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| _unlogo | **Economic and Social Council**  Informal document to amend  ECE/TRANS/WP.29/2022/42/Rev.1  Proposed updates to GRPE/2021/21 are shown via tracked changes. | | Distr.: General  21 January 2022  Original: English | |

**Economic Commission for Europe**

Inland Transport Committee

**World Forum for Harmonization of Vehicle Regulations**

**186th session**

Geneva, 8-11 March 2022

Item 14.1.1 of the provisional agenda

**1958 Agreement:  
Consideration of additional proposals for amendments  
to existing UN Regulations submitted by the   
Working Parties subsidiary to the World Forum, if any**

**Proposal for a new 03 series of amendments to   
UN Regulation No. 154 (Worldwide harmonized   
Light vehicles Test Procedures (WLTP))**

**Proposal for a new 03 series of amendments to UN Regulation No. 154 (Worldwide harmonized Light vehicles Test Procedures (WLTP))**

**Revision**

**Submitted by the Working Party on Pollution and Energy**[[1]](#footnote-2)\*

The text reproduced below was adopted by the Working Party on Pollution and Energy (GRPE) at its eighty-fourth session (ECE/TRANS/WP.29/GRPE/84, para. 16). It is based on ECE/TRANS/WP.29/GRPE/2021/22 as amended by Addendum 3 of the report. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee (AC.1) for consideration at their March 2022 sessions. This is a consolidated version.

6.2.6. Each of the vehicle families specified below shall be attributed a unique identifier of the following format:

FT-nnnnnnnnnnnnnnn-WMI

Where:

FT is an identifier of the family type:

1. IP = Interpolation family as defined in paragraph 6.3.2. with or without using the interpolation method
2. RL = Road load family as defined in paragraph 6.3.3.
3. RM = Road load matrix family as defined in paragraph 6.3.4.
4. PR = Periodically regenerating systems (Ki) family as defined in paragraph 6.3.5.
5. AT = ATCT family as defined in paragraph 2. of Annex B6a.
6. EV = Evaporative emissions family, as defined in paragraph 6.6.3.
7. DF = Durability family, as defined in paragraph 6.7.5.
8. OB = OBD family identifier, as defined paragraph 6.8.1.
9. ER = Exhaust after-treatment system using reagent (ER)family identifier, as defined in paragraph 6.9.2.
10. GV = GFV family identifier, as defined in paragraph 6.3.6.3.

(k) KC = KCO2 correction factor family identifier, as defined in paragraph 6.3.11.

nnnnnnnnnnnnnnn is a string with a maximum of fifteen characters, restricted to using the characters 0-9, A-Z and the underscore character '\_'.

WMI (world manufacturer identifier) is a code that identifies the manufacturer in a unique manner defined in ISO 3780:2009.

It is the responsibility of the owner of the WMI to ensure that the combination of the string nnnnnnnnnnnnnnn and the WMI is unique to the family and that the string nnnnnnnnnnnnnnn is unique within that WMI to the approval tests performed to obtain the approval.

6.3.2.2. Interpolation family for NOVC-HEVs and OVC-HEVs

In addition to the requirements of paragraph 6.3.2.1., only OVC-HEVs and NOVC-HEVs that are identical with respect to the following characteristics may be part of the same interpolation family:

(a) Type and number of electric machines: construction type (asynchronous/ synchronous, etc.), type of coolant (air, liquid) and any other characteristics having a non-negligible influence on CO2 emission and electric energy consumption under WLTP conditions;

(b) Type of traction REESS (type of cell, capacity, nominal voltage, nominal power, type of coolant (air, liquid));

(c) Type of electric energy converter between the electric machine and traction REESS, between the traction REESS and low voltage power supply and between the recharge-plug-in and traction REESS, and any other characteristics having a non-negligible influence on CO2 emission and electric energy consumption under WLTP conditions. At the request of the manufacturer and with the approval of the approval authority, electric energy converters between recharge-plug-in and traction REESS with lower recharge losses may be included in the family;

<Justification> This definition is combination of R\_CDC provision. Since R\_CDC provision is deleted, this criteria is no longer necessary

6.7.2.1. This paragraph is only applicable for emissions measurements to be compared against the limits in Table 1B

In the case that the limit value is different from the value defined in Table 1B, the assigned additive deterioration factor shall be calculated using the following equation and shall be rounded according to approval authority instruction:

the assigned additive deterioration factor = Limit value \* A \* (Useful life – 3,000)/(80,000 – 3,000)

where :

A 0.11 for CO, 0.12 for NMHC, 0.21 for NOx and 0.00 for PM and PN.

<Justifications> refer incorrect table

8.2.4. Run-in factors

8.2.4.3. At the option of the manufacturer, for CO2 emissions, in g/km an assigned run-in factor of 0.98 may be applied if the system odometer setting at the start of the CoP test is less than or equal to 80 km.

At the option of the manufacturer, for fuel efficiency, in km/l, an assigned run-in factor of 1.02 may be applied if the system odometer setting at the start of the CoP test is less than or equal to 80 km.

If the assigned run-in factors for CO2 emissions are applied, no run-in factors shall be applied for criteria emissions.

<Justifications> run-in factors of CO2/FE are independent from that of electric energy consumption

<Justifications> reference steps are insufficient and incorrect. All necessary process are described in Appendix 1

Appendix 1

The procedure for Type 1 test and for determination of test results during CoP

<Justification> focus on test procedure and how to derive the CoP test results in this appendix

1. Type 1 test procedure for verifying CoP

Unless otherwise stated in this appendix, Type 1 test shall be performed according to Annex B6 or B8

* 1. Each vehicle shall be tested on the chassis dynamometer set with the specific mass inertia setting and road load parameters of the individual vehicle. The chassis dynamometer shall be set to the target road load for the test vehicle according to the procedure specified in paragraph 7. of Annex B4.
  2. The applicable test cycle is the same used for the type approval of the interpolation family to which the vehicle belongs.

2. Verification of CoP on criteria emission for pure ICE vehicles, NOVC-HEVs and OVC-HEVs

The criteria emissions test results shall be determined according to:

a) Step 5 of Table A7/1 of Annex B7 for pure ICE vehicles;

b) Step 5 of Table A8/5 of Annex B8 for NOVC-HEVs and charge-sustaining condition of OVC-HEVs;

c) Step 6 of Table A8/8 of Annex B8 for the charge-depleting condition of OVC-HEVs

and, if available, applying a run-in factor as defined in paragraph 8.2.4. of this Regulation.

<Justification> refer incorrect steps, miss to apply run-in factor

3. Verification of CoP on CO2 emissions/ fuel efficiency of pure ICE vehicles

The CO2 emission after 4 phases shall be determined according to step 5 of Table A7/1 of Annex B7 and, if available, applying a run-in factor in paragraph 8.2.4. of this Regulation.

The fuel efficiency after 3 phases shall be determined according to step 5 of Table A7/1 of Annex B7 and, if available, applying a run-in factor in paragraph 8.2.4. of this Regulation.

<Justification> refer incorrect steps, avoid confusion to derive test results during COP (reference value are moved to Appendix 2)

4. Verification of CoP on CO2 emissions/ fuel efficiency of NOVC-HEVs and OVC-HEVs charge-sustaining condition

The CO2 emission after 4 phases of the NOVC-HEV and the charge-sustaining OVC-HEV shall be determined according to step 5 of Table A8/5 of Annex B8 and, if available, applying a run-in factor as defined in paragraph 8.2.4. of this Regulation.

The fuel efficiency after 3 phases f the NOVC-HEV and the charge-sustaining OVC-HEV shall be determined according to step 5 of Table A8/5 of Annex B8 and, if available, applying a run-in factor as defined in paragraph 8.2.4. of this Regulation.

<Justification> refer incorrect steps, avoid confusion to derive test results during COP (reference value are moved to Appendix 2)

5. Verification of CoP on electric energy consumption of PEVs

5.1. The vehicle shall be tested as described in paragraph either 3.4.4.1. or 3.4.4.2. of Annex B8, whilst the break-off criterion for the Type 1 test procedure shall be considered to have been reached when having finished the first applicable WLTP test cycle.

The DC electric energy consumption from the REESS(s) shall be determined according to paragraph 4.3 of Annex B8 where ∆EREESS,j shall be the electric energy change of all REESS and dj shall be the actual driven distance during this test cycle.

5.2. The electric energy consumption values for CoP

The electric energy consumption value shall be determined according to step 4 of Table A8/10 or step 3 of Table A8/11 of Annex B8 and, if available, applying a run-in factor as defined in paragraph 8.2.4. of this Regulation.

<Justification> COP has only one test procedure, refer incorrect steps, avoid confusion to derive test results during COP (reference value are moved to Appendix 2)

6. Verification of CoP on charge-depleting electric energy consumption of OVC-HEVs

6.1. At the request of the manufacturer it is allowed to use different test vehicles for the charge-sustaining test and charge-depleting test.

<Justification> paragraph 5.2. moves to new paragraph 4.

.2.1. The vehicle shall be tested during conformity of production according to paragraph 6.2.1.1. If there is no engine start during the first cycle of the type approval procedure of this vehicle, at the option of the manufacturer the vehicle may be tested according to paragraph 6.2.1.2.

6.2.1.1. 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.

If deemed necessary, the manufacturer shall demonstrate that preconditioning of the traction REESS in advance of the CoP procedure is required. In such a case, at the request of the manufacturer and with approval of the approval authority, preconditioning of the traction REESS shall be done in advance of the CoP procedure according to manufacturer’s recommendation.

The electric energy consumption ECAC,CD shall be determined according to step 9 of Table A8/8 of Annex B8.

6.2.1.2. First cycle of the Charge-Depleting Type 1 Test

6.2.1.2.1. The vehicle shall be tested according to the charge-depleting Type 1 test as described in paragraph 3.2.4. of Annex B8, whilst the break-off criterion of the charge-depleting Type 1 test procedure shall be considered to have been reached when having finished the first applicable WLTP test cycle.

The DC electric energy consumption from the REESS(s) shall be determined according to paragraph 4.3. of Annex B8 where ∆EREESS,j shall be the electric energy change of all REESS and dj shall be the actual driven distance during this test cycle.

6.2.1.2.2. In this cycle, there is no engine operation allowed. If there is engine operation, the test during conformity of production shall be considered as void.

6.2.2.1. Conformity of production for a test according to paragraph 6.2.1.1.

The charge-depleting electric energy consumption value shall be determined according to

For 4-phase WLTP test

step 9 of Table A8/8 of Annex B8

For 3-phase WLTP test

step 7 of Table A8/9 of Annex B8

and, if available, applying a run-in factor as defined in paragraph 8.2.4. of this Regulation.

6.2.2.2. Conformity of production for a test according to paragraph 6.2.1.2.

The charge-depleting electric energy consumption value shall be determined according to step 12 of Table A8/8 of Annex B8 and, if available, applying a run-in factor as defined in paragraph 8.2.4. of this Regulation.

<Justification> refer incorrect steps, avoid confusion to derive test results during COP (reference value are moved to Appendix 2)

**Appendix 2**

**Verification of conformity of production for Type 1 test - statistical method**

3.2. Statistical evaluation

3.2.1. For the CO2 emissions from the 4 phases of a WLTP test:

For the evaluation of CO2 emissions the normalised values shall be calculated as follows:

where:

CO2 test-i is the CO2 emission measured for the individual vehicle i

CO2 declared-i is the declared CO2 value for the individual vehicle i

<Justification> duplication, new paragraph 3.2.3.

The normalised xi values shall be used to determine the parameters Xtests and s according to paragraph 3.1.

3.2.2. For fuel efficiency from the first 3 phases of a WLTP test:

For the evaluation of fuel efficiency the normalised values shall be calculated as follows:

where:

FE test-i is the fuel efficiency measured for individual vehicle i

FE declared-i is the declared fuel efficiency value for the individual vehicle

3.2.3.For electric energy consumption:

For the evaluation of electric energy consumption EC the normalised values shall be calculated as follows:

where:

ECtest-i is the electric energy consumption measured for individual vehicle i according to the table below.

ECDC, COP-i is the declared electric energy consumption for the individual vehicle i, according to the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Vehicle category | COP test results | | Reference values | | |
| Test procedure according to | ECtest-i | Test procedure according to | ECDC, COP-i | |
| in case that the interpolation method is not applied | in case that the interpolation method is applied |
| OVC-HEV | Appendix 1 6.2.1.1. | Appendix 1 6.2.1.1. | Annex B8 3.2.4. | For 4-phase WLTP test  Annex B8Table A8/8Step 16  ECAC,CD,final  For 3-phase WLTP test  Annex B8Table A8/9Step 8  ECdec | For 4-phase WLTP test  Annex B8 Table A8/8 Step 17  ECAC,CD,ind  For 3-phase WLTP test  Annex B8 Table A8/9 Step 9  ECind |
| Appendix 1 6.2.1.2. | Appendix 1 6.2.1.2. | Annex B8 Table A8/8 Step 16  ECDC,CD,COP,final | Annex B8 Table A8/8 Step 17  ECDC,CD,COP,ind |
| PEV | Appendix 1 5.1. | Appendix 1 5.1. | Annex B8 3.4.4.1.3. | Annex B8 Table A8/10 Step 9 | Annex B8 Table A8/10 Step 10 |
| Annex B8 3.4.4.2.3. | Annex B8 Table A8/11 Step 8 | Annex B8 Table A8/11 Step 9 |

The normalised xi values shall be used to determine the parameters Xtests and s according to paragraph 3.1.

<Justification> refer insufficient step, incorrect step

Appendix 3

Run-in test procedure to determine run-in factors

1.2.1. Extension of run-in factor

At the request of the vehicle manufacturer and with approval by the responsible authority, the derived run-in factor for CO2, pollutant emissions, fuel efficiency and electric energy consumption can be extended to other CoP families.

The vehicle manufacturer shall provide evidence on the justification and technical criteria for merging these COP families, ensuring that there is a large similarity between those families.

<Justification> incorrect description

1.6. Before the run-in, the test vehicle shall be tested according to the Type 1 test procedure specified in Annex B6 or Annex B8. The test shall be repeated until three valid test results have been obtained. Drive trace indexes shall be calculated according to paragraph 7. of Annex B7 and these shall fulfil the criteria specified in paragraph 2.6.8.3.1.4. of Annex B6. The system odometer setting Di shall be recorded prior to each test. The measured criteria emissions, CO2 emissions, fuel efficiency and electric energy consumption shall be calculated according to Step 4a of Table A7/1 in Annex B7 or Step 4a of Table A8/5 in Annex B8.

The signal of the acceleration control position shall be recorded during all tests at a sampling frequency of 10 Hz. It is allowed to use the OBD acceleration control position signal for this purpose. The responsible authority may request the manufacturer to evaluate this signal to ensure that the test result is performed correctly.

1.8. After the run-in, the test vehicle shall be tested according to the Type 1 test procedure specified in Annex B6 or Annex B8. The test shall be repeated until three valid test results have been obtained.

Drive trace indexes shall be calculated according to paragraph 7. of Annex B7 and these shall fulfil the criteria specified in paragraph 2.6.8.3.1.4. of Annex B6.

These tests shall be performed in the same test cell as used for the tests prior to the run-in and by applying the same chassis dynamometer setting method. If this is not possible, the manufacturer shall justify the reason for using a different test cell. The system odometer setting Di in km shall be recorded prior to each test. The measured criteria emissions, CO2 emissions, fuel efficiency and electric energy consumption, as applicable and in accordance with paragraph 8.2.4.1. of this Regulation, shall be calculated according to Step 4a of Table A7/1 in Annex B7 or Step 4a of Table A8/5 in Annex B8.

<Justification> incorrect description

1.9. support GRPE86-16 For the determination of the run-in factor for CO2 emissions of the 4 phase WLTP test, the coefficients CRI and Cconst in the following equation shall be calculated by a least squares regression analysis to four significant digits on all valid tests before and after the run-in:

where:

MCO2,i is the measured CO2 emission for test i, g/km

CRI is the slope of the logarithmic regression line

Cconst is the constant value of the logarithmic regression line

In the case that multiple vehicles have been tested, the CRI shall be calculated for each vehicle, and the resulting values shall be averaged. The manufacturer will provide statistical evidence to the responsible authority that the fit is sufficiently statistically justified.

1.9.1. support GRPE86-16Based on the deviation of the measurements from the fit, the slope CRI should be corrected downward with the standard deviation of the errors in the fit:

where:

MCO2,i-fit is the result of the applying the equation for each of the distances Di.

The slope CRI shall be corrected for the uncertainty in the fit by:

CRI 🡪 CRI - fit

1.10. support GRPE86-16The run-in factor RICO2(j) for CO2 emissions after 4 phases of CoP test vehicle j shall be determined by the following equation:

where:

Dk is the average distance of the valid tests after the run-in, km

Dj is the system odometer setting of the CoP test vehicle, km

MCO2,j is the mass CO2 emission measured on the CoP test vehicle, g/km

In the case that Dj is lower than the minimum Di, Dj shall be replaced by the minimum Di.

1.11. For the determination of the run-in factor for all applicable criteria emissions after 4 phases, the coefficients CRI,c and Cconst, c shall be calculated with a least squares regression analysis to four significant digits on all valid tests before and after the run-in:

where:

MC,i is the measured mass criteria emission component C

CRI,c is the slope of the linear regression line, g/km2

Cconst,c is the constant value of the linear regression line, g/km

The manufacturer will provide statistical evidence to the responsible authority that the fit is sufficiently statistically justified and the uncertainty margin based on the variation in the data should be taken into account to avoid an overestimation of the run-in effect.

1.12. The run-in factor RIC(j) for criteria emission component C after 4 phases of CoP test vehicle j shall be determined by the following equation:

where:

Dk is the average distance of the valid tests after the run-in, km

Dj is the system odometer setting of the CoP test vehicle, km

MC,j is the mass emission of component C on the CoP test vehicle, g/km

In the case that Dj is lower than the minimum Di, Dj shall be replaced by the minimum Di.

1.13. The run-in factor RIEC(j) for electric energy consumption after 4 phases shall be determined according to the procedure specified in paragraphs 1.9., 1.9.1. and 1.10. of this appendix, where CO2 in the formulae is replaced by EC.

For fuel efficiency and electric energy consumption from the first 3 phases of a WLTP test

The run-in factor RIFE(j) for fuel efficiency and the run-in factor RIEC(j) for electric energy consumption shall be determined according to the procedure specified in paragraphs 1.9. (excluding paragraph 1.9.1.) and 1.10. of this appendix, where CO2 in the formulae is replaced by FE and EC respectively.

<Justification> in line with 02 series description

2. Prior to the application of the derived run-in factor for fuel efficiency, the manufacturer shall provide the following information to the responsible authority.

(a) Evidence of the derived run-in factor including the existence of statistical significance regarding the fit of the slope

(b) An explanation of the validation method to be used after the start of production, e.g. by measuring the run-in factor from selected vehicle(s) from the plant and then evaluating whether the run-in factor is appropriate or not.

<Justification> in line with 02 series description. only FE run-in factor requires the verification after SOP (Start Of Production)

Annex B4

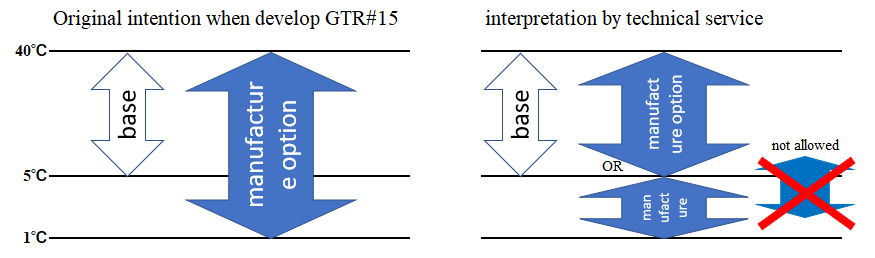
Road load and dynamometer setting

4.1.1.2. Atmospheric temperature

The atmospheric temperature should be within the range of 5 °C up to and including 40 °C.

At the option of the manufacturer, coastdowns may be performed between 1 °C and 40 °C.

<Justification>



If the difference between the highest and the lowest measured temperature during the coastdown test is more than 5 °C, the temperature correction shall be applied separately for each run with the arithmetic average of the ambient temperature of that run.

In that case, the values of the road load coefficients f0, f1 and f2 shall be determined and corrected for each run pair. The final set of f0, f1 and f2 values shall be the arithmetic average of the individually corrected coefficients f0, f1 and f2 respectively.

5.1.1. For the calculation of the road load of vehicles of a road load matrix family, the vehicle parameters described in paragraph 4.2.1.4. of this annex and the road load coefficients of the representative test vehicle determined in paragraph 4.3. or in paragraph 6.of this annex shall be used.

<Justification> 5.1. refers both coastdown and wind tunnel method, but 5.1.1. refers only coastdown method

5.1.2. For the calculation of the running resistance of vehicles of a road load matrix family, the vehicle parameters described in paragraph 4.2.1.4. of this annex and the running resistance coefficients of the representative test vehicle determined in paragraph 4.5.5.2. of this annex shall be used.

<Justification> refer incorrect paragraph (should refer after correction to reference conditions)

6.5.2.3.3. The force fjDyno at each reference speed vj shall be calculated by removing the dynamometer set force:

where:

fjDecel is the force determined according to the equation calculating Fj in paragraph 4.3.1.4.4. of this annex at reference speed point j, N;

is the force determined to the equation calculating Fd in paragraph 6.5.2.1. of this annex at reference speed point j, N.

Alternatively, at the request of the manufacturer, bd and cd may be set to zero during the coastdown and for calculating fjDyno.

<Justification> practically impossible, overlooked when modified para. 6.5.2.1.

Annex B7

Calculations

Table A7/1

**Procedure for calculating final test results (FE applicable for the 3-phase WLTP only)**

Table A7/1 shall be performed separately for results after 4 phases and for results after 3 phases.

| *Step No.* | *Source* | *Input* | *Process* | *Output* | |
| --- | --- | --- | --- | --- | --- |
| 1 | Annex B6 | Raw test results | Mass emissions  Paragraphs 3. to 3.2.2. inclusive of this annex. | Mi,p,1, g/km;  MCO2,p,1, g/km. | |
| 2 | Output step 1 | Mi,p,1, g/km;  MCO2,p,1, g/km. | Calculation of combined cycle values:  where:  Mi/CO2,c,2 are the emission results over the total cycle;  dp are the driven distances of the cycle phases, p. | Mi,c,2, g/km;  MCO2,c,2, g/km. | |
| 3 | | Output step 1  Output step 2 | MCO2,p,1, g/km;  MCO2,c,2, g/km. | RCB correction  Appendix 2 to Annex B6. | MCO2,p,3, g/km;  MCO2,c,3, g/km. |
| 4a | Output step 2  Output step 3 | Mi,c,2, g/km;  MCO2,c,3, g/km. | Emissions test procedure for all vehicles equipped with periodically regenerating systems, Ki.  Annex B6, Appendix 1.  Mi,c,4a = Ki × Mi,c,2  or  Mi,c,4a = Ki + Mi,c,2  and  MCO2,c,4a = KCO2 × MCO2,c,3  or  MCO2,c,4a = KCO2 + MCO2,c,3  Additive offset or multiplicative factor to be used according to Ki determination.  If Ki is not applicable:  Mi,c,4a = Mi,c,2  MCO2,c,4a = MCO2,c,3 | Mi,c,4a, g/km;  MCO2,c,4a, g/km. | |
| 4b | Output step 3  Output step 4a | MCO2,p,3, g/km;  MCO2,c,3, g/km;  MCO2,c,4a, g/km. | If Ki is applicable, align CO2 phase values to the combined cycle value:  for every cycle phase p;  where:  If Ki is not applicable:  MCO2,p,4 = MCO2,p,3 | MCO2,p,4, g/km. | |
| 4c | Output step 4a | Mi,c,4a, g/km;  MCO2,c,4a, g/km. | Mi,c,4c = Mi,c,4a  MCO2,c,4c = MCO2,c,4a | Mi,c,4c;  MCO2,c,4c | |
| Calculate fuel efficiency (FEc,4c\_temp)　according to paragraph 6. of Annex B7.  FEc,4c = FEc,4c\_temp | FEc,4c, km/l; | |
| 5  Result of a single test. | Output step 4b and 4c | MCO2,c,4c, g/km;  MCO2,p,4, g/km. | For results after 4 phases:  ATCT correction of MCO2,c,4c and MCO2,p,4 in accordance with paragraph 3.8.2. of Annex B6a.  For results after 3 phases:  MCO2,c,5 = MCO2,c,4c  MCO2,p,5 = MCO2,p,4 | MCO2,c,5, g/km;  MCO2,p,5, g/km. | |
| Mi,c,4c, g/km;  FEc,4c, km/l; | Apply deterioration factors calculated in accordance with Annex C4 to the criteria emissions values.  FEc,5=FEc4c | Mi,c,5, g/km;  FEc,5, km/l; | |
| 6 | For results after 4 phases  Output step 5 | For every test:  Mi,c,5, g/km;  MCO2,c,5, g/km;  MCO2,p,5, g/km. | Averaging of tests and declared value.  Paragraphs 1.2. to 1.2.3. inclusive of Annex B6. | Mi,c,6, g/km;  MCO2,c,6, g/km;  MCO2,p,6, g/km.  MCO2,c,declared, g/km. | |
| For results after 3 phases  Output step 5 | FEc,5, km/l;  Mi,c,5, g/km | Averaging of tests and declared value.  Paragraphs 1.2. to 1.2.3. inclusive of Annex B6.  Mi,c,5 = Mi,c,6  The conversion from FEc,declared to MCO2,c,declared shall be performed for the applicable cycle according to paragraph 6. of Annex B7. For that purpose, the criteria emission over the applicable cycle shall be used. | FEc,declared, km/l  FEc,6, km/l  Mi,c,6  MCO2,c,declared, g/km. | |
| 7 | For results after 4 phases:  Output step 6 | MCO2,c,6, g/km;  MCO2,p,6, g/km.  MCO2,c,declared, g/km. | Alignment of phase values.  Paragraph 1.2.4. of Annex B6.  and:  MCO2,c,7 = MCO2,c,declared | MCO2,c,7, g/km;  MCO2,p,7, g/km. | |
| For results after 3 phases:  Output step 5  Output step 6 | MCO2,c,5, g/km;  MCO2,p,5, g/km;  MCO2,c,declared, g/km. | Alignment of phase values.  Paragraph 1.2.4. of Annex B6. | MCO2,p,7, g/km. | |
| 8  Result of a Type 1 test for a test vehicle. | For results after 4 phases :  Output steps 6  Output steps 7 | Mi,c,6, g/km;  MCO2,c,7, g/km;  MCO2,p,7, g/km. | Calculation of fuel consumption according to Paragraph 6 of this annex.  The calculation of fuel consumption shall be performed for the applicable cycle and its phases separately. For that purpose: (a) the applicable phase or cycle CO2 values shall be used;  (b) the criteria emission over the complete cycle shall be used.  and:  Mi,c,8 = Mi,c,6  MCO2,c,8 = MCO2,c,7  MCO2,p,8 = MCO2,p,7 | FCc,8, l/100 km;  FCp,8, l/100 km;  Mi,c,8, g/km;  MCO2,c,8, g/km;  MCO2,p,8, g/km. | |
| For results after 3 phases :  Output steps 6  Output steps 7 | Mi,c,6, g/km;  FEc,6, km/l  MCO2,p,7, g/km. | Calculation of fuel consumption and conversion to fuel efficiency for phase value only according to paragraph 6 of this annex.  The calculation of fuel consumption shall be performed for the phases separately.  For that purpose: (a) the applicable phase CO2 values shall be used;  (b) the criteria emission over the complete cycle shall be used.  and:  Mi,c,8 = Mi,c,6  FEc,8 = FEc,6 | FCp,8, l/100 km;  FEp,8, km/l;  Mi,c,8, g/km;  FEc,8, km/l. | |
| 9  For results after 4 phases  Final criteria emission result | Output step 8 | For each of the test vehicles H and L:  Mi,c,8, g/km;  MCO2,c,8, g/km;  MCO2,p,8, g/km;  FCc,8, l/100 km;  FCp,8, l/100 km;  FEc,8, km/l.  FEp,8, km/l | For results after 4 phases;  If in addition to a test vehicle H a test vehicle M and/or vehicle L was also tested, the resulting criteria emission value shall be the highest of the two or, in case vehicle M does not meet the linearity criterion three values and referred to as Mi,c.  In the case of the combined THC + NOx emissions, the highest value of the sum referring to either the vehicle H or vehicle L or, if applicable, vehicle M is to be taken as the type approval value.  Otherwise, if no vehicle L was tested,  Mi,c = Mi,c,8  For CO2, FE and FC, the values derived in step 8 shall be used, and CO2 values shall be rounded according to paragraph 6.1.8. of this Regulation to two places of decimal, and FE and FC values shall be rounded according to paragraph 6.1.8. of this Regulation to three places of decimal. | Mi,c, g/km;  MCO2,c,H, g/km;  MCO2,p,H, g/km;  FCc,H, l/100 km;  FCp,H, l/100 km;  FEc,H, km/l;  FEp,H, km/l;  and if a vehicle L was tested:  MCO2,c,L, g/km;  MCO2,p,L, g/km;  FCc,L, l/100 km;  FCp,L, l/100 km;  FEc,L, km/l  FEp,L, km/l. | |
| 10  Result of an individual vehicle.  Final CO2, FE and FC result. | Output step 9 | MCO2,c,H, g/km;  MCO2,p,H, g/km;  FCc,H, l/100 km;  FCp,H, l/100 km;  FEc,H, km/l;  FEp,H, km/l;  and if a vehicle L was tested:  MCO2,c,L, g/km;  MCO2,p,L, g/km;  FCc,L, l/100 km;  FCp,L, l/100 km.  FEc,L, km/l;  FEp,L, km/l. | Fuel consumption, fuel efficiency and CO2 calculations for individual vehicles in an interpolation family.  Paragraph 3.2.3. of this annex.  Fuel consumption, fuel efficiency and CO2 calculations for individual vehicles in a road load matrix family.  Paragraph 3.2.4. of this annex.  CO2 emissions shall be expressed in grams per kilometre (g/km) rounded to the nearest whole number;  FC values shall be rounded according to paragraph 6.1.8. of this Regulation to one place of decimal, expressed in (l/100 km) ;  FE values shall be rounded according to paragraph 6.1.8. of this Regulation to one place of decimal, expressed in (km/l). | MCO2,c,ind g/km;  MCO2,p,ind, g/km;  FCc,ind l/100 km;  FCp,ind, l/100 km;  FEc,ind, km/l;  FEp,ind, km/l. | |

<Justification> mislead incorrect results, all necessary process are described in Appendix 1 of main body

<Justification for rev1> missing the parameter and/or refer incorrect parameter

Annex B8

Pure electric, hybrid electric and compressed hydrogen fuel cell hybrid vehicles

Table A8/5

**Calculation of final charge-sustaining gaseous emission and fuel efficiency values (FE applicable for results after 3 phases only)**

Table A8/5 shall be performed separately for results after 4 phases and for results after 3 phases.

| *Step No.* | *Source* | *Input* | *Process* | *Output* |
| --- | --- | --- | --- | --- |
| 1 | Annex B6 | Raw test results | Charge-sustaining mass emissions  Paragraphs 3. to 3.2.2. inclusive of Annex B7. | , g/km; , g/km. |
| 2 | Output step 1 | , g/km; , g/km. | Calculation of combined charge-sustaining cycle values:  where:  is the charge-sustaining mass emission result over the total cycle;  is the charge-sustaining CO2 emission result over the total cycle;  are the driven distances of the cycle phases p. | , g/km; , g/km. |
| 3 | Output step 1 | , g/km; | REESS electric energy change correction  Paragraphs 4.1.1.2. to 4.1.1.5. inclusive of this annex. | , g/km; , g/km. |
| Output step 2 | , g/km. |
| 4a | Output step 2 | , g/km; | Charge-sustaining mass emission correction for all vehicles equipped with periodically regenerating systems according to Annex B6, Appendix 1.  or and or  Additive offset or multiplicative factor to be used according to Ki determination.  If Ki is not applicable: | , g/km; , g/km. |
| Output step 3 | , g/km. |
| 4b | Output step 3 | , g/km; , g/km; | If Ki is applicable, align CO2 phase values to combined cycle value:  for every cycle phase p;  where:  If Ki is not applicable: | , g/km. |
| Output step 4a | , g/km. |
| 4c | Output step 4a | Mi,CS,c,4a, g/km;  MCO2,CS,c,4a, g/km. | Mi,c,4c = Mi,c,4a  MCO2,c,4c = MCO2,c,4a | Mi,CS,c,4c;  MCO2,CS,c,4c |
| Calculate fuel efficiency (FEc,4c\_temp) according to paragraph 6.14.1. of Annex B7.  FEc,4c = FEc,4c\_temp | FEc,4c, km/l; |
| 5  Result of a single test. | Output step 4b and 4c | , g/km; , g/km; | For results after 4 phases:  ATCT correction of MCO2,CS,c,4c and MCO2,CS,p,4 in accordance with paragraph 3.8.2. of Annex B6a.  For results after 3 phases:  MCO2,c,5 = MCO2,c,4c  MCO2,p,5 = MCO2,p,4 | , g/km;, g/km. |
|  | , g/km;  FEc,4c, km/l; | Apply deterioration factors calculated in accordance with Annex C4 to the criteria emissions values.  FEc,5 = FEc,4c | , g/km;  FEc,5, km/l; |
| 6  results of a Type 1 test for a test vehicle. | For results after 4 phases  Output step 5 | For every test: , g/km;, g/km;, g/km. | Averaging of tests and declared value according to paragraphs 1.2. to 1.2.3. inclusive of  Annex B6. | , g/km;, g/km;, g/km; , g/km. |
| For results after 3 phases  Output step 5 | FEc,5, km/l; | Averaging of tests and declared value.  Paragraphs 1.2. to 1.2.3. inclusive of Annex B6.  The conversion from FEc,declared to MCO2,c,declared shall be performed for the applicable cycle. For that purpose, the criteria emission over the complete cycle shall be used. | FEc,declared, km/l  MCO2,c,declared, g/km. |
| 7  results of a Type 1 test for a test vehicle. | For results after 4 phases: Output step 6 | , g/km;, g/km; , g/km. | Alignment of phase values. Paragraph 1.2.4. of Annex B6,  and: | , g/km; , g/km. |
| For results after 3 phases: Output step 5 Output step 6 | MCO2,CS,c,5, g/km;  MCO2,CS,p,5, g/km;  MCO2,CS,c,declared, g/km. | Alignment of phase values.  Paragraph 1.2.4. of Annex B6. | MCO2,CS,p,7, g/km. |
| For results after 4 phases only  8  Final criteria emission result.  If the interpolation method is not applied, step No. 9 is not required and the output of this step is the final CO2 result. | Output step 6 | For each of the test vehicles H and L and, if applicable, vehicle M:  , g/km; | If in addition to a test vehicle H a test vehicle M and/or vehicle L was also tested, the resulting criteria emission value shall be the highest of the two or, in case vehicle M does not meet the linearity criterion three values and referred to as  In the case of the combined THC+NOx emissions, the highest value of the sum referring to either the vehicle H or vehicle L or, if applicable, vehicle M is to be taken as the type approval value.  Otherwise, if no vehicle L or if applicable vehicle M was tested,  In the case that the interpolation method is applied, intermediate rounding shall be applied according to paragraph 6.1.8. of this Regulation:  CO2 values derived in step 7 of this table shall be rounded to two places of decimal. Also, the output for CO2 is available for vehicle H and vehicle L and, if applicable, for vehicle M.  In the case that the interpolation method is not applied, final rounding shall be applied according to paragraph 6.1.8. of this Regulation:  CO2 values derived in step 7 of this table shall be rounded to the nearest whole number. | , g/km; , g/km; , g/km; |
| Output step 7 | For each of the test vehicles H and L and, if applicable, vehicle M: , g/km; , g/km. |
| For results after 4 phases only  9  Result of an individual vehicle.  Final CO2 result. | Output step 8 | , g/km; , g/km; | CO2 emission calculation according to paragraph 4.5.4.1. of this annex for individual vehicles in an interpolation family.  Final rounding of individual vehicle CO2 values shall be performed according to paragraph 6.1.8. of this Regulation.  CO2 values shall be rounded to the nearest whole number.  Output is available for each individual vehicle. | , g/km; , g/km. |

<Jastification> mislead incorrect results, all necessary process are described in Appendix 1 of main body

4.1.2. Charge-depleting CO2 emission for OVC-HEVs

For 4-phase WLTP test

The utility factor-weighted charge-depleting CO2 emission MCO2,CD shall be calculated using the following equation:

For 3-phase WLTP test

The charge-depleting CO2 emission MCO2,CD shall be calculated using the following equation:

where:

is the utility factor-weighted charge-depleting CO2 emission, g/km;

is the CO2 emission determined according to paragraph 3.2.1. of Annex B7 of phase j of the charge-depleting Type 1 test, g/km;

is the utility factor of phase j according to Appendix 5 to this annex;

is the index number of the considered phase;

is the number of phases driven up to the end of the transition cycle according to paragraph 3.2.4.4. of this annex.

<Justification> high possibility to mislead the incorrect value during in-service testing

4.1.3. This paragraph is applicable for 4-phase WLTP test only:

Utility factor-weighted mass emissions of gaseous compounds, particulate matter emission and particle number emission for OVC-HEVs

4.1.3.1. The utility factor-weighted mass emission of gaseous compounds

where:

is the utility factor-weighted mass emission compound i, g/km;

is the index of the considered gaseous emission compound (except CO2);

is the utility factor of phase j according to Appendix 5 to this annex;

is the mass emission of the gaseous emission compound i determined according to paragraph 3.2.1. of Annex B7 of phase j of the charge-depleting Type 1 test, g/km;

is the charge-sustaining mass emission of gaseous emission compound i for the charge-sustaining Type 1 test according to Table A8/5, step No. 6, g/km;

is the index number of the considered phase;

is the number of phases driven until the end of the transition cycle according to paragraph 3.2.4.4. of this annex.

For calculating the utility-factor weighted CO2 emission the following equation shall be used:

where:

is the utility-factor weighted charge-depleting CO2 emission, g/km.

is the declared charge-depleting CO2 emission according to Table A8/8, step no. 14, g/km.

is the declared charge-sustaining CO2 emission according to Table A8/5, step no. 7, g/km.

is the average of the sum of utility factors of each charge-depleting test.

j is the index number of the considered phase;

k is the number of phases driven until the end of the transition cycle according to paragraph 3.2.4.4. of this annex.

<Justification> high possibility to mislead the incorrect value during in-service testing

4.2.2. The charge-depleting fuel consumption and charge-depleting fuel efficiency for OVC-HEVs

For 4-phase WLTP test:

The utility factor-weighted charge-depleting fuel consumption shall be calculated using the following equation:

where:

is the utility factor weighted charge-depleting fuel consumption, l/100 km;

is the fuel consumption for phase j of the charge-depleting Type 1 test, determined according to paragraph 6. of Annex B7, l/100 km;

is the utility factor of phase j according to Appendix 5 to this annex;

is the index number for the considered phase;

is the number of phases driven up to the end of the transition cycle according to paragraph 3.2.4.4. of this annex.

<Justification> high possibility to mislead the incorrect value during in-service testing

For 3-phase WLTP test

The charge-depleting fuel efficiency shall be calculated using the following equation:

where:

is the charge-depleting fuel efficiency, km/l;

actual charge-depleting range defined in paragraph 4.4.5. of this Annex, km;

is the fuel efficiency for cycle c of the charge-depleting Type 1 test, determined according to paragraph 6. of Annex B7, km/l;

;

is the index number for the considered cycle;

n is the number of applicable WLTP test cycles driven up to the end of the transition cycle according to paragraph 3.2.4.4. of this annex

is the distance driven in the applicable WLTP test cycle c of the charge-depleting Type 1 test, km;

is the distance driven in the applicable WLTP test cycle n of the charge-depleting Type 1 test, km;

4.2.3. This paragraph is applicable only for 4-phase WLTP test

Utility factor-weighted fuel consumption for OVC-HEVs

The utility factor-weighted fuel consumption for OVC-HEVs from the charge-depleting and charge-sustaining Type 1 test shall be calculated using the following equation:

where:

is the utility factor-weighted fuel consumption, l/100 km;

is the utility factor of phase jaccording to Appendix 5 to this annex;

is the fuel consumption of phase j of the charge-depleting Type 1 test, determined according to paragraph 6. of Annex B7, l/100 km;

is the declared charge-depleting CO2 emission according to Table A8/8, step no. 14, g/km;

is the arithmetic average charge-depleting CO2 emission according to Table A8/8, step no. 13, g/km;

is the fuel consumption determined according to Table A8/6, step No. 1, l/100 km;

is the index number for the considered phase;

is the number of phases driven up to the end of the transition cycle according to paragraph 3.2.4.4. of this annex.

<Justification> high possibility to mislead the incorrect value during in-service testing

4.3.1. This paragraph is applicable only for 4-phase WLTP test

Utility factor-weighted charge-depleting electric energy consumption based on the recharged electric energy from the mains for OVC-HEVs

The utility factor-weighted charge-depleting electric energy consumption based on the recharged electric energy from the mains shall be calculated using the following equation:

where:

is the utility factor-weighted charge-depleting electric energy consumption based on the recharged electric energy from the mains, Wh/km;

is the utility factor of phase j according to Appendix 5 to this annex;

is the electric energy consumption based on the recharged electric energy from the mains of phase j, Wh/km;

and

where:

is the electric energy consumption based on the REESS depletion of phase j of the charge-depleting Type 1 test according to paragraph 4.3. of this annex, Wh/km;

is the recharged electric energy from the mains determined according to paragraph 3.2.4.6. of this annex, Wh;

is the electric energy change of all REESSs of phase j according to paragraph 4.3. of this annex, Wh;

is the index number for the considered phase;

is the number of phases driven up to the end of the transition cycle according to paragraph 3.2.4.4. of this annex.

<Justification> high possibility to mislead the incorrect value during in-service testing4.3.2. This paragraph is applicable for 4-phase WLTP test only:

Utility factor-weighted electric energy consumption based on the recharged electric energy from the mains for OVC-HEVs

The utility factor-weighted electric energy consumption based on the recharged electric energy from the mains shall be calculated using the following equation:

where:

is the utility factor-weighted electric energy consumption based on the recharged electric energy from the mains, Wh/km;

is the utility factor of phase j according to Appendix 5 to this annex;

is the declared charge-depleting electric energy consumption based on the recharged electric energy from the mains for OVC-HEVs according to Table A8/8, step 14, Wh/km;

is the index number for the considered phase;

is the number of phases driven up to the end of the transition cycle according to paragraph 3.2.4.4. of this annex.

<Justification> high possibility to mislead the incorrect value during in-service testing

4.4.4.1. Determination of cycle-specific equivalent all-electric range

The cycle-specific equivalent all-electric range shall be calculated using the following equation:

For 4 phase WLTP test;

For 3 phase WLTP test;

where:

is the cycle-specific equivalent all-electric range, km;

is the declared charge-sustaining CO2 emission according to Table A8/5, step No. 7, g/km for 4 phase WLTP test

to Table A8/5, step No. 6, g/km for 3 phase WLTP test;

is the arithmetic average charge-depleting CO2 emission according to the equation below, g/km;

is the declared charge-depleting CO2 emission according to Table A8/8, step no. 14, g/km;

is the arithmetic average charge-depleting CO2 emission according to Table A8/8, step no. 13, g/km;

is the charge-depleting cycle range according to paragraph 4.4.3. of this annex, km;

and

where:

is the arithmetic average charge-depleting CO2 emission, g/km. In the case of more than one charge-depleting test, the additional arithmetic average of each test shall be calculated;

is the CO2 emission determined according to paragraph 3.2.1. of Annex B7 of phase j of the charge-depleting Type 1 test, g/km;

is the distance driven in phase j of the charge-depleting Type 1 test, km;

is the index number of the considered phase;

is the number of phases driven up to the end of the transition cycle n according to paragraph 3.2.4.4. of this annex.

<Justification> in line with 4-phase test process (CD CO2 has no declared value, so measured value is only option to be used)

4.4.4.2.

Determination of the phase-specific equivalent all-electric range

The phase-specific equivalent all-electric range shall be calculated using the following equation:

For 4-phase WLTP test;

For 3-phase WLTP test;

where:

is the phase-specific equivalent all-electric range for the considered phase p, km;

is the phase-specific CO2 emission from the charge-sustaining Type 1 test for the considered phase p according to Table A8/5, step No. 7, g/km;

is the declared charge-depleting CO2 emission according to Table A8/8, step no. 14, g/km;

is the arithmetic average charge-depleting CO2 emission according to Table A8/8, step no. 13, g/km;

are the electric energy changes of all REESSs during the considered phase j, Wh. In the case of more than one charge-depleting test, the additional arithmetic average of each test shall be calculated;

is the electric energy consumption over the considered phase p based on the REESS depletion, Wh/km. In the case of more than one charge-depleting test, the additional arithmetic average of each test shall be calculated;

is the index number of the considered phase;

k is the number of phases driven up to the end of the transition cycle n according to paragraph 3.2.4.4 of this annex;

and

where:

is the arithmetic average charge-depleting CO2 emission for the considered phase p, g/km. In the case of more than one charge-depleting test, the additional arithmetic average of each test shall be calculated;

is the CO2 emission determined according to paragraph 3.2.1. of Annex B7 of phase p in cycle c of the charge-depleting Type 1 test, g/km;

is the distance driven in the considered phase p of cycle c of the charge-depleting Type 1 test, km. In the case of more than one charge-depleting test, the additional arithmetic average of each test shall be calculated;

is the index number of the considered applicable WLTP test cycle;

is the index of the individual phase within the applicable WLTP test cycle;

is the number of applicable WLTP test cycles driven up to the end of the transition cycle n according to paragraph 3.2.4.4. of this annex;

and:

where:

is the electric energy consumption of the considered phase p based on the REESS depletion of the charge-depleting Type 1 test, Wh/km. In the case of more than one charge-depleting test, the additional arithmetic average of each test shall be calculated;

is the electric energy consumption of the considered phase p of cycle c based on the REESS depletion of the charge-depleting Type 1 test according to paragraph 4.3. of this annex, Wh/km;

is the distance driven in the considered phase p of cycle c of the charge-depleting Type 1 test, km;

is the index number of the considered applicable WLTP test cycle;

is the index of the individual phase within the applicable WLTP test cycle;

is the number of applicable WLTP test cycles driven up to the end of the transition cycle n according to paragraph 3.2.4.4. of this annex.

For the 4-phase WLTP test;

The considered phase shall be the low phase, medium phase, high phase, extra high phase, and the city driving cycle.

For the 3-phase WLTP test;

The considered phase shall be the low phase, medium phase and high phase.

<Justifications> During 02/03 SoA, 3-phase process was accidentally deleted.

<Justification> can be used to disable GTR#22 requirement (battery deterioration) without disadvantage

Table A8/8

**Calculation of final charge-depleting values (FE applicable for results after 3 phases only)**

Table A8/8 shall be performed separately for results after 4 phases and for results after 3 phases.

| *Step no.* | *Source* | *Input* | *Process* | *Output* | |
| --- | --- | --- | --- | --- | --- |
| 1 | Annex B8 | Charge-depleting test results | Results measured according to Appendix 3 to this annex, pre-calculated according to paragraph 4.3. of this annex.  Recharged electric energy according to paragraph 3.2.4.6. of this annex.  Cycle energy according to paragraph 5. of Annex B7.  CO2 emission according to paragraph 3.2.1. of Annex B7.  Mass of gaseous emission compound i according to paragraph 4.1.3.1. of Annex B8.  All-electric range determined according to paragraph 4.4.1.1. of this annex.  CO2 emission KCO2 correction coefficient might be necessary according to Appendix 2 to this annex.  Output is available for each test. | ΔEREESS,j, Wh;  dj, km;  EAC, Wh;  Ecycle, Ws;  MCO2,CD,j, g/km;  Mi,CD,j, g/km;  AER, km;  KCO2,  (g/km)/(Wh/km). | |
| For results after 4 phases  Annex B8 |  | Usable battery energy according to paragraph 4.4.1.2.2. of this annex.  In the case that the applicable WLTC city test cycle was driven: all- electric range city according to paragraph 4.4.1.2.1. of this annex.  Particle number emissions (if applicable) according to paragraph 4. of Annex B7.  Particulate matter emissions according to paragraph 4. of Annex B7. | UBEcity, Wh;  AERcity, km.  PNCD,j, particles per kilometer;  PMCD,c, mg/km; | |
| 2 | Output step 1 | ΔEREESS,j, Wh;  Ecycle, Ws. | Calculation of relative electric energy change for each cycle according to paragraph 3.2.4.5.2. of this annex.  Output is available for each test and each applicable WLTP test cycle. | REECi. |
| 3 | Output step 2 | REECi. | Determination of the transition and confirmation cycle according to paragraph 3.2.4.4. of this annex.  In the case that more than one charge-depleting test is available for one configuration, for the purpose of averaging, each test shall have the same transition cycle number nveh.  Determination of the charge-depleting cycle range according to paragraph 4.4.3. of this annex.  Output is available for each test. | nveh;  RCDC; km. |
| 4 | Output step 3 | nveh; | In the case that the interpolation method is used, the transition cycle shall be determined for vehicle H, L and, if applicable, M. | nveh,L;  nveh,H;  if applicable  nveh,M. |
| For results after 4 phases  5 | Output step 1 | Mi,CD,j, g/km;  PMCD,c, mg/km;  PNCD,j, particles per kilometer. | Calculation of combined values for emissions for nveh cycles;  Output is available for each test. | Mi,CD,c, g/km;  PMCD,c, mg/km;  PNCD,c, particles per kilometer. |
| For results after 4 phases  6 | Output step 5 | Mi,CD,c, g/km;  PMCD,c, mg/km;  PNCD,c, particles per kilometer. | Emission averaging of tests for each applicable WLTP test cycle within the charge-depleting Type 1 test and checking compliance with the limits according to Table A6/2 of Annex B6. | Mi,CD,c,ave, g/km;  PMCD,c,ave, mg/km;  PNCD,c,ave, particles per kilometer. |
| For results after 4 phases  7 | Output step 1 | ΔEREESS,j, Wh;  dj, km;  UBEcity, Wh. | In the case that AERcity is derived from the Type 1 test by driving the applicable WLTP test cycles, the value shall be calculated according to paragraph 4.4.1.2.2. of this annex.  In the case of more than one test,  ncity,pe shall be equal for each test.  Output is available for each test.  Averaging of AERcity. | AERcity, km;  AERcity,ave, km. |
| For results after 4 phases  8 | Output step 1 | dj, km; | Phase-specific and cycle-specific UF calculation.  Output is available for each test. | UFphase,j;  UFcycle,c. | |
| Output step 3 | nveh; |
| Output step 4 | nveh,L; |
| For results after 4 phases  9 | Output step 1 | ΔEREESS,j, Wh;  dj, km;  EAC, Wh; | Calculation of the electric energy consumption based on the recharged energy according. to paragraphs 4.3.1. of this annex.  Output is available for each test. | ECAC,CD, Wh/km; | |
| Output step 3 | nveh; |
| Output step 4 | nveh,L; |
| Output step 8 | UFphase,j; |
| 10 | Output step 1 | MCO2,CD,j, g/km;  KCO2, (g/km)/(Wh/km);  ΔEREESS,j, Wh;  dj, km;  nveh;  nveh,L;  UFphase,j. | Calculation of the charge-depleting CO2 emission according to paragraph 4.1.2. of this annex.  Output is available for each test. | MCO2,CD, g/km; | |
| Output step 3 | dj, km; |
| Output step 4 | nveh; |
| Output step 8 | nveh,L;  UFphase,j. |
| 11 | Output step 1 | MCO2,CD,j, g/km;  Mi,CD,j, g/km;  KCO2, (g/km)/(Wh/km).  nveh;  nveh,L;  UFphase,j; | Calculation of the charge-depleting fuel consumption and fuel efficiency according to paragraph 4.2.2. of this annex.  For results after 4 phases,  the phase-specific fuel consumption FCCD,j shall be calculated using the corrected CO2 emission according to paragraph 6. of Annex B7.  Output is available for each test. | For results after 4 phases,  FCCD,j, l/100 km;  FCCD, l/100 km.  For results after 3 phases,  FECD, km/l. | |
| Output step 3 | nveh; |
| Output step 4 | nveh,L; |
| Output step 8 | UFphase,j; |
| 12 | Output step 1 | ΔEREESS,j, Wh;  dj, km; | If applicable, calculation of the electric energy consumption from the first applicable WLTP test cycle.  Output is available for each test. | ECDC,CD,first, Wh/km |
| 13 | Output step 9 | ECAC,CD, Wh/km; | Averaging of tests for each vehicle.  In the case that the interpolation method is applied, the output is available for each vehicle H, L and, if applicable, M. | If applicable:  ECDC,CD,first,ave, Wh/km  For results after 4 phases,  ECAC,CD,ave, Wh/km;  MCO2,CD,ave, g/km;  FCCD,ave, l/100 km;  For results after 3 phases,  FECD,ave, km/l. | |
| Output step 10 | MCO2,CD, g/km; |
| Output step 11 | FCCD, l/100 km; FECD, km/l. |
| Output step 12 | If applicable:  ECDC,CD,first, Wh/km. |
| 14 | Output step 13 | ECAC,CD,ave, Wh/km;  MCO2,CD,ave, g/km.  FECD,ave, km/l. | Declaration of charge-depleting electric energy consumption, fuel efficiency and CO2 emission for each vehicle.  Calculation of ECAC,weighted according to paragraph 4.3.2. of this annex.  In the case that the interpolation method is applied, the output is available for each vehicle H, L and, if applicable, M. | For results after 4 phases,  ECAC,CD,declared, Wh/km;  ECAC,weighted, Wh/km;  MCO2,CD,declared, g/km.  For results after 3 phases,  FECD,declared, km/l. |
| 15 | Output step 13 | ECAC,CD,ave, Wh/km;  If applicable:  ECDC,CD,first,ave, Wh/km; | If applicable:  Adjustment of electric energy consumption for the purpose of COP as described in paragraph 2.2. of Appendix 8 to this annex.  In the case that the interpolation method is applied, the output is available for each vehicle H, L and, if applicable, M. | ECDC,CD,COP, Wh/km; | |
| Output step 14 | ECAC,CD,declared, Wh/km; |
| 16  If the interpolation method is not applied, step No. 17 is not required and the output of this step is the final result. | Output step 15 | If applicable: ECDC,CD,COP, Wh/km; | In the case that the interpolation method is applied, intermediate rounding shall be performed according to paragraph 6.1.8. of this Regulation:  MCO2,CD shall be rounded to the second place of decimal.  ECAC,CD,final and ECAC,weighted,final shall be rounded to the first place of decimal.  If applicable:  ECDC,CD,COP shall be rounded to the first place of decimal.  FCCD and FECD shall be rounded to the third place of decimal.  Output is available for vehicle H and for vehicle L and, if applicable, for vehicle M.  In case that the interpolation method is not applied, final rounding shall be applied according to paragraph 6.1.8. of this Regulation:  ECAC,CD , ECAC,weighted and MCO2,CD shall be rounded to the nearest whole number.    If applicable:  ECDC,CD,COP shall be rounded to the nearest whole number.    FCCD and FECD shall be rounded to the first place of decimal. | If applicable: ECDC,CD,COP,final, Wh/km;  For results after 4 phases,  ECAC,CD,final, Wh/km;  MCO2,CD,final, g/km;  ECAC,weighted,final, Wh/km;  FCCD,final, l/100 km;  For results after 3 phases,  FECD,final, km/l; | |
| Output step 14 | ECAC,CD,declared, Wh/km;  ECAC,weighted, Wh/km;  FECD,declared, km/l;  MCO2,CD,declared, g/km. |
| Output step 13 | FCCD,ave, l/100 km; |
| 17  Result of an individual vehicle.  Final test result. | Output step 16 | If applicable: ECDC,CD,COP,final, Wh/km;  ECAC,CD,final, Wh/km;  MCO2,CD,final, g/km;  ECAC,weighted,final, Wh/km;  FCCD,final, l/100 km; FECD,final, km/l; | Interpolation of individual values based on input from vehicles H and L and, if applicable, vehicle M.  Final rounding of individual vehicle values shall be performed according to paragraph 6.1.8. of this Regulation.  ECAC,CD , ECAC,weighted and MCO2,CD shall be rounded to the nearest whole number.  If applicable:  ECDC,CD,COP shall be rounded to the nearest whole number.    FCCD shall be rounded to the first place of decimal.  Output is available for each individual vehicle. | If applicable: ECDC,CD,COP,ind, Wh/km;  For results after 4 phases,  ECAC,CD,ind, Wh/km;  MCO2,CD,ind, g/km;  ECAC,weighted,ind, Wh/km;  FCCD,ind, l/100 km;  For results after 3 phases,  FECD,ind, km/l; | |

<Jastifications> delete R\_CDC provision, double process

Table A8/9

**Calculation of final charge-depleting and charge-sustaining weighted values (FE applicable for results after 3 phases only)**

Table A8/9 shall be performed separately for results after 4 phases and for results after 3 phases.

| *Step no.* | *Source* | *Input* | *Process* | *Output* | |
| --- | --- | --- | --- | --- | --- |
| 1 | Output step 1, Table A8/8 | Mi,CD,j, g/km;  PNCD,j, particles per kilometer;  PMCD,c, mg/km;  MCO2,CD,j, g/km;  ΔEREESS,j, Wh;  dj, km;  AER, km;  EAC, Wh; | Input from CD and CS post processing.  Output in the case of CD is available for each CD test. Output in the case of CS is available once due to CS test averaged values.  In the case that the interpolation method is applied, the output (except of KCO2) is available for vehicle H, L and, if applicable, M.  CO2 emission correction coefficient KCO2 might be necessary according to Appendix 2 to this annex. | MCO2,CD,j, g/km;  AER, km;  EAC, Wh;  MCO2,CS,declared, g/km;  MCO2,CD,declared, g/km;  MCO2,CD,ave, g/km;  For results after 4 phases  Mi,CD,j, g/km;  PNCD,j, particles per kilometer;  PMCD,c, mg/km;  ΔEREESS,j, Wh;  dj, km;  AERcity,ave, km;  nveh;  RCDC, km;  nveh,L;  nveh,H;  UFphase,j;  UFcycle,c;  Mi,CS,c,6, g/km;  MCO2,CS,p  KCO2,  (g/km)/(Wh/km). | |
| Output step 7, Table A8/8 | AERcity,ave, km; |
| Output step 3, Table A8/8 | nveh;  RCDC, km; |
| Output step 4, Table A8/8 | nveh,L;  nveh,H; |
| Output step 8, Table A8/8 | UFphase,j;  UFcycle,c; |
| Output step 6, Table A8/5 | Mi,CS,c,6, g/km; |
| Output step 7, Table A8/5 | MCO2,CS,declared, g/km;  MCO2,CS,p |
| Output step 14, Table A8/8 | MCO2,CD,declared, g/km; |
| Output step 13, Table A8/8 | MCO2,CD,ave, g/km; |
|  | KCO2,  (g/km)/(Wh/km). |
| For results after 4 phases  2 | Output step 1 | Mi,CD,j, g/km;  PNCD,j, particles per kilometer;  PMCD,c, mg/km;  nveh;  nveh,L;  UFphase,j;  UFcycle,c;  Mi,CS,c,6, g/km; | Calculation of weighted emission (except MCO2,weighted) compounds according to paragraphs 4.1.3.1. to 4.1.3.3. inclusive of this annex.  Remark:  Mi,CS,c,6 includes PNCS,c and PMCS,c.  Output is available for each CD test. | Mi,weighted, g/km;  PNweighted, particles per kilometer;  PMweighted, mg/km; |
| 3 | Output step 1 | MCO2,CD,j, g/km;  ΔEREESS,j, Wh;  dj, km;  nveh;  RCDC, km  MCO2,CS,declared, g/km;  MCO2,CS,p | Calculation of equivalent all-electric range according to paragraphs 4.4.4.1. and 4.4.4.2. of this annex, and actual charge-depleting range according to paragraph 4.4.5. of this annex.  Output is available for each CD test.  RCDA shall be rounded according to paragraph 6.1.8. of this Regulation to the nearest whole number. | EAER, km;  EAERp, km;  RCDA, km. | |
| 4 | Output step 1 | AER, km; | Output is available for each CD test.  In the case that the interpolation method is applied, check the availability of AER interpolation between vehicle H, L and, if applicable, M according to paragraph 4.5.7.1. of this annex.  If the interpolation method is used, each test shall fulfil the requirement. | AER-interpolation availability. | |
| Output step 3 | RCDA, km. |
| 5  If the interpolation method is not applied, step No. 9 is not required and the output of this step is the final result. | Output step 1 | AER, km. | Averaging AER and AER declaration.  The declared AER shall be rounded according to paragraph 6.1.8. of this Regulation to the number of decimal places specified in Table A6/1 of Annex B6.  In the case that the interpolation method is applied and the AER interpolation availability criterion is fulfilled, AERshall be rounded according to paragraph 6.1.8. of this Regulation to the first place of decimal.  The output is available for each vehicles H and L and, if applicable, for vehicle M.  If the case that the interpolation method is applied but the criterion is not fulfilled, AER of vehicle H shall be applied for the whole interpolation family and shall be rounded according to paragraph 6.1.8. of this Regulation to the nearest whole number.  In the case that the interpolation method is not applied, AERshall be rounded according to paragraph 6.1.8. of this Regulation to the nearest whole number. | AERave, km;  For results after 4 phases  AERdec, km. |
| For results after 4 phases,  6 | Output step 1 | Mi,CD,j, g/km;  MCO2,CD,j, g/km;  nveh;  nveh,L;  UFphase,j;  Mi,CS,c,6, g/km;  MCO2,CS,declared, g/km.  MCO2,CD,declared, g/km;  MCO2,CD,ave, g/km; | Calculation of weighted CO2 emission and fuel consumption according to paragraphs 4.1.3.1. and 4.2.3. of this annex.  Output is available for each CD test. | MCO2,weighted, g/km;  FCweighted, l/100 km; | |
| 7 | Output step 1 | EAC, Wh; | Calculation of the electric energy consumption based on EAER according to paragraphs 4.3.3.1. and 4.3.3.2. of this annex.  Output is available for each CD test. | EC, Wh/km;  ECp, Wh/km; | |
| Output step 3 | EAER, km;  EAERp, km; |
| 8  If the interpolation method is not applied, step No. 9 is not required and the output of this step is the final result. | Output step 1 | AERcity, ave, km; | For results after 3 phases  Averaging EC and EC declaration.  For results after 3 phases and 4 phases  Averaging and intermediate rounding according to paragraph 6.1.8. of this Regulation.  In the case that the interpolation method is applied, intermediate rounding shall be performed according to paragraph 6.1.8. of this Regulation.  AERcity,ave, EAER and EAERp shall be rounded to the first place of decimal.  MCO2,weighted shall be rounded to the second place of decimal.  FCweighted shall be rounded to the third place of decimal.  EC and ECp shall be rounded to the first place of decimal.  The output is available for each vehicle H, vehicle L and, if applicable, vehicle M.  In case that the interpolation method is not applied, final rounding of the test results shall be applied according to paragraph 6.1.8. of this Regulation.  AERcity,final, EAER and EAERp shall be rounded to the nearest whole number.  MCO2,weighted shall be rounded to the nearest whole number.  FCweighted shall be rounded to the first place of decimal.  EC and ECp shall be rounded to the nearest whole number. | For results after 3 phases  ECdec, Wh/km;  ECp,final, Wh/km;  EAERfinal, km;  For results after 4 phases  AERcity,final, km;  MCO2,weighted,final, g/km;  FCweighted,final, l/100 km;  ECfinal, Wh/km;  ECp,final, Wh/km;  EAERfinal, km;  EAERp,final, km. | |
| Output step 6 | MCO2,weighted, g/km;  FCweighted, l/100 km; |
| Output step 7 | EC, Wh/km;  ECp, Wh/km; |
| Output step 3 | EAER, km;  EAERp, km; |
| Output step 5 | AERdec, km;  AERave, km. |
| 9  Result of an individual vehicle.  Final test result. | Output step 5 | AERdec, km; | Interpolation of individual values based on input from vehicle low, medium and high according to paragraph 4.5. of this annex, and final rounding according to paragraph 6.1.8. of this Regulation.  AERind,AERcity,ind, EAERind and EAERp,ind shall be rounded to the nearest whole number.  MCO2,weighted,ind shall be rounded to the nearest whole number.  ECweighted,ind shall be rounded to the first place of decimal.  FCweighted,ind shall be rounded to the first place of decimal.  ECind and ECp,ind shall be rounded to the nearest whole number.  Output is available for each individual vehicles.  RCDC shall be rounded according to paragraph 6.1.8. of this Regulation to the nearest whole number. | ECind, Wh/km;  ECp,ind, Wh/km;  EAERind, km;  For results after 4 phases,  AERind, km;  AERcity,ind, km;  MCO2,weighted,ind, g/km;  FCweighted,ind, l/100 km;  EAERp,ind, km.  RCDC,final | |
| Output step 8 | AERcity,final, km;  MCO2,weighted,final, g/km;  FCweighted,final, l/100 km;  ECfinal, Wh/km;  ECp,final, Wh/km;  EAERfinal, km;  EAERp,final, km; |
| Output step 4 | AER-interpolation availability |
| Output step 1 | RCDC |

Table A8/10

**Calculation of final PEV values determined by application of the consecutive cycle Type 1 procedure**

Table A8/10 shall be performed separately for results after 4 phases and for results after 3 phases.

For results after 4 phases;

The considered periods shall be the low phase, medium phase, high phase, extra high phase, the applicable WLTP city test cycle and the applicable WLTP test cycle.

For results after 3 phases;

The considered periods shall be the low phase, medium phase, high phase and the applicable WLTP test cycle.

| *Step no.* | *Source* | *Input* | *Process* | *Output* |
| --- | --- | --- | --- | --- |
| 1 | Annex B8 | Test results | Results measured according to Appendix 3 to this annex and pre-calculated according to paragraph 4.3. of this annex.  Usable battery energy according to paragraph 4.4.2.2.1. of this annex.  Recharged electric energy according to paragraph 3.4.4.3. of this annex.  Output is available for each test.  EAC shall be rounded according to paragraph 6.1.8. of this Regulation to the first place of decimal. | ΔEREESS,j, Wh;  dj, km;  UBECCP, Wh;  EAC, Wh. |
| 2 | Output step 1 | ΔEREESS,j, Wh;  UBECCP, Wh. | Determination of the number of completely driven applicable WLTC phases and cycles according to paragraph 4.4.2.2. of this annex.  Output is available for each test. | nWLTC;  ncity;  nlow;  nmed;  nhigh;  nexHigh. |
| 3 | Output step 1 | ΔEREESS,j, Wh;  UBECCP, Wh. | Calculation of weighting factors according to paragraph 4.4.2.2. of this annex.  *Note*: The number of weighting factors depends on the applicable cycle that was used (3- or 4-phase WLTC). In the case of 4-phase WLTCs, the output in brackets might be needed in addition.  Output is available for each test. | KWLTC,1  KWLTC,2  KWLTC,3  (KWLTC,4)  Kcity,1  Kcity,2  Kcity,3  (Kcity,4)  Klow,1  Klow,2  Klow,3  (Klow,4)  Kmed,1  Kmed,2  Kmed,3  (Kmed,4)  Khigh,1  Khigh,2  Khigh,3  (Khigh,4)  KexHigh,1  KexHigh,2  KexHigh,3  (KexHigh,4) |
| Output step 2 | nWLTC;  ncity;  nlow;  nmed;  nhigh;  nexHigh. |
| 4 | Output step 1 | ΔEREESS,j, Wh;  dj, km;  UBECCP, Wh. | Calculation of electric energy consumption at the REESSs according to paragraph 4.4.2.2. of this annex.  Calculation of the electric energy consumption from the first applicable WLTP test cycle ECDC,first  Output is available for each test. | ECDC,WLTC, Wh/km;  ECDC,city, Wh/km;  ECDC,low, Wh/km;  ECDC,med, Wh/km;  ECDC,high, Wh/km;  ECDC,exHigh, Wh/km;  ECDC,first, Wh/km. |
| Output step 2 | nWLTC;  ncity;  nlow;  nmed;  nhigh;  nexHigh. |
| Output step 3 | All weighting  factors |
| 5 | Output step 1 | UBECCP, Wh; | Calculation of pure electric range according to paragraph 4.4.2.2. of this annex.  Output is available for each test. | PERWLTC, km;  PERcity, km;  PERlow, km;  PERmed, km;  PERhigh, km;  PERexHigh, km. |
| Output step 4 | ECDC,WLTC, Wh/km;  ECDC,city, Wh/km;  ECDC,low, Wh/km;  ECDC,med, Wh/km;  ECDC,high, Wh/km;  ECDC,exHigh, Wh/km. |
| 6 | Output step 1 | EAC, Wh; | Calculation of electric energy consumption at the mains according to paragraph 4.3.4. of this annex.  Output is available for each test. | ECWLTC, Wh/km;  ECcity, Wh/km;  EClow, Wh/km;  ECmed, Wh/km;  EChigh, Wh/km;  ECexHigh, Wh/km. |
| Output step 5 | PERWLTC, km;  PERcity, km;  PERlow, km;  PERmed, km;  PERhigh, km;  PERexHigh, km. |
| 7  If the interpolation method is not applied, step No. 10 is not required and the output of this step for PERWLTC,dec and ECWLTC,dec is the final result. | Output step 5 | PERWLTC, km;  PERcity, km;  PERlow, km;  PERmed, km;  PERhigh, km;  PERexHigh, km; | Averaging of tests for all input values.  Declaration of PERWLTC,dec and ECWLTC,dec based on PERWLTC,ave and ECWLTC,ave.  Alignment of PER in case of city, low, med, high and exHigh based on the ratio between PERWLTC,dec and PERWLTC,ave:  Alignment of EC in case of city, low, med, high and exHigh based on the ratio between ECWLTC,dec and ECWLTC,ave:  In the case that the interpolation method is applied, the output is available for vehicle H and vehicle L. PERWLTC,dec as well as ECWLTC,dec shall be rounded according to paragraph 6.1.8. of this Regulation to the number of places of decimal as specified in Table A6/1 of Annex B6.  In the case that the interpolation method is not applied, PERWLTC,dec and ECWLTC,dec shall be rounded according to paragraph 6.1.8. of this Regulation to the nearest whole number.  . | PERWLTC,dec, km;  PERWLTC,ave, km;  PERcity,ave, km;  PERlow,ave, km;  PERmed,ave, km;  PERhigh,ave, km;  PERexHigh,ave, km;  ECWLTC,dec, Wh/km;  ECWLTC,ave, Wh/km;  ECcity,ave, Wh/km;  EClow,ave, Wh/km;  ECmed,ave, Wh/km;  EChigh,ave, Wh/km;  ECexHigh,ave, Wh/km;  ECDC,first,ave, Wh/km. |
| Output step 6 | ECWLTC, Wh/km;  ECcity, Wh/km;  EClow, Wh/km;  ECmed, Wh/km;  EChigh, Wh/km;  ECexHigh, Wh/km. |
| Output step 4 | ECDC,first, Wh/km. |
| 8 | Output step 7 | ECWLTC,dec, Wh/km;  ECWLTC,ave, Wh/km;  ECDC,first,ave, Wh/km. | Adjustment of the electric energy consumption for the purpose of COP as described in paragraph 1.2. of Appendix 8 to this annex.  In the case that the interpolation method is applied, the output is available for vehicle H and vehicle L. | ECDC,COP, Wh/km. |
| 9  If the interpolation method is not applied, step No. 10 is not required and the output of this step is the final result. | Output step 7 | PERcity,ave, km;  PERlow,ave, km;  PERmed,ave, km;  PERhigh,ave, km;  PERexHigh,ave, km;  ECcity,ave, Wh/km;  EClow,ave, Wh/km;  ECmed,ave, Wh/km;  EChigh,ave, Wh/km;  ECexHigh,ave, Wh/km; | Intermediate rounding according to paragraph 6.1.8. of this Regulation.  In the case that the interpolation method is applied, intermediate rounding shall be performed according to paragraph 6.1.8. of this Regulation:  PERcity and PERp shall be rounded to the first place of decimal.  ECcity and ECp shall be rounded to the first place of decimal.  ECDC,COP shall be rounded to the first place of decimal.  The output is available for vehicle H and vehicle L.  In case that the interpolation method is not applied, final rounding of the test results according to paragraph 6.1.8. of this Regulation:  PERcity and PERp shall be rounded to the nearest whole number.  ECcity and ECp shall be rounded to the nearest whole number.  ECDC,COP shall be rounded to the nearest whole number. | PERcity,final, km;  PERlow,final, km;  PERmed,final, km;  PERhigh,final, km;  PERexHigh,final, km;  ECcity,final, Wh/km;  EClow,final, Wh/km;  ECmed,final, Wh/km;  EChigh,final, Wh/km;  ECexHigh,final, Wh/km;  ECDC,COP,final, Wh/km. |
| Output step 8 | ECDC,COP, Wh/km. |
| 10  Result of an individual vehicle.  Final test result. | Output step 7 | PERWLTC,dec, km;  ECWLTC,dec, Wh/km | Interpolation of individual values based on input from vehicle H and vehicle L according to paragraph 4.5. of this annex, and final rounding according to paragraph 6.1.8. of this Regulation.  PERind, PERcity,ind, and PERp,ind shall be rounded to the nearest whole number.  ECind, ECcity and ECp,ind shall be rounded to the nearest whole number.  ECDC,COP,ind shall be rounded to the nearest whole number.  The output is available for each individual vehicle. | PERWLTC,ind, km;  PERcity,ind, km;  PERlow,ind, km;  PERmed,ind, km;  PERhigh,ind, km;  PERexHigh,ind, km;  ECWLTC,ind, Wh/km;  ECcity,ind, Wh/km;  EClow,ind, Wh/km;  ECmed,ind, Wh/km;  EChigh,ind, Wh/km;  ECexHigh,ind, Wh/km;  ECDC,COP,ind, Wh/km. |
| Output step 9 | PERcity,final, km;  PERlow,final, km;  PERmed,final, km;  PERhigh,final, km;  PERexHigh,final, km;  ECcity,final, Wh/km;  EClow,final, Wh/km;  ECmed,final, Wh/km;  EChigh,final, Wh/km;  ECexHigh,final, Wh/km;  ECDC,COP,final, Wh/km. |

<Jastification> double process

Table A8/11

**Calculation of final PEV values determined by application the shortened Type 1 test procedure**

Table A8/11 shall be performed separately for results after 4 phases and for results after 3 phases.

For results after 4 phases;

The considered periods shall be the low phase, medium phase, high phase, extra high phase, the applicable WLTP city test cycle and the applicable WLTP test cycle.

For results after 3 phases;

The considered periods shall be the low phase, medium phase, high phase and the applicable WLTP test cycle.

| *Step no.* | *Source* | *Input* | *Process* | *Output* |
| --- | --- | --- | --- | --- |
| 1 | Annex B8 | Test results | Results measured according to Appendix 3 to this annex, and pre-calculated according to paragraph 4.3. of this annex.  Usable battery energy according to paragraph 4.4.2.1.1. of this annex.  Recharged electric energy according to paragraph 3.4.4.3. of this annex.  Output is available for each test.  EAC shall be rounded according to paragraph 6.1.8. of this Regulation to the first place of decimal. | ΔEREESS,j, Wh;  dj, km;  UBESTP, Wh;  EAC, Wh. |
| 2 | Output step 1 | ΔEREESS,j, Wh;  UBESTP, Wh. | Calculation of weighting factors according to paragraph 4.4.2.1. of this annex.  Output is available for each test. | KWLTC,1  KWLTC,2  Kcity,1  Kcity,2  Kcity,3  Kcity,4  Klow,1  Klow,2  Klow,3  Klow,4  Kmed,1  Kmed,2  Kmed,3  Kmed,4  Khigh,1  Khigh,2  KexHigh,1  KexHigh,2 |
| 3 | Output step 1  Output step 2 | ΔEREESS,j, Wh;  dj, km;  UBESTP, Wh.  All weighting factors | Calculation of electric energy consumption at the REESSs according to paragraph 4.4.2.1. of this annex.  Calculation of the electric energy consumption from the first applicable WLTP test cycle ECDC,first.  Output is available for each test. | ECDC,WLTC, Wh/km;  ECDC,city, Wh/km;  ECDC,low, Wh/km;  ECDC, med, Wh/km;  ECDC,high, Wh/km;  ECDC,exHigh, Wh/km;  ECDC,first, Wh/km. |
| 4 | Output step 1 | UBESTP, Wh; | Calculation of pure electric range according to paragraph 4.4.2.1. of this annex.  Output is available for each test. | PERWLTC, km;  PERcity, km;  PERlow, km;  PERmed, km;  PERhigh, km;  PERexHigh, km. |
| Output step 3 | ECDC,WLTC, Wh/km;  ECDC,city, Wh/km;  ECDC,low, Wh/km;  ECDC, med, Wh/km;  ECDC,high, Wh/km;  ECDC,exHigh,  Wh/km. |
| 5 | Output step 1 | EAC, Wh; | Calculation of electric energy consumption at the mains according to paragraph 4.3.4. of this annex.  Output is available for each test. | ECWLTC, Wh/km;  ECcity, Wh/km;  EClow, Wh/km;  ECmed, Wh/km;  EChigh, Wh/km;  ECexHigh, Wh/km. |
| Output step 4 | PERWLTC, km;  PERcity, km;  PERlow, km;  PERmed, km;  PERhigh, km;  PERexHigh, km. |
| 6  If the interpolation method is not applied, step No. 9 is not required and the output of this step for PERWLTC,dec and ECWLTC,dec is the final result. | Output step 4 | PERWLTC, km;  PERcity, km;  PERlow, km;  PERmed, km;  PERhigh, km;  PERexHigh, km; | Averaging of tests for all input values.  Declaration of PERWLTC,dec and ECWLTC,dec based on PERWLTC,ave and ECWLTC,ave.  Alignment of PER in case of city, low, med, high and exHigh based on the ratio between PERWLTC,dec and PERWLTC,ave:  Alignment of EC in case of city, low, med, high and exHigh based on the ratio between ECWLTC,dec and ECWLTC,ave:    In the case that the interpolation method is applied, the output is available for vehicle H and vehicle L. PERWLTC,dec as well as ECWLTC,dec shall be rounded according to paragraph 6.1.8. of this Regulation to the number of places of decimal specified in Table A6/1 of Annex B6.  In the case that the interpolation method is not applied, PERWLTC,dec and ECWLTC,dec shall be rounded according to paragraph 6.1.8. of this Regulation to the nearest whole number. | PERWLTC,dec, km;  PERWLTC,ave, km;  PERcity,ave, km;  PERlow,ave, km;  PERmed,ave, km;  PERhigh,ave, km;  PERexHigh,ave, km;  ECWLTC,dec, Wh/km;  ECWLTC,ave, Wh/km;  ECcity,ave, Wh/km;  EClow,ave, Wh/km;  ECmed,ave, Wh/km;  EChigh,ave, Wh/km;  ECexHigh,ave, Wh/km;  ECDC,first,ave, Wh/km. |
| Output step 5 | ECWLTC, Wh/km;  ECcity, Wh/km;  EClow, Wh/km;  ECmed, Wh/km;  EChigh, Wh/km;  ECexHigh, Wh/km. |
| Output step 3 | ECDC,first, Wh/km. |
| 7 | Output step 6 | ECWLTC,dec, Wh/km;  ECWLTC,ave, Wh/km;  ECDC,first,ave, Wh/km. | Adjustment of the electric energy consumption for the purpose of COP as described in paragraph 1.2. of Appendix 8 to this annex.  In the case that the interpolation method is applied, the output is available for vehicle H and vehicle L. | ECDC,COP, Wh/km. |
| 8  If the interpolation method is not applied, step No. 9 is not required and the output of this step is the final result. | Output step 6 | PERcity,ave, km;  PERlow,ave, km;  PERmed,ave, km;  PERhigh,ave, km;  PERexHigh,ave, km;  ECcity,ave, Wh/km;  EClow,ave, Wh/km;  ECmed,ave, Wh/km;  EChigh,ave, Wh/km;  ECexHigh,ave, Wh/km; | Intermediate rounding according to paragraph 6.1.8. of this Regulation.  In the case that the interpolation method is applied, intermediate rounding shall be performed according to paragraph 6.1.8. of this Regulation:  PERcity and PERp shall be rounded to the first place of decimal.  ECcity and ECp shall be rounded to the first place of decimal.  ECDC,COP shall be rounded to the first place of decimal.  The output is available for vehicle H and vehicle L.  In case that the interpolation method is not applied, final rounding of the test results according to paragraph 6.1.8. of this Regulation shall apply:  PERcity and PERp shall be rounded to the nearest whole number.  ECcity and ECp shall be rounded to the nearest whole number.  ECDC,COP shall be rounded to the nearest whole number. | PERcity,final, km;  PERlow,final, km;  PERmed,final, km;  PERhigh,final, km;  PERexHigh,final, km;  ECcity,final, Wh/km;  EClow,final, Wh/km;  ECmed,final, Wh/km;  EChigh,final, Wh/km;  ECexHigh,final, Wh/km;  ECDC,COP,final, Wh/km. |
| Output step 7 | ECDC,COP, Wh/km. |
| 9  Result of an individual vehicle.  Final test result. | Output step 6 | PERWLTC,dec, km;  ECWLTC,dec, Wh/km; | Interpolation of individual values based on input from vehicle H and vehicle L according to paragraph 4.5. of this annex, and final rounding according to paragraph 6.1.8. of this Regulation.  PERind, PERcity,ind, and PERp,ind shall be rounded to the nearest whole number.  ECind, ECcity and ECp,ind shall be rounded to the nearest whole number.  ECDC,COP,ind shall be rounded to the nearest whole number.  Output is available for each individual vehicle. | PERWLTC,ind, km;  PERcity,ind, km;  PERlow,ind, km;  PERmed,ind, km;  PERhigh,ind, km;  PERexHigh,ind, km;  ECWLTC,ind, Wh/km;  ECcity,ind, Wh/km;  EClow,ind, Wh/km;  ECmed,ind, Wh/km;  EChigh,ind, Wh/km;  ECexHigh,ind, Wh/km;  ECDC,COP,ind, Wh/km. |
| Output step 8 | PERcity,final, km;  PERlow,final, km;  PERmed,final, km;  PERhigh,final, km;  PERexHigh,final, km;  ECcity,final, Wh/km;  EClow,final, Wh/km;  ECmed,final, Wh/km;  EChigh,final, Wh/km;  ECexHigh,final, Wh/km;  ECDC,COP,final, Wh/km. |

<Jastification> double process

Annex B8 - Appendix 3

Determination of REESS current and REESS voltage for NOVC-HEVs, OVC-HEVs, PEVs and NOVC-FCHVs

Table A8 App3/1

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| *Test events* | *Paragraph 3.1.* | *Paragraph 3.2.* | | *Paragraph 3.3.* |
| *60V or more* | *Less than 60V* |
| NOVC-HEV | shall not to be used | shall be used | | shall not to be used |
| OVC-HEV CS condition |
| NOVC-FCHV |
| OVC-FCHV CS condition |
| REESS energy change-based correction procedure (Appendix 2) |
| Break-Off Criterion calculation for CD-test (Annex B8, paragraph 3.2.5.4.2.) |
| OVC-HEV CD condition | allowed to use | shall not to be used | allowed to use | allowed to use |
| OVC-FCHV CD condition |
| PEV |

<Justif­ication> incorrect description

Annex C3: Type 4 test

Determination of evaporative emissions from vehicles fuelled with petrol

Type 4 test procedures and test conditions

4.7.1. The following pure gases shall be available for calibration and operation:

Purified synthetic air: (purity < 1 ppm C1 equivalent,

≤1 ppm CO, ≤ 400 ppm CO2, ≤ 0.1 ppm NO);

Oxygen content between 18 and 21 per cent by volume.

Hydrocarbon analyser fuel gas: defined in paragraph 6.1.2.4. of Annex B5 to this Regulation or (40 ± 2 per cent hydrogen, and balance helium with less than 1 ppm C1 equivalent hydrocarbon, less than 400 ppm CO2),

Propane (C3H8): 99.5 per cent minimum purity.

Butane (C4H10): 98 per cent minimum purity.

Nitrogen (N2): defined in paragraph 6.1.2.1. of Annex B5 to this Regulation or 98 per cent minimum purity.

<Justification> allow to use gases for Type1 test as an option to improve test operation efficiency

1. \* In accordance with the programme of work of the Inland Transport Committee for 2022 as outlined in proposed programme budget for 2022 (A/76/6 (part V sect. 20) para 20.76), the World Forum will develop, harmonize and update UN Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate. [↑](#footnote-ref-2)