How to determine each parameter during Part A and/or Part B verification ?

Legend:
- already defined in existing reg. (green)
- need to define newly (pink)

	PEV			OVC-HEV		
scene	Part A&B	Part A		Part A&B	Part A	
	denominator	molecule		denominator	molecule	
	UBE_certified	UBE_algorithm	UBE_measured	UBE_certified	UBE_algorithm	UBE_measured
SOCE	**1** WLTP : GTR#15 Annex 8 para. 4.4.2.1.1. base CFR :	up to manufacture	WLTP : GTR#15 Table A8/11* Step no.1 CFR :	**2** WLTP : GTR#15 Annex 8 para. 4.4.2.1.1. base CFR :	up to manufacture	**4** WLTP : GTR#15 Annex 8 para. 4.4.4.2. base CFR :
	PER_certified	PER_algorithm	PER_measured	EAER_certified	EAER_algorithm	EAER_measured
SOCR	WLTP : GTR#15 Table A8/11* Step no.6 or 9** CFR :	up to manufacture	WLTP : GTR#15 Table A8/11* Step no.6 or 9** CFR :	**3** WLTP : GTR#15 Annex 8 para. 4.4.4.1. base CFR :	up to manufacture	**5** WLTP : GTR#15 Annex 8 para. 4.4.4.1. base CFR :

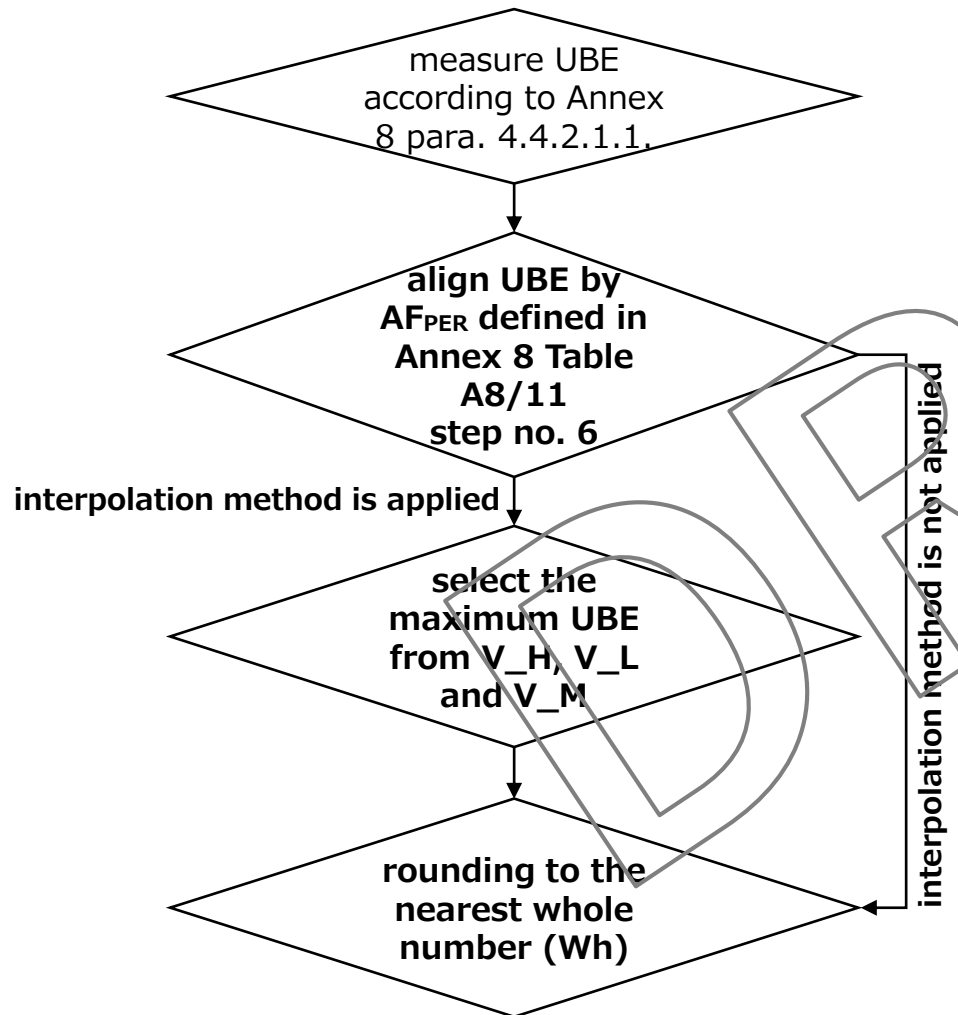* : Table A8/10 in case of consecutive cycle procedure
** : 6 for when interpolation method is not applied
      9 for when interpolation method is applied

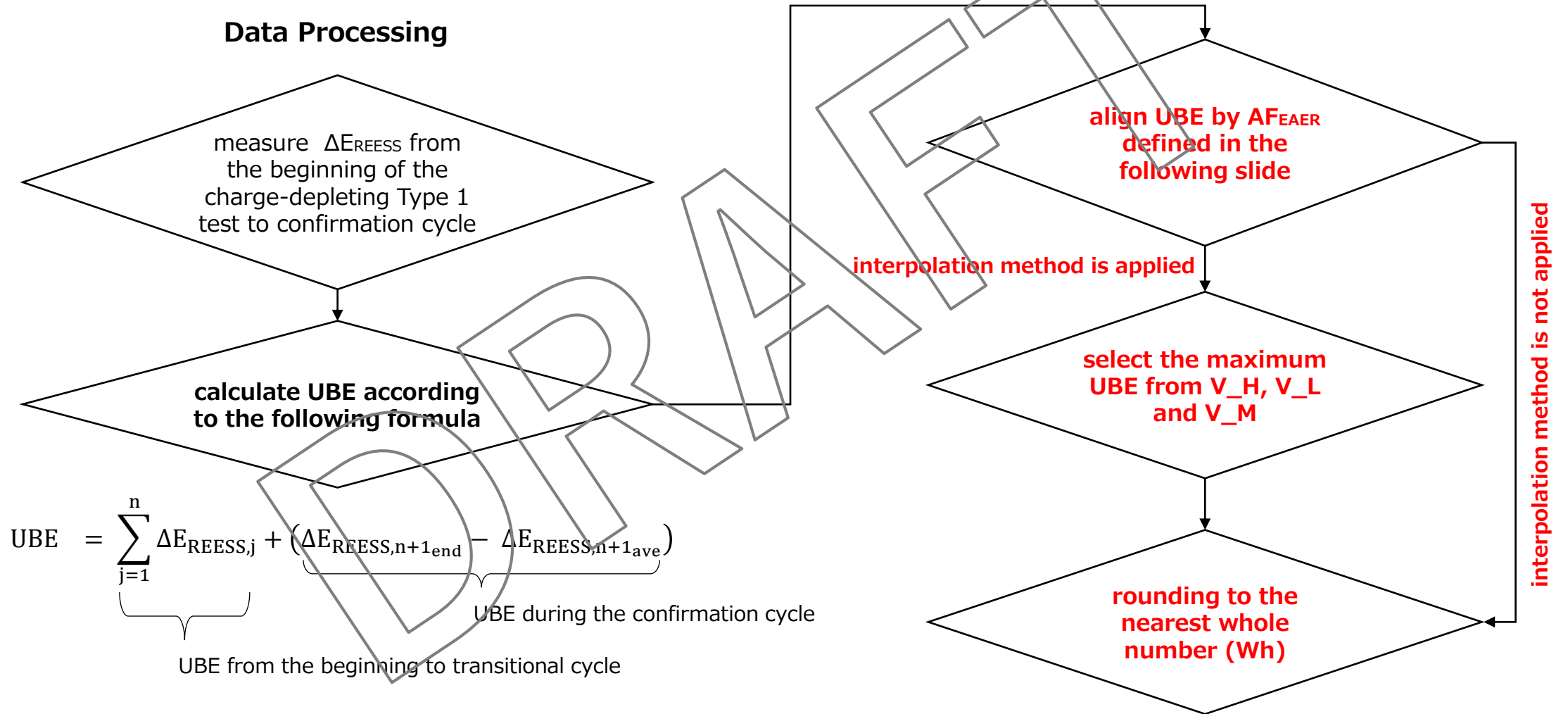# 1. UBE_certified for PEV (refer EVE-46-03e for more detail)

Data Processing (in case of STP)

- measure UBE according to Annex 8 para. 4.4.2.1.1.
- **align UBE by AF_{PER} defined in Annex 8 Table A8/11 step no. 6**
- interpolation method is applied
- interpolation method is not applied
- **select the maximum UBE from V_H, V_L and V_M**
- **rounding to the nearest whole number (Wh)**

Concrete proposed text is already incorporated to draft GTR

$UBE_{certified}$	Table A8/11 Step no.6	Table A8/10 Step no.7
	Averaging of tests for $UBE_{STP,ave}$, then alignment of $UBE_{STP,ave}$, by applying AF_{PER}	**Averaging of tests for $UBE_{CCP,ave}$, then alignment of $UBE_{CCP,ave}$, by applying AF_{PER}**
	In the case that the interpolation method is not applied, $UBE_{CCP,ave}$, **shall be rounded according to paragraph 7. to the nearest whole number.**	In the case that the interpolation method is not applied, $UBE_{CCP,ave}$, **shall be rounded according to paragraph 7. to the nearest whole number.**
	Table A8/11 Step no.9	**Table A8/10 Step no.10**
	Select the maximum $UBE_{STP,ave}$, and final rounding to the nearest whole number according to paragraph 7.	**Select the maximum $UBE_{CCP,ave}$, and final rounding to the nearest whole number according to paragraph 7.**
$Range_{measured}$	Table A8/11 Step no.6 or 9	Table A8/10 Step no.7 or 10
	No rounding	**No rounding**
$Range_{certified}$	Table A8/11 Step no.6 or 9	Table A8/10 Step no.7 or 10

2. UBE_certified for OVC-HEV

Data Processing

measure ΔE_{REESS} from the beginning of the charge-depleting Type 1 test to confirmation cycle

calculate UBE according to the following formula

$$UBE = \sum_{j=1}^{n} \Delta E_{REESS,j} + \left(\Delta E_{REESS,n+1_{end}} - \Delta E_{REESS,n+1_{ave}} \right)$$

UBE during the confirmation cycle

UBE from the beginning to transitional cycle

align UBE by AF_{EAER} defined in the following slide

interpolation method is applied

select the maximum UBE from V_H, V_L and V_M

rounding to the nearest whole number (Wh)
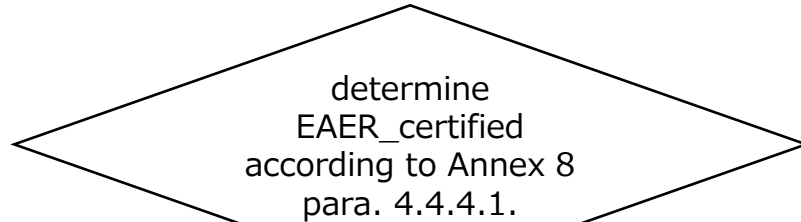
interpolation method is not applied

Concrete proposed text is already incorporated to draft GTR

Concrete proposed text is not incorporated to draft GTR at this moment
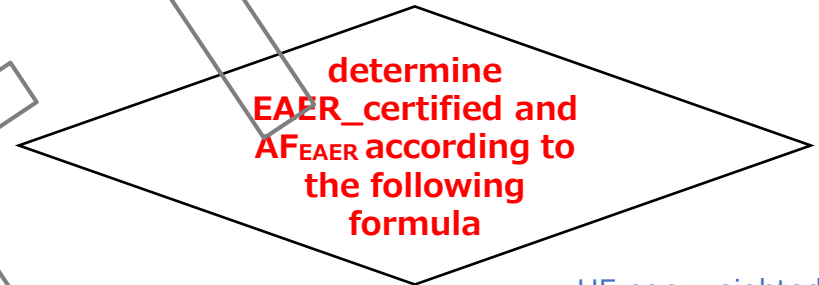
3. EAER_certified for OVC-HEV

Data Processing in EU

determine EAER_certified according to Annex 8 para. 4.4.4.1.

determine AF$_{EAER}$ according to the following formula

$$AF_{EAER} = \frac{EAER_{certified}}{EAER_{measured}}$$

UF non-weighted CO_2

$$EAER_{measured} = \left(\frac{M_{CO2,CS,measured,ave} - M_{CO2,CD,measured,avg}}{M_{CO2,CS,measured,ave}} \right) \times R_{CDC}$$

Data Processing in JPN

determine EAER_certified and AF$_{EAER}$ according to the following formula

UF non-weighted CO_2

$$EAER_{certified} = \left(\frac{M_{CO2,CS,measured,ave} - M_{CO2,CD,measured,avg}}{M_{CO2,CS,measured,ave}} \right) \times R_{CDC}$$

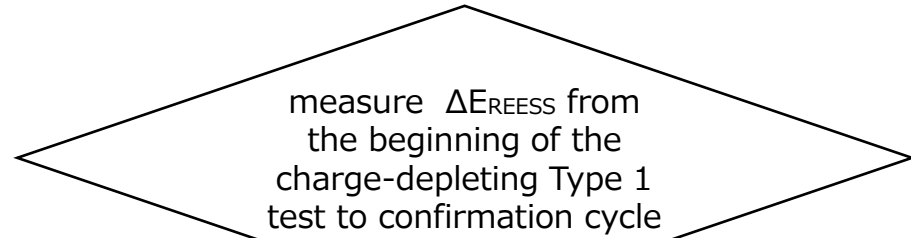$$AF_{EAER} = \frac{EC_{measured}}{EC_{certified}} \quad \text{or} \quad AF_{EAER} = \frac{EAER_{declared}}{EAER_{measured}}$$

Under the study

DRAFT

Concrete proposed text is not incorporated to draft GTR at this moment

4. UBE_measured for OVC-HEV

(refer EVE-46-04e for more detail)

Data Processing

Concrete proposed text is already incorporated to draft GTR
However, need to modify for more clear description

measure ΔE_{REESS} from the beginning of the charge-depleting Type 1 test to confirmation cycle

↓

calculate UBE according to the following formula

parameters	stepwise procedure
$UBE_{measured}$	$$\Delta E_{REESS,j} = \sum_{i=1}^{n} \Delta E_{REESS,j,i}$$ $$\Delta E_{REESS,j,i} = \frac{1}{3600} \times \int_{t_o}^{t_{end}} U(t)_{REESS,j,i} \times I(t)_{j,i}\, dt$$ t_{end} is the time at the end of the confirmation cycle j, s; then correct to charge/discharge energy balance point

$$UBE_{corr} = UBE_{meas} + (\Delta E_{REESS\_end} - \Delta E_{REESS\_ave})$$

$$UBE = \underbrace{\sum_{j=1}^{n} \Delta E_{REESS,j}}_{\text{UBE from the beginning to transitional cycle}} + \underbrace{\left(\Delta E_{REESS,n+1_{end}} - \Delta E_{REESS,n+1_{ave}}\right)}_{\text{UBE during the confirmation cycle}}$$

n : transition cycle
n+1 : confirmation cycle

5. EAER_measured for OVC-HEV

Data Processing

calculate EAER according to Annex 8 para. 4.4.4.1. **with modifying to the right hand side formula**

Concrete proposed text is already incorporated to draft GTR

$Range_{measured}$

$$EAER = \left(\frac{M_{CO2,CS} - M_{CO2,CD,avg}}{M_{CO2,CS}} \right) \times R_{CDC}$$

\<reference\> Current "declared" parameter under the WLTP world

Vehicle type		Level 1A only M_{CO2} [b] (g/km)	Level 1A: FC (kg/100 km)	Level 1B; FE (km/l or km/kg)	Electric energy consumption [c] (Wh/km)	All electric range / Pure Electric Range [c] (km)
OVC-HEV	CD	**$M_{CO2,CD}$** Paragraph 4.1.2. of Annex B8.	-	FE_{CD} Paragraph 4.6.1. of Annex B8.	For Level 1A: $EC_{AC,CD}$ Paragraph 4.3.1. of Annex B8. For Level 1B: **EC** Paragraph 4.6.2. of Annex B8	AER Paragraph 4.4.1.1. of Annex B8.
	CS	**$M_{CO2,CS}$** Paragraph 4.1.1. of Annex B8.	-	FE_{CS} Paragraph 4.1.1.1. of Annex B8.	-	-
PEV		-	-	-	EC_{WLTC} Paragraph 4.3.4.2. of Annex B8.	**PER_{WLTC}** Paragraph 4.4.2. of Annex B8.