km).