

Proposal for amendments to the original version, 01, 02 and 03 series of Amendments to UN Regulation No. 154 (Worldwide harmonized Light vehicles Test Procedures (WLTP))

This document proposes amendments to bring clarity in the text relating to alternative procedures for demonstrating Conformity of Production of evaporative emissions control systems and consistency in the rounding of the Deterioration Factors (DFs). It also proposes an amendment to the formatting of a paragraph relating to Speed Trace Tolerances in order to bring clarity. The intention is for these proposals to be integrated in the following working documents: GRPE-2024-02 (document from OICA proposing amendments to the original version of UN Regulation No. 154), GRPE-2024-03 (document from OICA proposing amendments to UN Regulation No. 154.01), GRPE-2024-09 (document from Japan proposing amendments to UN Regulation No. 154.02) and GRPE-2024-10 (document from Japan proposing amendments to UN Regulation No. 154.03). The modifications to the current text of the Regulation are marked in bold for new or strikethrough for deleted characters.

I. Proposal

(1) *In the original version, 01, 02 and 03 Series of Amendments,*

Appendix 4, paragraph 2.2., amend to read:

"2.2. A pressure of 3.70 kPa ± 0.10 kPa shall be applied to the fuel system. At the request of manufacturer and with approval of the responsible authority, an alternative pressure can also be applied, taking into account the **design pressures** ~~range in use~~ of the fuel system."

Appendix 4, paragraph 3.6., amend to read:

"3.6. At the request of the manufacturer and in agreement with the responsible authority the functional capacity for venting can be demonstrated, when applicable, by an equivalent alternative procedure. **In this case the pressures and times stated in paragraphs 3.2. and 3.5. may be adapted to take into account the design parameters of the fuel system.**"

(2) *In the original version and 02 Series of Amendments,*

Addendum to type approval communication, Paragraph 2.1., amend the first two tables to read (titles remain bold):

".....

Test 1

<i>Type 1 Result</i>	<i>CO</i> (mg/km)	<i>THC</i> (mg/km)	<i>NMHC</i> (mg/km)	<i>NO_x</i> (mg/km)	<i>THC + NO_x</i> (mg/km)	<i>PM</i> (mg/km)	<i>PN</i> (#.10 ¹¹ /km)
Measured ⁽⁸⁾ ⁽⁹⁾							
Ki × ⁽⁸⁾ ⁽¹⁰⁾					⁽¹¹⁾		
Ki + ⁽⁸⁾ ⁽¹⁰⁾					⁽¹¹⁾		

Mean value calculated with Ki (M × Ki or M + Ki) ⁽⁹⁾					(12)		
DF (+) ⁽⁸⁾ ^(10a)							
DF (×) ⁽⁸⁾ ^(10a)							
Final mean value calculated with Ki and DF ⁽¹³⁾							
Limit value							

..... "

(3) In the 01 and 03 Series of Amendments,

Addendum to type approval communication, Paragraph 2.1., amend the first two tables to read (titles remain bold):

".....

Test 1a 4 phase test

<i>Type 1 Result</i>	<i>CO</i> (mg/km)	<i>THC</i> (mg/km)	<i>NMHC</i> (mg/km)	<i>NO_x</i> (mg/km)	<i>THC + NO_x</i> (mg/km)	<i>PM</i> (mg/km)	<i>PN</i> (#.10 ¹¹ /km)
Measured ⁽⁸⁾ ⁽⁹⁾							
Ki × ⁽⁸⁾ ⁽¹⁰⁾					(11)		
Ki + ⁽⁸⁾ ⁽¹⁰⁾					(11)		
Mean value calculated with Ki (M × Ki or M + Ki) ⁽⁹⁾					(12)		
DF (+) ⁽⁸⁾ ^(10a)							
DF (×) ⁽⁸⁾ ^(10a)							
Final mean value calculated with Ki and DF ⁽¹³⁾							
Limit value							

Test 1b 3 phase test

<i>Type 1 Result</i>	<i>CO</i> (mg/km)	<i>THC</i> (mg/km)	<i>NMHC</i> (mg/km)	<i>NO_x</i> (mg/km)	<i>PM</i> (mg/km)	<i>PN</i> (#.10 ¹¹ /km)
Measured ⁽⁸⁾ ⁽⁹⁾						
Ki × ⁽⁸⁾ ⁽¹⁰⁾						
Ki + ⁽⁸⁾ ⁽¹⁰⁾						
Mean value calculated with						

Ki (M × Ki or M + Ki) ⁽⁹⁾						
DF (+) ⁽⁸⁾ ^(10a)						
DF (×) ⁽⁸⁾ ^(10a)						
Final mean value calculated with Ki and DF ⁽¹³⁾						
Limit value						

..... "

(4) In the original version, 01, 02 and 03 Series of Amendments,

Addendum to type approval communication, Paragraph 3., amend to read (titles remain bold):

"3. **Remarks: ...**

Explanatory Notes

⁽⁴⁾ If the means of identification of type contains characters not relevant to describe the vehicle, component or separate technical unit types covered by this information, such characters shall be represented in the documentation by the symbol '?' (e.g. ABC??123??)

⁽⁵⁾ (Reserved)

^(5a) (Reserved)

⁽⁶⁾ (Reserved)

⁽⁸⁾ Where applicable.

⁽⁹⁾ Round to 2 decimal places

⁽¹⁰⁾ Round to 4 decimal places

^(10a) Round to 3 decimal places

⁽¹¹⁾ Not applicable

⁽¹²⁾ Mean value calculated by adding mean values (M.Ki) calculated for THC and NOx.

⁽¹³⁾ Round to 1 decimal place more than limit value.

⁽¹⁴⁾ Indicate the applicable procedure.

⁽²²⁾ Applicable Type 1 cycle: Annex B1 of UN Regulation No. 154

⁽²³⁾ If modelling is applied instead of the type 1 test-cycle, this value shall be the one provided by the modelling methodology.

^(a) Delete where not applicable (there are cases where nothing needs to be deleted when more than one entry is applicable)"

(5) In the original version, 01, 02 and 03 Series of Amendments,

Annex B5, paragraph 3.3.2.1., amend to read:

"3.3.2.1. The dilution air used for the primary dilution of the exhaust in the CVS tunnel shall pass through a medium capable of reducing particles of the most penetrating particle size in the filter material by $\leq \geq 99.95$ per cent, or through a filter of at least Class H13 of EN 1822:2009~~2009~~2019. This represents the specification of High Efficiency Particulate Air (HEPA) filters. The dilution air may optionally be charcoal-scrubbed before being passed to the HEPA

filter. It is recommended that an additional coarse particle filter be situated before the HEPA filter and after the charcoal scrubber, if used."

In the original version, 01, 02 and 03 Series of Amendments,

Annex B5, paragraph 4.2.1.3.3.1.1., amend to read:

"4.2.1.3.3.1.1. Secondary dilution air shall be filtered through a medium capable of reducing particles in the most penetrating particle size of the filter material by ≥ 99.95 per cent, or through a HEPA filter of at least Class H13 of EN 1822:~~2009~~**2019**. The dilution air may optionally be charcoal-scrubbed before being passed to the HEPA filter. It is recommended that an additional coarse particle filter be situated before the HEPA filter and after the charcoal scrubber, if used."

In the original version and 01 Series of Amendments,

Annex B5, paragraph 5.7.1.3.3., amend to read:

"5.7.1.3.3. For the requirements of paragraphs 5.7.1.3.(a) and 5.7.1.3.(b), the selected points shall include a nominal zero concentration point produced by attaching HEPA filters of at least Class H13 of EN 1822:~~2008~~**2019**, or equivalent performance, to the inlet of each instrument. With no calibration factor applied to the PNC under calibration, measured concentrations shall be within ± 10 per cent of the standard concentration for each concentration, with the exception of the zero point, otherwise the PNC under calibration shall be rejected. The gradient from a linear least squares regression of the two data sets shall be calculated and recorded. A calibration factor equal to the reciprocal of the gradient shall be applied to the PNC under calibration. Linearity of response is calculated as the square of the Pearson product moment correlation coefficient (r) of the two data sets and shall be equal to or greater than 0.97. In calculating both the gradient and r^2 , the linear regression shall be forced through the origin (zero concentration on both instruments)."

In the 02 and 03 Series of Amendments,

Annex B5, paragraph 5.7.1.3.2., amend to read:

"5.7.1.3.2. For the requirements of paragraphs 5.7.1.3.(a) and 5.7.1.3.(b), the selected points shall include a nominal zero concentration point produced by attaching HEPA filters of at least Class H13 of EN 1822:~~2008~~**2019**, or equivalent performance, to the inlet of each instrument. The gradient from a linear least squares regression of the two data sets shall be calculated and recorded. A calibration factor equal to the reciprocal of the gradient shall be applied to the PNC under calibration. Linearity of response is calculated as the square of the Pearson product moment correlation coefficient (r) of the two data sets and shall be equal to or greater than 0.97. In calculating both the gradient and r^2 , the linear regression shall be forced through the origin (zero concentration on both instruments). The calibration factor shall be between 0.9 and 1.1. Each concentration measured with the PNC under calibration, shall be within ± 5 per cent of the measured reference concentration multiplied with the gradient, with the exception of the zero point."

(6) In the original version, 01, 02 and 03 Series of Amendments,

Annex B5, paragraph 4.2.2.2., Table A5/1, amend to read:

"Table A5/1

Analytical balance verification criteria

<i>Measurement system</i>	<i>Intercept a_0</i>	<i>Slope a_1</i>	<i>Standard error of estimate (SEE)</i>	<i>Coefficient of determination r^2</i>
Particulate balance	$\leq 1 \mu\text{g}$ $\leq 0.1 \text{ mg}$	0.99 – 1.01	≤ 1 per cent max	≥ 0.998

"

(7) In the original version, 01, 02 and 03 Series of Amendments,

Annex B5, paragraph 5.1., Table A5/4, amend to read:

"Table A5/4

Constant volume sampler (CVS) calibration intervals

<i>CVS</i>	<i>Interval</i>	<i>Criterion</i>
CVS flow	After overhaul	±2 per cent
Temperature sensor	Yearly	±1 °C
Pressure sensor	Yearly	±0.4 kPa
Injection check	Weekly Monthly	±2 per cent

"

(8) In the original version, 01, 02 and 03 Series of Amendments,

Annex B5, paragraph 6.1.1., amend to read:

"6.1.1. All values in ppm mean volume-ppm (vpm) **which is considered equal to mol-ppm**"

(9) In the original version, 01, 02 and 03 Series of Amendments,

Annex B6, paragraph 2.6.8.3.1.2., amend to read:

"2.6.8.3.1.2. Tolerance (2)

Speed tolerances greater than those prescribed shall be accepted provided the tolerances are never exceeded for more than 1 second on any one occasion. There shall be no more than ten such deviations per test cycle

- (a) Upper limit: 2.0 km/h higher than the highest point of the trace within ±1.0 second of the given point in time;
- (b) Lower limit: 2.0 km/h lower than the lowest point of the trace within ±1.0 second of the given time.
 - (i) ~~Speed tolerances greater than those prescribed shall be accepted provided the tolerances are never exceeded for more than 1 second on any one occasion.~~
 - (ii) ~~There shall be no more than ten such deviations per test cycle.~~

(10) In the original version, 01, 02 and 03 Series of Amendments,

Appendix 1, paragraph 5.2., amend to read:

"5.2. Test values of electric energy consumption ($EC_{\text{test-i}}$)

The DC electric energy consumption from the REESS(s) $EC_{\text{DC,first,i}}$ shall be determined according to step 4 of Table A8/10 **and according to step 3 of Table A8/11** of Annex B8 and, if available, applying a run-in factor and/or test cell correction as defined in paragraph 8.2.4. of this Regulation."

(11) In the original version, 01, 02 and 03 Series of Amendments,

Appendix 1, paragraph 6.4., renumbered as:

"~~6.4.7.~~ The procedure for the final COP test results is shown in Table App1/1. "

(12) In the original version and 02 Series of Amendments,
Appendix 1 Table App1/1, amend to read:

"

Annex B8 Table A8/10 Step 4 and Table A8/11 Step 3 for PEVs	EC _{DC,first} , Wh/km;	The electric energy consumption shall be multiplied with the run-in factor determined according to paragraph 8.2.4. of this Regulation:	EC _{test-i} , Wh/km;
For Level 1A only Annex B8 Table A8/8 Step 9 for the charge-depleting condition of OVC-HEVs tested according to paragraph 6.2.1.	EC _{AC,CD} , Wh/km;	EC _{test-i} = RI _{EC} (j) x EC _{DC,first} or EC _{AC,CD} or EC _{DC,CD,first} In the case that the run-in factor is not used: EC _{test-i} = EC _{DC,first} or EC _{AC,CD} or EC _{DC,CD,first}	
For Level 1A and Level 1B Annex B8 Table A8/8 Step 12 for the charge-depleting condition of OVC-HEVs tested according to paragraph 6.2.2.	EC _{DC,CD,first} , Wh/km;	For Level 1B only The electric energy consumption shall be corrected by the test cell correction factor determined according to paragraph 8.2.4. of this Regulation, if the factor is available.	

"

(13) In the 01 and 03 Series of Amendments,
Appendix 1, Table App1/1, amend to read:

"

Annex B8 Table A8/10 Step 4 and Table A8/11 Step 3 for PEVs	EC _{DC,first} , Wh/km;	The electric energy consumption shall be multiplied with the run-in factor determined according to paragraph 8.2.4. of this Regulation:	EC _{test-i} , Wh/km;
For 4-phase WLTP test only Annex B8 Table A8/8 Step 9 for the charge-depleting condition of OVC-HEVs tested according to paragraph 6.2.1.	EC _{AC,CD} , Wh/km;	EC _{test-i} = RI _{EC} (j) x EC _{DC,first} or EC _{AC,CD} or EC _{DC,CD,first} In the case that the run-in factor is not used: EC _{test-i} = EC _{DC,first} or EC _{AC,CD} or EC _{DC,CD,first}	
For 3-phase and 4-phase WLTP test Annex B8 Table A8/8 Step 12 for the charge-depleting condition of OVC-HEVs tested according to paragraph 6.2.2.	EC _{DC,CD,first} , Wh/km;		

"

(14) In the original version, 01, 02 and 03 Series of Amendments,
Annex A1 Engine and vehicle characteristics and information concerning the conduct of tests
(‘information document’), amend to read:

"

3.5.7.3.2.	All Electric Range AER and Equivalent All Electric Range for OVC-HEVs and OVC-FCHVs (as applicable)
3.5.7.3.2.1.	Vehicle high: AER: ... km, EAER: ... km
3.5.7.3.2.2.	Vehicle low (if applicable): AER: ... km, EAER: ... km
3.5.7.3.2.3.	Vehicle M (if applicable): AER: ... km, EAER: ... km

....."

(15) *In the original version and 02 Series of Amendments,*

Annex B4, paragraph 4.2.2.1., Table A4/2, amend to read (titles remain bold):

"Table A4/2

Energy efficiency classes according to rolling resistance coefficients (RRC) for C1, C2 and C3 tyres and the RRC values to be used for those energy efficiency classes in the interpolation, kg/tonne

<i>Energy efficiency class</i>	<i>Range of RRC for C1 tyres</i>	<i>Range of RRC for C2 tyres</i>	<i>Range of RRC for C3 tyres</i>
1	RRC ≤ 6.5	RRC ≤ 5.5	RRC ≤ 4.0
2	6.6 ≤ RRC ≤ 7.7	5.6 ≤ RRC ≤ 6.7	4.1 ≤ RRC ≤ 5.0
3	7.8 ≤ RRC ≤ 9.0	6.8 ≤ RRC ≤ 8.0	5.1 ≤ RRC ≤ 6.0
4	9.1 ≤ RRC ≤ 10.5	8.1 ≤ RRC ≤ 9.0	6.1 ≤ RRC ≤ 7.0
5	RRC ≥ 10.6	RRC ≥ 9.1	RRC ≥ 7.1

<i>Energy efficiency class</i>	<i>Value of RRC to be used for interpolation for C1 tyres</i>	<i>Value of RRC to be used for interpolation for C2 tyres</i>	<i>Value of RRC to be used for interpolation for C3 tyres</i>
1	RRC = 5.9*	RRC = 4.9*	RRC = 3.5*
2	RRC = 7.1	RRC = 6.1	RRC = 4.5
3	RRC = 8.4	RRC = 7.4	RRC = 5.5
4	RRC = 9.8	RRC = 8.6	RRC = 6.5
5	RRC = 11.3	RRC = 9.9	RRC = 7.5

* For Level 1A only: In case the actual RRC value is lower than this value, the actual rolling resistance value of the tyre or any higher value up to the RRC value indicated here shall be used for interpolation. Only for 4 phase WLTP calculation of individual vehicles: In case the actual RRC value is lower than this value, the actual rolling resistance value of the tyre or any higher value up to the RRC value indicated here shall be used for interpolation.

"

(16) *In the 01 and 03 Series of Amendments,*

Annex B4, paragraph 4.2.2.1., Table A4/2, amend to read (titles remain bold):

"Table A4/2

Energy efficiency classes according to rolling resistance coefficients (RRC) for C1, C2 and C3 tyres and the RRC values to be used for those energy efficiency classes in the interpolation, kg/tonne

<i>Energy efficiency class</i>	<i>Range of RRC for C1 tyres</i>	<i>Range of RRC for C2 tyres</i>	<i>Range of RRC for C3 tyres</i>
1	RRC ≤ 6.5	RRC ≤ 5.5	RRC ≤ 4.0
2	6.6 ≤ RRC ≤ 7.7	5.6 ≤ RRC ≤ 6.7	4.1 ≤ RRC ≤ 5.0
3	7.8 ≤ RRC ≤ 9.0	6.8 ≤ RRC ≤ 8.0	5.1 ≤ RRC ≤ 6.0
4	9.1 ≤ RRC ≤ 10.5	8.1 ≤ RRC ≤ 9.0	6.1 ≤ RRC ≤ 7.0

5	RRC ≥ 10.6	RRC ≥ 9.1	RRC ≥ 7.1
<i>Energy efficiency class</i>	<i>Value of RRC to be used for interpolation for C1 tyres</i>	<i>Value of RRC to be used for interpolation for C2 tyres</i>	<i>Value of RRC to be used for interpolation for C3 tyres</i>
1	RRC = 5.9*	RRC = 4.9*	RRC = 3.5*
2	RRC = 7.1	RRC = 6.1	RRC = 4.5
3	RRC = 8.4	RRC = 7.4	RRC = 5.5
4	RRC = 9.8	RRC = 8.6	RRC = 6.5
5	RRC = 11.3	RRC = 9.9	RRC = 7.5

* Only for 4 phase WLTP calculation of individual vehicles: In case the actual RRC value is lower than this value, the actual rolling resistance value of the tyre or any higher value up to the RRC value indicated here shall be used for interpolation.

"

(17) In the original version and 02 Series of Amendments,

Annex B6, paragraph 1.2.3.9., Table A6/1, amend to read (titles remain bold):

"Table A6/1

Applicable rules for a manufacturer's declared values (total cycle values)^(a) (as applicable)

<i>Powertrain</i>	Level 1A <i>M_{CO2}^(b)</i> (g/km)	Level 1A: <i>FC</i> (kg/100 km)	Level 1B; <i>FE (km/l or km/kg)</i>	<i>Electric energy consumption^(c)</i> (Wh/km)	<i>All electric range / Equivalent all electric range/ Pure Electric Range^(c)</i> (km)	
Vehicles tested according to Annex B6 (pure ICE)	M _{CO2} Paragraph 3. of Annex B7.		FE Paragraph 1.4. of Annex B7.	-	-	
NOVC-FCHV	-	FCs Paragraph 4.2.1.2.1. of Annex B8.	FEs Paragraph 4,2,1.2.1. of Annex B8.	-	-	
OVC-FCHV	CD	-	FC _{CD}	N/A	EC _{AC,CD}	AER
	CS	-	FCs	N/A	-	-
	CD/ CS weighted	-	-	-	-	EAER Paragraph 4.4.6.1. of Annex B8

<i>Powertrain</i>		Level 1A <i>M_{CO2}^(b)</i> <i>(g/km)</i>	Level 1A: <i>FC</i> <i>(kg/100 km)</i>	Level 1B; <i>FE (km/l or km/kg)</i>	<i>Electric energy consumption^(c)</i> <i>(Wh/km)</i>	<i>All electric range / Equivalent all electric range/ Pure Electric Range^(c)</i> <i>(km)</i>
NOVC-HEV		<i>M_{CO2,CS}</i> Paragraph 4.1.1. of Annex B8.	-	<i>FE_{CS}</i> Paragraph 4.1.1.1. of Annex B8.	-	-
OVC-HEV	CD	<i>M_{CO2,CD}</i> Paragraph 4.1.2. of Annex B8.	-	<i>FE_{CD}</i> Paragraph 4.6.1. of Annex B8.	For Level 1A: <i>EC_{AC,CD}</i> Paragraph 4.3.1. of Annex B8.	AER Paragraph 4.4.1.1. of Annex B8.
	CS	<i>M_{CO2,CS}</i> Paragraph 4.1.1. of Annex B8.	-	<i>FE_{CS}</i> Paragraph 4.1.1.1. of Annex B8.	-	-
	CD/ CS <i>weighted</i>	-	-	-	For Level 1B: <i>EC</i> Paragraph 4.6.2. of Annex B8	EAER ^(d) Paragraph 4.4.4.1. of Annex B8
PEV		-	-	-	<i>EC_{WLTC}^(d)</i> Paragraph 4.3.4.2. of Annex B8.	<i>PER_{WLTC}^(d)</i> Paragraph 4.4.2. of Annex B8.

(a) The declared value shall be the value to which the necessary corrections, as applicable, are applied

(b) Rounding to 2 places of decimal according to paragraph 6.1.8. of this Regulation

(c) Rounding to one place of decimal according to paragraph 6.1.8. of this Regulation

(d) **The declared value shall be provided for Level 1A and Level 1B (as applicable)**

....."

(18) *In the 01 and 03 Series of Amendments,*

Annex B6, paragraph 1.2.3.9., Table A6/1, amend to read (titles remain bold):

"Table A6/1

Applicable rules for a manufacturer's declared values (total cycle values)^(a) (as applicable)

Powertrain		For 4 phase WLTP test $M_{CO_2}^{(b)}$ (g/km)	For 4 phase WLTP test FC (kg/100 km)	For 3 phase WLTP FE (km/l or km/kg)	Electric energy consumption ^(c) (Wh/km)	All electric range / Equivalent all-electric range/ Pure Electric Range ^(c) (km)
Vehicles tested according to Annex B6 (pure ICE)		M_{CO_2} Paragraph 3. of Annex B7.	-	FE Paragraph 1.4. of Annex B7.	-	-
NOVC-FCHV		-	FCcs Paragraph 4.2.1.2.1. of Annex B8.	FEcs Paragraph 4.2.1.2.1. of Annex B8.	-	-
NOVC-HEV		$M_{CO_2,CS}$ Paragraph 4.1.1. of Annex B8.	-	FEcs Paragraph 4.1.1.1. of Annex B8.	-	-
OVC-HEV	CD	$M_{CO_2,CD}$ Paragraph 4.1.2. of Annex B8.	-	FE _{CD} Paragraph 4.6.1. of Annex B8.	For 4 phase WLTP test: EC _{AC,CD} Paragraph 4.3.1. of Annex B8.	AER Paragraph 4.4.1.1. of Annex B8.
	CS	$M_{CO_2,CS}$ Paragraph 4.1.1. of Annex B8.	-	FEcs Paragraph 4.1.1.1. of Annex B8.	-	-
	CD/CS weighted	-	-	-	For 3 phase WLTP: EC Paragraph 4.6.2. of Annex B8	EAER ^(d) Paragraph 4.4.4.1. of Annex B8
PEV		-	-	-	EC _{WLTC} ^(d) Paragraph 4.3.4.2. of Annex B8.	PER _{WLTC} ^(d) Paragraph 4.4.2. of Annex B8.

(a) The declared value shall be the value to which the necessary corrections, as applicable, are applied

(b) Rounding to 2 places of decimal according to paragraph 6.1.8. of this Regulation

(c) Rounding to one place of decimal according to paragraph 6.1.8. of this Regulation

(d) **The declared value shall be provided for the 3 phase WLTP and 4 phase WLTP (as applicable)**

(19) In the original version and 02 Series of Amendments,

Annex B7, paragraph 1.4., Table A7/1 Step no. 7; amend to read:

"....."

7	For Level 1A: Output step 6	$M_{CO_2,c,6}$, g/km; $M_{CO_2,p,6}$, g/km.	Alignment of phase values: according to paragraph 1.2.4. of Annex B6.	$M_{CO_2,c,7}$, g/km; $M_{CO_2,p,7}$, g/km.
---	--------------------------------	--	--	--

		$M_{CO_2,c,declared}$, g/km.	and: $M_{CO_2,c,7} = M_{CO_2,c,declared}$	
	For Level 1B: Output step 5 Output step 6	$M_{CO_2,c,5}$, g/km; $M_{CO_2,p,5}$, g/km; $M_{CO_2,c,declared}$, g/km.	Alignment of phase values- according to paragraph 1.2.4. of Annex B6.	$M_{CO_2,p,7}$, g/km.

....."

(20) In the 01 and 03 Series of Amendments,

Annex B7, paragraph 1.4., Table A7/1 Step no. 7, amend to read:

".....

7	For results after 4 phases: Output step 6	$M_{CO_2,c,6}$, g/km; $M_{CO_2,p,6}$, g/km. $M_{CO_2,c,declared}$, g/km.	Alignment of phase values- according to paragraph 1.2.4. of Annex B6. and: $M_{CO_2,c,7} = M_{CO_2,c,declared}$	$M_{CO_2,c,7}$, g/km; $M_{CO_2,p,7}$, g/km.
	For results after 3 phases: Output step 5 Output step 6	$M_{CO_2,c,5}$, g/km; $M_{CO_2,p,5}$, g/km; $M_{CO_2,c,declared}$, g/km.	Alignment of phase values- according to paragraph 1.2.4. of Annex B6.	$M_{CO_2,p,7}$, g/km.

..... "

(21) In the original version and 02 Series of Amendments,

Annex B7, paragraph 6.2., amend to read:

"6.2. For Level 1A

The fuel consumption values shall be calculated from the emissions of hydrocarbons, carbon monoxide, and carbon dioxide using the results of step 6 for criteria emissions and step 7 for CO₂ of Table A7/1 **in case of ICE or of Table A8/6 in case of NOVC-HEV and OVC-HEV.**

For Level 1B

The fuel efficiency values shall be calculated from the emissions of hydrocarbons, carbon monoxide, and carbon dioxide using the results of the step as specified in the input column of the relevant table of this annex or Annex B8."

(22) In the 01 and 03 Series of Amendments,

Annex B7, paragraph 6.2., amend to read:

"6.2. For 4-phase WLTP test

The fuel consumption values shall be calculated from the emissions of hydrocarbons, carbon monoxide, and carbon dioxide using the results of step 6 for criteria emissions and step 7 for CO₂ of Table A7/1 **in case of ICE or of Table A8/6 in case of NOVC-HEV and OVC-HEV.**

For 3-phase WLTP

The fuel efficiency values shall be calculated from the emissions of hydrocarbons, carbon monoxide, and carbon dioxide using the results of the step as specified in the input column of the relevant table of this annex or Annex B8."

(23) In the original version and 02 Series of Amendments,

Annex B8, paragraph 1.4.2.2., amend to read:

"1.4.2.2. ~~Level 1A only~~

Applicable WLTP city test cycle

The Class 3 WLTP city test cycle (WLTC_{city}) is specified in paragraph 3.5. of Annex B1."

(24) In the original version and 02 Series of Amendments,

Annex B8, paragraph 4.1.1.1., Table A8/5 Step no. 4c to Step no. 7, amend to read:

".....

4c	Output step 4a	M _{i,CS,c,4a} , g/km; M _{CO2,CS,c,4a} , g/km.	M _{i,CS,c,4c} = M _{i,CS,c,4a} M _{CO2,CS,c,4c} = M _{CO2,CS,c,4a}	M _{i,CS,c,4c} ; M _{CO2,CS,c,4c}
			Calculate fuel efficiency (FE _{CS,c,4c_temp}) according to paragraph 6.14.1. of Annex B7. FE _{CS,c,4c} = FE _{CS,c,4c_temp}	FE _{CS,c,4c} , km/l;
5 Result of a single test.	Output step 4b and 4c	M _{CO2,CS,p,4} , g/km; M _{CO2,CS,c,4c} , g/km;	For Level 1A: ATCT correction of M _{CO2,CS,c,4c} and M _{CO2,CS,p,4} in accordance with paragraph 3.8.23. of Annex B6a. For Level 1B: M _{CO2,c,5} = M _{CO2,c,4c} M _{CO2,p,5} = M _{CO2,p,4}	M _{CO2,CS,c,5} , g/km; M _{CO2,CS,p,5} , g/km.
			Apply deterioration factors calculated in accordance with Annex C4 to the criteria emissions values. FE _{CS,c,5} = FE _{CS,c,4c}	M _{i,CS,c,5} , g/km; FE _{CS,c,5} , km/l;
6 M _{i,CS} results of a Type 1 test for a test vehicle.	For Level 1A Output step 5	For every test: M _{i,CS,c,5} , g/km; M _{CO2,CS,c,5} , g/km; M _{CO2,CS,p,5} , g/km.	Averaging of tests and declared value- according to paragraphs 1.2. to 1.2.3. inclusive of Annex B6.	M _{i,CS,c,6} , g/km; M _{CO2,CS,c,6} , g/km; M _{CO2,CS,p,6} , g/km; M _{CO2,CS,c,declared} , g/km.
	For Level 1B Output step 5	FE _{CS,c,5} , km/l; M _{i,c,5} , g/km; M _{i,CS,c,5} , g/km; M _{CO2,CS,c,5} , g/km; M _{CO2,CS,p,5} , g/km.	Averaging of tests and declared value- according to paragraphs 1.2. to 1.2.3. inclusive of Annex B6. The conversion from FE _{CS,c,declared} to M _{CO2,CS,c,declared} shall be performed for the applicable cycle. For that purpose, the average criteria emission over the complete cycle shall be used.	FE _{CS,c,declared} , km/l; M _{i,CS,c,6} , g/km; M _{CO2,CS,c,6} , g/km; M _{CO2,CS,p,6} , g/km; M _{CO2,CS,c,declared} , g/km.
7 M _{CO2,CS} results of a Type 1 test	For Level 1A: Output step 6	M _{CO2,CS,c,6} , g/km; M _{CO2,CS,p,6} , g/km; M _{CO2,CS,c,declared} , g/km.	Alignment of phase values- according to paragraph 1.2.4. of Annex B6, and:	M _{CO2,CS,c,7} , g/km; M _{CO2,CS,p,7} , g/km.

for a test vehicle.			$M_{CO_2,CS,c,7} = M_{CO_2,CS,c,declared}$	
	For Level 1B: Output step 5 Output step 6	$M_{CO_2,CS,e,5}$ g/km; $M_{CO_2,CS,p,5}$ g/km; $M_{CO_2,CS,e,declared}$ g/km.	Alignment of phase values- Paragraph 1.2.4. of Annex B6.	$M_{CO_2,CS,p,7}$ g/km.

"....."

(25) In the 01 and 03 Series of Amendments,

Annex B8, paragraph 4.1.1.1., Table A8/5 Step no. 4c to Step no. 7, amend to read:

"....."

4c	Output step 4a	$M_{i,CS,c,4a}$ g/km; $M_{CO_2,CS,c,4a}$ g/km.	$M_{i,CS,c,4c} = M_{i,CS,c,4a}$ $M_{CO_2,CS,c,4c} = M_{CO_2,CS,c,4a}$	$M_{i,CS,c,4c}$; $M_{CO_2,CS,c,4c}$
			Calculate fuel efficiency ($FE_{CS,c,4c_temp}$) according to paragraph 6.14.1. of Annex B7. $FE_{CS,c,4c} = FE_{CS,c,4c_temp}$	$FE_{CS,c,4c}$ km/l;
5 Result of a single test.	Output step 4b and 4c	$M_{CO_2,CS,p,4}$ g/km; $M_{CO_2,CS,c,4c}$ g/km;	For results after 4 phases: ATCT correction of $M_{CO_2,CS,c,4c}$ and $M_{CO_2,CS,p,4}$ in accordance with paragraph 3.8.23. of Annex B6a. For results after 3 phases: $M_{CO_2,c,5} = M_{CO_2,c,4c}$ $M_{CO_2,p,5} = M_{CO_2,p,4}$	$M_{CO_2,CS,c,5}$ g/km; $M_{CO_2,CS,p,5}$ g/km.
			$M_{i,CS,c,4c}$ g/km; $FE_{c,4c}$ km/l;	Apply deterioration factors calculated in accordance with Annex C4 to the criteria emissions values. $FE_{CS,c,5} = FE_{CS,c,4c}$
6 $M_{i,CS}$ results of a Type 1 test for a test vehicle.	For results after 4 phases Output step 5	For every test: $M_{i,CS,c,5}$ g/km; $M_{CO_2,CS,c,5}$ g/km; $M_{CO_2,CS,p,5}$ g/km.	Averaging of tests and declared value according to paragraphs 1.2. to 1.2.3. inclusive of Annex B6.	$M_{i,CS,c,6}$ g/km; $M_{CO_2,CS,c,6}$ g/km; $M_{CO_2,CS,p,6}$ g/km; $M_{CO_2,CS,c,declared}$ g/km.
	For results after 3 phases Output step 5	$FE_{CS,c,5}$ km/l; $M_{i,CS,c,4c}$ $M_{i,CS,c,5}$ g/km; $M_{CO_2,CS,c,5}$ g/km; $M_{CO_2,CS,p,5}$ g/km.	Averaging of tests and declared value- according to paragraphs Paragraphs 1.2. to 1.2.3. inclusive of Annex B6. The conversion from $FE_{CS,c,declared}$ to $M_{CO_2,CS,c,declared}$ shall be performed for the applicable cycle. For that purpose, the average criteria emission over the complete cycle shall be used.	$FE_{CS,c,declared}$ km/l; $M_{i,CS,c,6}$ g/km; $M_{CO_2,CS,c,6}$ g/km; $M_{CO_2,CS,p,6}$ g/km; $M_{CO_2,CS,c,declared}$ g/km.
7 $M_{CO_2,CS}$ results of a Type 1 test	For results after 4 phases: Output step 6	$M_{CO_2,CS,c,6}$ g/km; $M_{CO_2,CS,p,6}$ g/km; $M_{CO_2,CS,c,declared}$ g/km.	Alignment of phase values- according to paragraph Paragraph 1.2.4. of Annex B6, and: $M_{CO_2,CS,c,7} = M_{CO_2,CS,c,declared}$	$M_{CO_2,CS,c,7}$ g/km; $M_{CO_2,CS,p,7}$ g/km.

for a test vehicle.	For results after 3 phases: Output step 5 Output step 6	$M_{CO_2,CS,e,5}$ g/km; $M_{CO_2,CS,p,5}$ g/km; $M_{CO_2,CS,e,declared}$ g/km.	Alignment of phase values. Paragraph 1.2.4. of Annex B6.	$M_{CO_2,CS,p,7}$ g/km.
---------------------	---	--	---	---

....."

(26) In the original version, 01, 02 and 03 Series of Amendments,

Annex B8, paragraph 4.1.3.1., amend to read:

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

4.1.3.1.1. For calculating the utility factor-weighted mass of gaseous compounds (except CO₂ emission), the following equation shall be used

$$M_{i,weighted} = \sum_{j=1}^k (UF_j \times M_{i,CD,j}) + (1 - \sum_{j=1}^k UF_j) \times M_{i,CS}$$

where:

.....

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

$$M_{CO_2,weighted} = \left(\sum_{j=1}^k UF_j \right)_{ave} \times M_{CO_2,CD,declared} + \left(1 - \left(\sum_{j=1}^k UF_j \right)_{ave} \right) \times M_{CO_2,CS,declared}$$

where:

$M_{CO_2,weighted}$ is the utility-factor weighted charge-depleting CO₂ emission, g/km.

$M_{CO_2,CD,declared}$ is the declared charge-depleting CO₂ emission according to Table A8/8, step no. 14, g/km.

$M_{CO_2,CS,declared}$ is the declared charge-sustaining CO₂ emission according to Table A8/5, step no. 7, g/km.

$\left(\sum_{j=1}^k UF_j \right)_{ave}$ 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.

In the case that the interpolation method is applied for CO₂, k shall be the number of phases driven up to the end of the transition cycle of vehicle L $n_{veh,L}$. ~~for the application of both equations of this paragraph.~~

If the transition cycle number driven by vehicle H, $n_{veh,H}$, and, if applicable, by an individual vehicle within the vehicle interpolation family $n_{veh,ind}$ is lower than the transition cycle number driven by vehicle L, $n_{veh,L}$, the confirmation cycle of vehicle H and, if applicable, an individual vehicle shall be included in the calculation. The CO₂ emission of each phase of the confirmation cycle shall then be corrected to an electric energy consumption of zero ($EC_{DC,CD,j} = 0$) by using the CO₂ correction coefficient according to Appendix 2 to this annex."

In the original version and 02 Series of Amendments,

Annex B8, paragraph 4.6.1., Table A8/8 Step no. 1, amend to read:

"Table A8/8

Calculation of final charge-depleting values (FE applicable for Level 1B only)

<i>Step no.</i>	<i>Source</i>	<i>Input</i>	<i>Process</i>	<i>Output</i>
1	Annex B8	Charge-depleting test results	<p>Results measured according to Appendix 3 to this annex, pre-calculated according to paragraph 4.3. of this annex.</p> <p>Recharged electric energy according to paragraph 3.2.4.6. of this annex.</p> <p>Cycle energy according to paragraph 5. of Annex B7.</p> <p>CO₂ emission according to paragraph 3.2.1. of Annex B7.</p> <p>Mass of gaseous emission compound i according to paragraph 4.1.3.1.1. of Annex B8.</p> <p>All-electric range determined according to paragraph 4.4.1.1. of this annex.</p> <p>CO₂ emission K_{CO2} correction coefficient might be necessary according to Appendix 2 to this annex.</p> <p>Output is available for each test.</p>	<p>$\Delta E_{REESS,j}$, Wh; d_j, km;</p> <p>E_{AC}, Wh;</p> <p>E_{cycle}, Ws;</p> <p>$M_{CO_2,CD,j}$, g/km;</p> <p>$M_{i,CD,j}$, g/km;</p> <p>AER, km;</p> <p>K_{CO_2}, (g/km)/(Wh/km).</p>
	For Level 1A Annex B8		<p>Usable battery energy according to paragraph 4.4.1.2.2. of this annex.</p> <p>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.</p> <p>Particle number emissions (if applicable) according to paragraph 4. of Annex B7.</p> <p>Particulate matter emissions according to paragraph 4. of Annex B7.</p>	<p>UBE_{city}, Wh;</p> <p>AER_{city}, km.</p> <p>$PN_{CD,j}$, particles per kilometer;</p> <p>$PM_{CD,c}$, mg/km;</p>

....."

Annex B8, paragraph 4.6.1., Table A8/9 Step no. 2 and Step no. 6, amend to read:

".....

For Level 1A 2	Output step 1	$M_{i,CD,j}$, g/km; $PN_{CD,j}$, particles per kilometer; $PM_{CD,e}$, mg/km; n_{veh} ; $n_{veh,L}$; $UF_{phase,j}$; $UF_{cycle,c}$; $M_{i,CS,e,6}$, g/km;	Calculation of weighted emission (except $M_{CO2,weighted}$) compounds according to paragraphs 4.1.3.1.1. to 4.1.3.3. inclusive of this annex. Remark: $M_{i,CS,e,6}$ includes $PN_{CS,e}$ and $PM_{CS,e}$. Output is available for each CD test.	$M_{i,weighted}$, g/km; $PN_{weighted}$, particles per kilometer; $PM_{weighted}$, mg/km;
----------------------	------------------	---	--	---

.....

For Level 1A, 6	Output step 1	$M_{i,CD,j}$, g/km; $M_{CO2,CD,j}$, g/km; n_{veh} ; $n_{veh,L}$; $UF_{phase,j}$; $M_{i,CS,e,6}$, g/km; $M_{CO2,CS,declared}$, g/km. $M_{CO2,CD,declared}$, g/km; $M_{CO2,CD,ave}$, g/km;	Calculation of weighted CO ₂ emission and fuel consumption according to paragraphs 4.1.3.1.2. and 4.2.3. of this annex. Output is available for each CD test. In the case that the interpolation method is applied, $n_{veh,L}$ cycles shall be used. With reference to paragraph 4.1.2. of this annex, $M_{CO2,CD,j}$ of the confirmation cycle shall be corrected according to Appendix 2 to this annex.	$M_{CO2,weighted}$, g/km; $FC_{weighted}$, l/100 km;
-----------------------	------------------	--	---	---

....."

In the 01 and 03 Series of Amendments,

Annex B8, paragraph 4.6.1., Table A8/8 Step no. 1, amend to read:

"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. CO ₂ emission according to paragraph 3.2.1. of Annex B7.	$\Delta E_{REESS,j}$, Wh; d_j , km; E_{AC} , Wh; E_{cycle} , Ws; $M_{CO2,CD,j}$, g/km; $M_{i,CD,j}$, g/km;

<i>Step no.</i>	<i>Source</i>	<i>Input</i>	<i>Process</i>	<i>Output</i>
			<p>Mass of gaseous emission compound <i>i</i> according to paragraph 4.1.3.1.1. of Annex B8.</p> <p>All-electric range determined according to paragraph 4.4.1.1. of this annex.</p> <p>CO₂ emission K_{CO2} correction coefficient might be necessary according to Appendix 2 to this annex.</p> <p>Output is available for each test.</p>	<p>AER, km;</p> <p>K_{CO2}, (g/km)/(Wh/km).</p>
	For results after 4 phases Annex B8		<p>Usable battery energy according to paragraph 4.4.1.2.2. of this annex.</p> <p>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.</p> <p>Particle number emissions (if applicable) according to paragraph 4. of Annex B7.</p> <p>Particulate matter emissions according to paragraph 4. of Annex B7.</p>	<p>UBE_{city}, Wh;</p> <p>AER_{city}, km.</p> <p>PN_{CD,j}, particles per kilometer;</p> <p>PM_{CD,e}, mg/km;</p>

....."

Annex B8, paragraph 4.6.1., Table A8/9 Step no. 2 and Step no. 6, amend to read:

".....

For results after 4 phases 2	Output step 1	<p>M_{i,CD,j}, g/km;</p> <p>PN_{CD,j}, particles per kilometer;</p> <p>PM_{CD,e}, mg/km;</p> <p>n_{veh};</p> <p>n_{veh,L};</p> <p>UF_{phase,j};</p> <p>UF_{cycle,e};</p> <p>M_{i,CS,e,6}, g/km;</p>	<p>Calculation of weighted emission (except M_{CO2,weighted}) compounds according to paragraphs 4.1.3.1.1. to 4.1.3.3. inclusive of this annex.</p> <p>Remark: M_{i,CS,e,6} includes PN_{CS,e} and PM_{CS,e}.</p> <p>Output is available for each CD test.</p>	<p>M_{i,weighted}, g/km;</p> <p>PN_{weighted}, particles per kilometer;</p> <p>PM_{weighted}, mg/km;</p>
------------------------------	---------------	---	--	--

.....

For results after 4 phases, 6	Output step 1	$M_{i,CD,j}$, g/km; $M_{CO_2,CD,j}$, g/km; n_{veh} ; $n_{veh,L}$; $UF_{phase,j}$; $M_{i,CS,c,6}$, g/km; $M_{CO_2,CS,declared}$, g/km. $M_{CO_2,CD,declared}$, g/km; $M_{CO_2,CD,ave}$, g/km;	<p>Calculation of weighted CO₂ emission and fuel consumption according to paragraphs 4.1.3.1.2. and 4.2.3. of this annex.</p> <p>Output is available for each CD test.</p> <p>In the case that the interpolation method is applied, $n_{veh,L}$ cycles shall be used. With reference to paragraph 4.1.2. of this annex, $M_{CO_2,CD,j}$ of the confirmation cycle shall be corrected according to Appendix 2 to this annex.</p>	$M_{CO_2,weighted}$, g/km; $FC_{weighted}$, l/100 km;
-------------------------------	---------------	--	--	--

....."

(27) In the original version and 02 Series of Amendments,

Annex B8, paragraph 4.2.1.1., Table A8/6 Step No. 1, amend to read:

"Table A8/6

Calculation of final charge-sustaining fuel consumption and fuel efficiency for OVC-HEVs, NOVC-HEVs (FE applicable for Level 1B only)

Step No.	Source	Input	Process	Output
1	Output step 6, Table A8/5 Output step 7, Table A8/5	$M_{i,CS,c,6}$, g/km; $M_{CO_2,CS,c,6}$, g/km; $FE_{CS,c,declared}$, km/l; $M_{CO_2,CS,c,7}$, g/km; $M_{CO_2,CS,p,7}$, g/km.	<p>Calculation of fuel consumption $FC_{CS,c}$ according to paragraph 6. of Annex B7 based on $M_{CO_2,CS,c,7}$ and conversion to fuel efficiency $FE_{CS,ep,1}$ for phase value</p> $FE_{CS,c,1} = FE_{CS,c,declared}$, <p>The calculation of fuel consumption shall be performed separately for the applicable cycle and its phases.</p> <p>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.</p>	$FC_{CS,c,1}$, l/100 km; $FE_{CS,c,1}$, km/l; $FC_{CS,p,1}$, l/100 km. $FE_{CS,p,1}$ km/l

....."

In the 01 and 03 Series of Amendments,

Annex B8, paragraph 4.2.1.1., Table A8/6 Step No. 1, amend to read:

"Table A8/6

Calculation of final charge-sustaining fuel consumption and fuel efficiency for OVC-HEVs, NOVC-HEVs (FE applicable for results after 3 phases only)

Table A8/6 shall be performed separately for results after 4 phases and for results after 3 phases.

Step No.	Source	Input	Process	Output
1	Output step 6, Table A8/5	$M_{i,CS,c,6}$, g/km; $M_{CO_2,CS,c,6}$, g/km; $FE_{CS,c,declared}$, km/l;	<p>Calculation of fuel consumption $FC_{CS,c}$ according to paragraph 6. of Annex B7 based on $M_{CO_2,CS,c,7}$</p>	$FC_{CS,c,1}$, l/100 km; $FE_{CS,c,1}$, km/l;

Step No.	Source	Input	Process	Output
	Output step 7, Table A8/5	$M_{CO_2,CS,c,7}$, g/km; $M_{CO_2,CS,p,7}$, g/km.	and conversion to fuel efficiency $FE_{CS,ep,1}$ for phase value $FE_{CS,c,1} = FE_{CS,c,declared}$ The calculation of fuel consumption shall be performed separately for the applicable cycle and its phases. For that purpose: (a) the applicable phase or cycle CO_2 values shall be used; (b) the criteria emission over the complete cycle shall be used.	$FC_{CS,p,1}$, l/100 km. $FE_{CS,p,1}$ km/l

....."

(28) In the original version and 02 Series of Amendments,

Annex B8, paragraph 4.4.4.1., amend to read:

".....

$M_{CO_2,CS,declared}$ is the declared charge-sustaining CO_2 emission according to Table A8/5, step No. 6 ($M_{CO_2,CS,c,declared}$) for Level 1B, g/km;

....."

In the 01 and 03 Series of Amendments,

Annex B8, paragraph 4.4.4.1., amend to read:

"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;

$$EAER = \left(\frac{M_{CO_2,CS,ave} - M_{CO_2,CD,avg,ave}}{M_{CO_2,CS,ave}} \right) \times R_{CDC,ave}$$

For 3-phase WLTP test;

$$EAER = \left(\frac{M_{CO_2,CS,declared} - M_{CO_2,CD,avg}}{M_{CO_2,CS,declared}} \right) \times R_{CDC,ave}$$

where:

.....

$M_{CO_2,CS,declared}$ is the declared charge-sustaining CO_2 emission according to Table A8/5, step No. 6 ($M_{CO_2,CS,c,declared}$) for 3-phase WLTP test, g/km;

....."

(29) In the original version and 02 Series of Amendments,

Annex B8, paragraph 4.6.2., Table A8/9 Step no. 1, Step no. 3 and Step no. 9, amend to read:

"Table A8/9

Calculation of final charge-depleting and charge-sustaining weighted values (FE applicable for Level 1B only)

Step no.	Source	Input	Process	Output
1	Output step 1, Table A8/8	$M_{i,CD,j}$, g/km; $PN_{CD,j}$, particles per kilometer; $PM_{CD,c}$, mg/km; $M_{CO_2,CD,j}$, g/km; $\Delta E_{REESS,j}$, Wh; d_j , km; AER, km; E_{AC} , Wh;	Input from CD and CS post processing. For Level 1A: The arithmetic average of E_{AC} for all individual charge-depleting tests shall be calculated.	$M_{CO_2,CD,j}$, g/km; AER, km; E_{AC} , Wh; $M_{CO_2,CS,declared}$, g/km; $M_{CO_2,CS,c,6}$, g/km; $M_{CO_2,CS,e,6}$, g/km; $M_{CO_2,CD,declared}$, g/km; $M_{CO_2,CD,ave}$, g/km;
	Output step 7, Table A8/8	$AER_{city,ave}$, km;		For Level 1A $M_{i,CD,j}$, g/km; $PN_{CD,j}$, particles per kilometer; $PM_{CD,c}$, mg/km; $\Delta E_{REESS,j}$, Wh; d_j , km; $AER_{city,ave}$, km;
	Output step 3, Table A8/8	n_{veh} ; R_{CDC} , km;		n_{veh} ; R_{CDC} , km;
	Output step 4, Table A8/8	$n_{veh,L}$; $n_{veh,H}$;		$n_{veh,L}$; $n_{veh,H}$;
	Output step 8, Table A8/8	$UF_{phase,j}$; $UF_{cycle,c}$;		$UF_{phase,j}$; $UF_{cycle,c}$;
	Output step 6, Table A8/5	$M_{i,CS,c,6}$, g/km; For Level 1A: $M_{CO_2,CS,c,6}$, g/km; $M_{CO_2,CS,p,6}$, g/km.	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.	$M_{i,CS,c,6}$, g/km; $M_{CO_2,CS,p}$, g/km;
	Output step 7, Table A8/5	$M_{CO_2,CS,7}$, g/km; $M_{CO_2,CS,p,7}$, g/km;		
	Output step 14, Table A8/8	$M_{CO_2,CD,declared}$, g/km;	In the case that the interpolation method is applied, the output (except of K_{CO_2}) is available for vehicle H, L and, if applicable, M.	
	Output step 13, Table A8/8	$M_{CO_2,CD,ave}$, g/km; K_{CO_2} , (g/km)/(Wh/km).	CO_2 emission correction coefficient K_{CO_2} might be necessary according to Appendix 2 to this annex.	K_{CO_2} , (g/km)/(Wh/km).

.....

3	Output step 1	$M_{CO_2,CD,j}$, g/km; $\Delta E_{REESS,j}$, Wh; d_j , km; n_{veh} ; R_{CDC} , km $M_{CO_2,CS,declared}$, g/km; $M_{CO_2,CS,c,6}$, g/km; $M_{CO_2,CS,c,6}$, g/km; $M_{CO_2,CS,p}$, g/km;	<p>Calculation of equivalent all-electric range according to paragraphs 4.4.4.1. and 4.4.4.2. of this annex.</p> <p>For Level 1B: Output is available for each CD test.</p>	$EAER$, km; $EAER_{p,3}$, km; R_{CDA} , km.
---	---------------	--	---	---

.....

9 Result of an individual vehicle. Final test result.	Output step 5	AER_{dec} , km;	<p>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.</p> <p>AER_{ind}, $AER_{city,ind}$, $EAER_{ind}$ and $EAER_{p,ind}$ shall be rounded to the nearest whole number.</p> <p>$M_{CO_2,weighted,ind}$ shall be rounded to the nearest whole number.</p> <p>$EC_{weighted,ind}$ shall be rounded to the first place of decimal.</p> <p>$FC_{weighted,ind}$ shall be rounded to the first place of decimal.</p> <p>EC_{ind} and $EC_{p,ind}$ shall be rounded to the nearest whole number.</p> <p>Output is available for each individual vehicles.</p> <p>$R_{CDC,final}$ shall be rounded according to paragraph 6.1.8. of this Regulation to the nearest whole number.</p>	EC_{ind} , Wh/km; $EC_{p,ind}$, Wh/km; $EAER_{ind}$, km;
	Output step 8	$AER_{city,final}$, km; $M_{CO_2,weighted,final}$, g/km; $FC_{weighted,final}$, l/100 km; EC_{final} , Wh/km; $EC_{p,final}$, Wh/km; $EAER_{final}$, km; $EAER_{p,final}$, km;		<p>For Level 1A, AER_{ind}, km; $AER_{city,ind}$, km; $M_{CO_2,weighted,ind}$, g/km; $FC_{weighted,ind}$, l/100 km; $EAER_{p,ind}$, km.</p>
	Output step 4	AER-interpolation availability		
	Output step 1	R_{CDC} , km;		$R_{CDC,final}$, km;

"

(30) In the 01 and 03 Series of Amendments,

Annex B8, paragraph 4.6.2., Table A8/9 Step no. 1, Step no. 3 and Step no. 9, amend to read:

"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	$M_{i,CD,j}$, g/km; $PN_{CD,j}$, particles per kilometer; $PM_{CD,c}$, mg/km; $M_{CO_2,CD,j}$, g/km; $\Delta E_{REESS,j}$, Wh; d_j , km; AER, km; E_{AC} , Wh;	Input from CD and CS post processing. For results after 4 phases: The arithmetic average of E_{AC} for all individual charge-depleting tests shall be calculated	$M_{CO_2,CD,j}$, g/km; AER, km; E_{AC} , Wh; $M_{CO_2,CS,declared}$, g/km; $M_{CO_2,CS,c,6}$, g/km; $M_{CO_2,CS,c,6}$, g/km; $M_{CO_2,CD,declared}$, g/km; $M_{CO_2,CD,ave}$, g/km;
	Output step 7, Table A8/8	$AER_{city,ave}$, km;		For results after 4 phases $M_{i,CD,j}$, g/km; $PN_{CD,j}$, particles per kilometer; $PM_{CD,c}$, mg/km; $\Delta E_{REESS,j}$, Wh; d_j , km; $AER_{city,ave}$, km;
	Output step 3, Table A8/8	n_{veh} ; R_{CDC} , km;		n_{veh} ; R_{CDC} , km;
	Output step 4, Table A8/8	$n_{veh,L}$; $n_{veh,H}$;		$n_{veh,L}$; $n_{veh,H}$;
	Output step 8, Table A8/8	$UF_{phase,j}$; $UF_{cycle,c}$;		$UF_{phase,j}$; $UF_{cycle,c}$;
	Output step 6, Table A8/5	$M_{i,CS,c,6}$, g/km; For 4 phases WLTP test: $M_{CO_2,CS,c,6}$, g/km; $M_{CO_2,CS,p,6}$, g/km;	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.	$M_{i,CS,c,6}$, g/km; $M_{CO_2,CS,p}$, g/km;
	Output step 7, Table A8/5	$M_{CO_2,CS,7}$, g/km; $M_{CO_2,CS,p,7}$, g/km;	In the case that the interpolation method is applied, the output (except of K_{CO_2}) is available for vehicle H, L and, if applicable, M.	K_{CO_2} , (g/km)/(Wh/km).
	Output step 14, Table A8/8	$M_{CO_2,CD,declared}$, g/km;	CO ₂ emission correction coefficient K_{CO_2} might be necessary according to Appendix 2 to this annex.	
	Output step 13, Table A8/8	$M_{CO_2,CD,ave}$, g/km;		
			K_{CO_2} , (g/km)/(Wh/km).	

.....

3	Output step 1	$M_{CO_2,CD,j}$, g/km; $\Delta E_{REESS,j}$, Wh; d_j , km; n_{veh} ; R_{CDC} , km $M_{CO_2,CS,declared}$, g/km; $M_{CO_2,CS,c,6}$, g/km; $M_{CO_2,CS,c,6}$, g/km; $M_{CO_2,CS,p}$, g/km;	<p>Calculation of equivalent all-electric range according to paragraphs 4.4.4.1. and 4.4.4.2. of this annex.</p> <p>For results after 3 phases Output is available for each CD test.</p> <p>Calculation of actual charge-depleting range according to paragraph 4.4.5. of this annex.</p> <p>Output is available for each CD test.</p> <p>The arithmetic average of R_{CDA} for all individual charge-depleting tests shall be calculated and shall be rounded according to paragraph 6.1.8. of this Regulation to the nearest whole number.</p>	$EAER$, km; $EAER_{p,3}$, km; R_{CDA} , km.
---	---------------	--	---	---

.....

Step no.	Source	Input	Process	Output
9 Result of an individual vehicle. Final test result.	Output step 5	AER_{dec} , 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. AER_{ind} , $AER_{city,ind}$, $EAER_{ind}$ and $EAER_{p,ind}$ shall be rounded to the nearest whole number. $M_{CO_2,weighted,ind}$ shall be rounded to the nearest whole number.	EC_{ind} , Wh/km; $EC_{p,ind}$, Wh/km; $EAER_{ind}$, km; For Level 1A, AER_{ind} , km; $AER_{city,ind}$, km; $M_{CO_2,weighted,ind}$, g/km; $FC_{weighted,ind}$, l/100 km; $EAER_{p,ind}$, km.
	Output step 8	$AER_{city,final}$, km; $M_{CO_2,weighted,final}$, g/km; $FC_{weighted,final}$, l/100 km; EC_{final} , Wh/km; $EC_{p,final}$, Wh/km; $EAER_{final}$, km; $EAER_{p,final}$, km;		
	Output step 4	AER-interpolation availability	$EC_{weighted,ind}$ shall be rounded to the first place of decimal.	
	Output step 1	R_{CDC} , km;	$FC_{weighted,ind}$ shall be rounded to the first place of decimal. EC_{ind} and $EC_{p,ind}$ shall be rounded to the nearest whole number. Output is available for each individual vehicles. $R_{CDC,final}$ shall be rounded according to paragraph 6.1.8. of this Regulation to the nearest whole number.	$R_{CDC,final}$, km;

"

(31) *In the original version and 02 Series of Amendments,*

Appendix 3, paragraph 1.6., amend to read:

- "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 D_i 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.~~

For Level 1A only:

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."

In the original version and 02 Series of Amendments,

Appendix 3, paragraph 1.8., amend to read:

- "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 the following number of valid test results have been obtained:

For Level 1A and Level 1B criteria emissions: three tests

For Level 1B fuel efficiency and/or electric energy consumption: two tests

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 D_i 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. "~~

(32) *In the 01 and 03 Series of Amendments,*

Appendix 3, paragraph 1.6., amend to read:

- "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 D_i 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."

In the 01 and 03 Series of Amendments,

Appendix 3, paragraph 1.8., amend to read:

"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 D_1 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.~~"

(33) In the original version and 02 Series of Amendments,

in Appendix A1 - Appendix 1, paragraph 2.1.1.5.2., amend to read:

"2.1.1.5.2. Electric energy consumption of PEVs (if applicable)

Test 1

EAC(Wh)	
---------	--

<i>EC (Wh/km)</i>	<i>City</i>	<i>Combined</i>
Calculated values EC		
Declared value	-	

Test 2 (if applicable)

Record test results in accordance with the table of Test 1

Test 3a – Results after 4 Phase cycle (for Level 1A - if applicable)

Record test results in accordance with the table of Test 1

<i>EC (Wh/km)</i>	<i>Low 4 phase cycle</i>	<i>Medium 4 phase cycle</i>	<i>High 4 phase cycle</i>	<i>Extra High 4 phase cycle</i>	<i>City 4 phase cycle</i>	<i>Combined 4 phase cycle</i>
Averaging EC						
Final values EC						

Test 3b – Results after 3 Phase cycle (for Level 1B -if applicable)

<i>EC (Wh/km)</i>	<i>Low 3 phase cycle</i>	<i>Medium 3 phase cycle</i>	<i>High 3 phase cycle</i>	<i>Combined 3 phase cycle</i>
Averaging EC				
Final values EC				

Information for COP - **Results after 4 Phase cycle (For Level 1A - if applicable)**

	<i>Combined 4 phase cycle</i>
--	-----------------------------------

Electric Energy Consumption (Wh/km) EC _{DC,COP}	
AF _{EC}	

Information for COP - Results after 3 Phase cycle (For Level 1B - if applicable)

	<i>Combined 3 phase cycle</i>
Electric Energy Consumption (Wh/km) EC_{DC,COP}	
AF_{EC}	

"

(34) In the 01 and 03 Series of Amendments,

Annex 1A, Appendix 1, paragraph 2.1.1.5.2., amend to read:

"2.1.1.5.2. Electric energy consumption of PEVs (if applicable)

Test 1

E _{AC} (Wh)	
----------------------	--

<i>EC (Wh/km)</i>	<i>City</i>	<i>Combined 4 phase cycle</i>	<i>Combined 3 phase cycle</i>
Calculated values EC			
Declared value	-		

Test 2 (if applicable)

Record test results in accordance with the table of Test 1

Test 3a – Results after 4 Phase cycle (if applicable)

Record test results in accordance with the table of Test 1

<i>EC (Wh/km)</i>	<i>Low 4 phase cycle</i>	<i>Medium 4 phase cycle</i>	<i>High 4 phase cycle</i>	<i>Extra High 4 phase cycle</i>	<i>City 4 phase cycle</i>	<i>Combined 4 phase cycle</i>
Averaging EC						
Final values EC						

Test 3b – Results after 3 Phase cycle (if applicable)

<i>EC (Wh/km)</i>	<i>Low 3 phase cycle</i>	<i>Medium 3 phase cycle</i>	<i>High 3 phase cycle</i>	<i>Combined 3 phase cycle</i>
Averaging EC				
Final values EC				

Information for COP – Results after 4 phase cycle (if applicable)

	<i>Combined 4 phase cycle</i>
--	-----------------------------------

Electric Energy Consumption (Wh/km) EC _{DC,COP}	
AF _{EC}	

Information for COP – Results after 3 phase cycle (if applicable)

	<i>Combined 3 phase cycle</i>
Electric Energy Consumption (Wh/km) EC_{DC,COP}	
AF_{EC}	

"

(35) In the original version, 01, 02 and 03 Series of Amendments,

Table A8 App 3/1, amend to read:

"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 3.2.5.4.23.)				
OVC-HEV CD condition	may be used	shall not to be used	may be used	may be used
OVC-FCHV CD condition				
PEV				

"

(36) In the original version and 02 Series of Amendments,

Annex B8, paragraph 4.5.7.2., amend to read:

"4.5.7.2. Individual pure electric range for PEVs

The pure electric range for an individual vehicle shall be calculated using the following equation:

$$PER_{ind,p} = PER_{L,p} + K_{ind,p} \times (PER_{H,p} - PER_{L,p})$$

$$PER_{ind,p} = \frac{1}{\left(\frac{1}{PER_{L,p}} + K_{ind,p} \times \left(\frac{1}{PER_{H,p}} - \frac{1}{PER_{L,p}} \right) \right)}$$

where:

PER_{ind,p} is the pure electric range for an individual vehicle for the considered period p, km;

$PER_{L,p}$	is the pure electric range for vehicle L for the considered period p, km;
$PER_{H,p}$	is the pure electric range for vehicle H for the considered period p, km;
$K_{ind,p}$	is the interpolation coefficient for the considered individual vehicle for period p;
p	is the index of the individual period within the applicable test cycle.

For Level 1A;

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 Level 1B;

The considered periods shall be the applicable WLTP test cycle."

(37) In the 01 and 03 Series of Amendments,

Annex B8, paragraph 4.5.7.2., amend to read:

"4.5.7.2. Individual pure electric range for PEVs

The pure electric range for an individual vehicle shall be calculated using the following equation:

$$PER_{ind,p} = PER_{L,p} + K_{ind,p} \times (PER_{H,p} - PER_{L,p})$$

$$PER_{ind,p} = \frac{1}{\left(\frac{1}{PER_{L,p}} + K_{ind,p} \times \left(\frac{1}{PER_{H,p}} - \frac{1}{PER_{L,p}}\right)\right)}$$

where:

$PER_{ind,p}$	is the pure electric range for an individual vehicle for the considered period p, km;
$PER_{L,p}$	is the pure electric range for vehicle L for the considered period p, km;
$PER_{H,p}$	is the pure electric range for vehicle H for the considered period p, km;
$K_{ind,p}$	is the interpolation coefficient for the considered individual vehicle for period p;
p	is the index of the individual period within the applicable test cycle.

For the 4-phase WLTP only;

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 the 3-phase WLTP only;

The considered periods shall be the applicable WLTP test cycle."

II. Justification

1. The terminology used in the evaporative emissions “quick check” procedure “taking into account the pressure range in use of the fuel system” has led to some misunderstandings. The pressure that should be taken into account is the design pressure.
2. The concept of the “quick check” procedure in Conformity of Production testing is to ensure that vehicles conform to the specification tested at type approval as this specification has been demonstrated to be compliant. It is therefore logical in the usage of the alternative procedure for the pressures and times used to be representative of that specification.
3. Paragraph 7.1. of Annex C4 which describes the calculation of the DFs requires that “The result shall be rounded to three places to the right of the decimal point”.
4. An error has been identified in the text describing the specification of the HEPA filter where the “less than or equal to” symbol (\leq) has been used in place of the “greater than or equal to” symbol (\geq). The text is correct in Regulation 83 from which it was derived.
5. The standard EN 1822 was updated in 2019 and this update should be reflected in the Regulation.
6. From the requirements in the text of paragraph 4.2.2.2., it follows that a balance with a scale interval of $d \leq 1 \mu\text{g}$ has to be used. While most of the requirements are usually fulfilled without problems by modern high-quality balances, the requirement on the “intercept a_0 ” of “ $\leq 1 \mu\text{g}$ ” given in Table A5/1 is not realistic:

The typical uncertainty of the determination of the intercept a_0 is already in the order of $1 \mu\text{g}$, even if weights of the best available accuracy class E1 are used for testing (which usually is not even the case – for rather common weights of accuracy class E2, the uncertainty is on the order of $3 \mu\text{g}$). This means that even for a “perfect” balance, the tolerance of $1 \mu\text{g}$ can be exceeded due to deviations of the test weights within in their uncertainties. For “non-perfect” balances, systematic or random deviations of only \pm a few μg (which is covered by the specifications of such balances) can cause exceedance of the tolerance of $1 \mu\text{g}$ for the intercept a_0 .
7. US regulation 40 CFR 1065.341 defines a monthly interval for the CVS injection check at the same tolerance level of $\pm 2\%$. As most labs use essentially the same equipment for US and UNR testing, both requirements should be aligned. The failure rate of this check is neglectable, CVS volume flow is robust/not prone to errors.
8. Paragraph 6 of Annex B5 defines reference gases to be in „volume ppm“ while many gas suppliers sell their gases solely with DAKKS certificates with concentrations in „mol-ppm“. In Annex B7, UN-R 154 states, that all gases in the engines intake combustion an exhaust are deemed to be „ideal gases“. That implies that reference gases can be regarded as ideal gases as well.
9. It has been noticed that the formatting of paragraph 2.6.8.3.1.2. of Annex B6 has been incorrect since the initial publication of Regulation 154. As currently formatted, the sub-points (i) and (ii) apply only to sub-paragraph (b) which is illogical. This proposal aims to clarify that they apply to both (a) and (b).
10. Verification of CoP on electric energy consumption of PEVs can be conducted according to Consecutive cycle Type 1 Test Procedure (Table A8/10) or Shortened Type 1 Test Procedure (Table A8/11). References for DC Electric energy consumption according to Shortened Type 1 Test Procedure (Table A8/11) should be included as well.
11. Table App1/1 currently under paragraph 6.4. which is limited only to EC of OVC-HEVs but Table App1/1 covers all vehicles so paragraph number to be changed in 7.
12. Electric energy consumption of PEVs can be measured acc. to Consecutive cycle Type 1 Test Procedure (Table A8/10) or Shortened Type 1 Test Procedure (Table A8/11) (original version and 02 Series of Amendments)

13. Electric energy consumption of PEVs can be measured acc. to Consecutive cycle Type 1 Test Procedure (Table A8/10) or Shortened Type 1 Test Procedure (Table A8/11) (01 and 03 Series of Amendments)
14. All declared values are part of information document, AER as well as EAER.
15. 4 phases calculation results of individual vehicles should be identical whatever the series of amendment. Proposal is to harmonize, in all series of amendment, existing provisions for tyre rolling resistance of individual vehicles, as today applicable for Level 1A of 00 and 02 series. This would apply to 4 phases calculation only. No change for 3 phases calculation. (original version and 02 Series of Amendments)
16. 4 phases calculation results of individual vehicles should be identical whatever the series of amendment. Proposal is to harmonize, in all series of amendment, existing provisions for tyre rolling resistance of individual vehicles, as today applicable for Level 1A of 00 and 02 series. This would apply to 4 phases calculation only. No change for 3 phases calculation. (01 and 03 Series of Amendments)
17. Separate declared values for 3 and 4 phased EC_{WLTC} and PER. Manufacturer's declared value table not distinguishes between 3 and 4 phase here. No weighted results for 3 phase WLTC, as there is no UF in 3 phase WLTC, therefore deletion of "weighted" proposed.(original version and 02 Series of Amendments)
18. Separate declared values for 3 and 4 phased EC_{WLTC} and PER. Manufacturer's declared value table not distinguishes between 3 and 4 phase here. No weighted results for 3 phase WLTC, as there is no UF in 3 phase WLTC, therefore deletion of "weighted" proposed. (01 and 03 Series of Amendments).
19. Editorial change "according to paragraph" (original version and 02 Series of Amendments)
20. Editorial change "according to paragraph" (01 and 03 Series of Amendments)
21. A7/1 only for pure ICE vehicles, Table A8/6 reference added for OVC-HEVs and NOVC-HEVs (original version and 02 Series of Amendments)
22. A7/1 only for pure ICE vehicles, Table A8/6 reference added for OVC-HEVs and NOVC-HEVs (01 and 03 Series of Amendments)
23. "Level 1A only" in Annex B8 1.4.2.2. in combination with paragraph 3.4.2.1.1. could lead to the interpretation that the dynamic segment for Level 1B just consists out of one applicable WLTP test cycle only as paragraph 1.4.2.2. is not applicable. Furthermore, restriction to Level 1A not required in paragraph 1.4.2.2. because anyway stated in the whole calculation chapter that city cycle not applicable for Level 1B, e.g. in headline of Table A8/11
- 24.
- a. CS indices were missing
 - b. Step 5: editorial correction of "emissions" and wrong reference to paragraph 3.8.2. instead of 3.8.3.
 - c. Step 6:
 - i. editorial change "according to paragraphs"
 - ii. "averaged" added for better understanding which criteria emission values shall be used
 - iii. As in Table A7/1 (for conventional vehicles) the input for 3 phases shall also be $M_{i,CS,c,5}$ with applied DF factor
 - iv. The input and output values in Step 6 shall be the same for 4 and 3 phases (besides the FE value and $M_{i,CS,c,6}$), otherwise in case of 3 phases: 3 Tests (see Table A6/2 Criteria for number of tests) would lead to 3 $M_{CO_2,CS,declared}$ and also 3 Criteria Emissions results. This results in inconsistencies in further calculations. Proposal to clarify that average of CO_2 (phase + cycle) and Emission(cycle) values are

- meant. A8/6 confirms that further calculation is continued with only one value.
- d. Step 7:
 - i. Editorial change “according to paragraph”
 - ii. As the input and output values in Step 7 shall be the same for 4 and 3 phases, there is no need for differentiation between 3 phase and 4 phase anymore in step 7.
- 25.
- a. All steps: CS indices were missing
 - b. Step 5: editorial correction of “emissions” and wrong reference to paragraph 3.8.2. instead of 3.8.3.
 - c. Step 6:
 - i. editorial change “according to paragraphs”
 - ii. “averaged” added for better understanding which criteria emission values shall be used
 - iii. As in Table A7/1 (for conventional vehicles) the input for 3 phases shall also be $M_{i,CS,e,5}$ with applied DF factor
 - iv. The input and output values in Step 6 shall be the same for 4 and 3 phases (besides the FE value), otherwise in case of 3 phases: 3 Tests (see Table A6/2 Criteria for number of tests) would lead to 3 $M_{CO_2,CS,declared}$ and also 3 Criteria Emissions results. This results in inconsistencies in further calculations. Proposal to clarify that average of CO₂ (phase + cycle) and Emission(cycle) values are meant. A8/6 confirms that further calculation is continued with only one value.
 - d. Step 7:
 - i. Editorial change “according to paragraph”
 - ii. As the input and output values in Step 6 shall be the same for 4 and 3 phases, there is no need for differentiation between 3 phase and 4 phase anymore in step 7.
- 26.
- a. Last text section in 4.1.3.1. applies only to weighted CO₂, but last sentence indicates that it also applies to criteria emissions. Therefore deletion of “for the application of both equations of this paragraph”. To make it clearer a numbering should be added within 4.1.3.1 for each calculations. In addition to that a change of reference is necessary in Table A8/8 step 1 and table A8/9 step 2 referring to 4.1.3.1.1. instead of 4.1.3.1. Table A8/9 step 6, should refer to 4.1.3.1.2. instead of 4.1.3.1.
 - b. Deletion of “ave” in equation of $M_{CO_2,weighted}$ as there is no averaging of Utility Factors required according to Table A8/6 Step 6 and Step 8. Instead in case of multiple tests, the $M_{CO_2,weighted}$ is averaged. “ $(\sum_{j=1}^k UF_j)_{ave}$ is the average of the sum of utility factors of each charge-depleting test.” also needs to be deleted.
27. Wrong/Missing indices in step 1 for FE. Proposal gets it in line with Other post processing tables.
28. Annex B8 paragraph 4.4.4.1.
- a. Equation for 3 phase EAER already corrected in Series 01 and 03.
 - b. missing indices CS in all UN-R154 series

-
29. Editorial correction for original version and 02 Series of Amendments Annex B8 Table A8/9
- In Step, 1, 3, 9: Some units are missing
 - In Step, 1 and Step 3: $M_{CO_2,CS,c,6}$, g/km and $M_{CO_2,CS,c,6}$, g/km are missing as input (step 1) and as output (step 3), as EAER calculation in 4.4.4.1. & 4.4.4.2. requires these values
 - In step 9: Parameter $EC_{weighted,ind}$ does not exist, therefore it is proposed to delete it and $R_{CDC,final}$ has to be rounded, not R_{CDC} .
30. Editorial correction for 01 and 03 Series of Amendments Annex B8 Table A8/9
- In Step, 1, 3, 9: Some units are missing
 - In Step, 1 and Step 3: $M_{CO_2,CS,c,6}$, g/km and $M_{CO_2,CS,c,6}$, g/km are missing as input (step 1) and as output (step 3), as EAER calculation in 4.4.4.1. & 4.4.4.2. requires these values
 - In step 9: Parameter $EC_{weighted,ind}$ does not exist, therefore it is proposed to delete it and $R_{CDC,final}$ has to be rounded, not R_{CDC} .
31. Appendix 3 paragraph 1.6. and 1.8.: the same sentence has already been removed in section 8.2.4. from Supplement 01, as the referenced steps were insufficient and incorrect. The sentence should be removed as well for the same reasons. All necessary procedures are described in Appendix 1. (original version and 02 Series of Amendments)
32. Appendix 3 paragraph 1.6. and 1.8.: the same sentence has already been removed in section 8.2.4. from Supplement 01, as the referenced steps were insufficient and incorrect. The sentence should be removed as well for the same reasons. All necessary procedures are described in Appendix 1. (01 and 03 Series of Amendments)
33. Additional tables required as Low, Mid, High can be different for 3-phase and 4-phase because these are multiplied by the Adjustment factor. Adjustment factor is calculated from “combined value measured” and “combined value declared”. Adjustment factor can be different between 3-phase and 4-phase. Note: Same rationale applies for COP values. (original version and 02 Series of Amendments)
34. Additional tables required as Low, Mid, High can be different for 3-phase and 4-phase because these are multiplied by the Adjustment factor. Adjustment factor is calculated from “combined value measured” and “combined value declared”. Adjustment factor can be different between 3-phase and 4-phase. Note: Same rationale applies for COP values. (original version and 02 Series of Amendments) (01 and 03 Series of Amendments)
35. Wrong reference in Annex B8 Table A8 App3/1, as break off criterion is described in 3.2.4.5.2.
36. EC and PER for individual vehicles are currently derived through linear interpolation over energy demand. Due to the linear interpolation the PER of individual vehicles are overestimated. Less simplified interpolation approach through interpolation of 1/PER to achieve more correct individual PER values. (original version and 02 Series of Amendments)
37. EC and PER for individual vehicles are currently derived through linear interpolation over energy demand. Due to the linear interpolation the PER of individual vehicles are overestimated. Less simplified interpolation approach through interpolation of 1/PER to achieve more correct individual PER values. (01 and 03 Series of Amendments)
-