

# **UNECE GRPE Real Driving Emissions IWG**

## **Regional Settings & Requirements for Trip Validity**

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7th RDE-IWG Meeting, Seoul, October 30-31, 2019

# Outline

- **Objective of the present document**
- **Regional Trip Validity Settings (Items #1 to #10)**
- **Regional Emissions Calculations Method (Item #11)**

# General information

- **Presentations made by the different regions (Japan, South Korea, India, China) describing their own RDE regulations**
- **Additional information and verifications collected at the initiative of the JRC in September-October 2019**
- **Status as off mid-October 2019**
- **Contracting parties are kindly asked to double check the information provided, as the information is used to prepare a special version of EMROAD with pre-defined regional settings.**
- **In the following, TBC = To Be Confirmed**

# Item#1 – Ambient conditions - Temperature

Item	Region(s)	Settings/Requirements
1. Ambient temperature	China	Moderate: $0^{\circ}\text{C} \leq T \leq 30^{\circ}\text{C}$ Extended: $-7^{\circ}\text{C} \leq T < 0^{\circ}\text{C}$ and $30^{\circ}\text{C} < T \leq 35^{\circ}\text{C}$
	EU, South Korea	Moderate: $0^{\circ}\text{C} \leq T \leq 30^{\circ}\text{C}$ Extended: $-7^{\circ}\text{C} \leq T < 0^{\circ}\text{C}$ and $30^{\circ}\text{C} < T \leq 35^{\circ}\text{C}$
	Japan	Moderate: $0^{\circ}\text{C} \leq T \leq 35^{\circ}\text{C}$ Extended: $-2^{\circ}\text{C} \leq T < 0^{\circ}\text{C}$ and $35^{\circ}\text{C} < T \leq 38^{\circ}\text{C}$
	India	Moderate: $10^{\circ}\text{C} \leq T \leq 40^{\circ}\text{C}$ Extended: $8^{\circ}\text{C} \leq T < 10^{\circ}\text{C}$ and $40^{\circ}\text{C} < T \leq 45^{\circ}\text{C}$
	US, Canada	TBC

## Item#2 – Ambient conditions - Altitude

Item	Region(s)	Settings/Requirements
2. Altitude	China	Moderate: $A \leq 700\text{m}$ Extended: $700\text{m} < A \leq 1300\text{m}$ Enhanced-extended: $1300\text{m} < A \leq 2400\text{m}$
	EU, India, South Korea	Moderate: $A \leq 700\text{m}$ Extended: $700\text{m} < A \leq 1300\text{m}$
	Japan	Moderate: $A \leq 700\text{m}$ Extended: $700\text{m} < A \leq 1000\text{m}$
	US, Canada	TBC

# Item#3 – Emissions allowance for extended conditions

Item	Region(s)	Settings/Requirements
3. Emissions allowance for extended conditions	China	Yes Extended factor: 1.6 Enhanced-extended factor: 1.8
	EU, South Korea	Yes Extended factor: 1.6
	US, Canada, Japan, India	TBC

# Item#4 – Trip requirements – Distance characteristics

Item	Region(s)	Settings/Requirements
4. Trip distance characteristics	China EU, South Korea	<p>Low speed: <math>1 &lt; S \leq 60</math> km/h            Medium speed: <math>60 &lt; S \leq 90</math> km/h            High speed: <math>90 &lt; S</math> km/h</p>
	India	<p>M1 vehicles:            Low speed: <math>1 &lt; S \leq 45</math> km/h            Medium speed: <math>45 &lt; S \leq 65</math> km/h            High speed: <math>65 &lt; S</math> km/h</p> <p>N1 vehicles:            Low speed: <math>1 &lt; S \leq 40</math> km/h            Medium speed: <math>40 &lt; S \leq 60</math> km/h            High speed: <math>60 &lt; S</math> km/h</p> <p>M1 and N1 vehicles (Low powered):            Low speed: <math>1 &lt; S \leq 45</math> km/h            Medium speed: <math>45 &lt; S \leq 65</math> km/h</p>
	Japan	<p>Low speed: <math>1 &lt; S \leq 60</math> km/h            Medium speed: <math>60 &lt; S</math> km/h</p>
	US, Canada	TBC

# Item#5 – Trip requirements – Specific speed characteristics

Item	Region(s)	Settings/Requirements
5. Trip specific speed characteristics	EU, South Korea	(Urban) - Low speed average speed: $15 \leq AS \leq 40$ km/h (Motorway) - High speed operation above 145 km/h: <3% of high speed driving time (Motorway) - High speed operation above 100 km/h: >5 minutes
	India	(Phase 1) - Low speed average speed: $15 \leq AS \leq 30$ km/h  M1 vehicles: (Phase 3) - High speed operation above 100 km/h: <3% of high speed driving time (Phase 3) - Maximum high speed : 120 km/h  N1 vehicles: (Phase 3) - Maximum high speed : 80 km/h  M1 and N1 vehicles (Low powered): (Phase 3) - Maximum high speed : 70 km/h
	Japan	None
	US, Canada, China	TBC



# Items#6, 7 – Trip requirements – Duration and stops

Item	Region(s)	Settings/Requirements
6. Trip duration	EU, South Korea, India, Japan, China	$90 \leq D \leq 120$ min.
	US, Canada	TBC
7. Stop Time Share	EU, South Korea, India, Japan, China	Stop definition speed: $S \leq 1$ km/h Stop time share: $6 \leq ST \leq 30$ %
	US, Canada	TBC

- **In all the following slides (Items 8 to 10): Elements To Be Confirmed for US and Canada**

# Item#8 – Trip overall dynamics verification (MAW)

Item	Region(s)	Settings/Requirements
8. Overall dynamics verification (MAW) <b>- Reference curve</b>	China EU, South Korea	Reference cycle: WLTP (Cold, 4 phases) Reference CO2 Mass: 50% of the CO2 emitted on the WLTP  Curve definition: Point / Cycle phase for CO2[g/km] / Correction coefficient Ref. curve point 1 (P1) / WLTP Phase 1 / 1.00 (China 1.20 TBC) Ref. curve point 2 (P2) / WLTP Phase 3 / 1.00 (China (1.10 TBC) Ref. curve point 3 (P3) / WLTP Phase 4 / 1.00 (China (1.05 TBC)
	Japan	Reference cycle: WLTP (Cold, 3 phases) Reference CO2 Mass: 50% of the CO2 emitted on the WLTP  Curve definition: Point / Cycle phase for CO2[g/km] / Correction coefficient Ref. curve point 1 (P1) / WLTP Phase 1 / 1.00 Ref. curve point 2 (P2) / WLTP Phase 3 / 1.00 Ref. curve point 3 (P3) / WLTP Phase 3 / 1.00
	India	Reference cycle: MIDC Cold Reference CO2 Mass: 100% of the CO2 emitted on the MIDC  Curve definition: Point / Cycle phase for CO2[g/km] / Correction coefficient Ref. curve point 1 (P1) / MIDC Phase 1 / 1.10 (M1) – 1.05 (N1) – 1.05 (M1 and N1 LP) Ref. curve point 2 (P2) / MIDC Phase 2 / 1.10 (M1) – 1.05 (N1) – 1.05 (M1 and N1 LP) Ref. curve point 3 (P3) / MIDC Phase 2 / 1.10 (M1) – 1.05 (N1) – 1.05 (M1 and N1 LP)

# Item#8 – Trip overall dynamics verification (MAW)

Item	Region(s)	Settings/Requirements
8. Overall dynamics verification (MAW) <b>- MAW Speed bins</b>	China EU, South Korea	MAW Speed bins: Low Speed: $0 < AS \leq 45$ km/h Medium Speed: $45 < AS \leq 80$ km/h High Speed: $80 < AS$ km/h
	Japan	MAW Speed bins: Low Speed: $0 < AS \leq 50$ km/h Medium Speed: $50 < AS$ km/h
	India	MAW Speed bins (M1 and N1): Low Speed: $0 < AS \leq 35$ km/h Medium Speed: $35 < AS \leq 55$ km/h High Speed: $55 < AS$ km/h

# Item#8 – Trip overall dynamics verification (MAW)

Item	Region(s)	Settings/Requirements	
8. Overall dynamics verification (MAW) <b>- Tolerances and verification</b>	EU, South Korea, Japan	Tol1_High: 45% (Low Speed) / 40% Tol1_Low: -25% / -100% for OVC-HEV Tol2_High: None Tol2_Low: None	Normality: 50% of windows within Tol1_High and Tol1_Low for Low, Medium and High speed MAWs  Completeness: None
	India	Tol1_High: 25% Tol1_Low: -25% Tol2_High: None Tol2_Low: None	Normality: 50% of MAWs within Tol1_High and Tol1_Low for Low, Medium and High speed MAWs  Completeness: At least 10% of the total number of MAWs within each of the MAW speed bins (Low, Medium and High speed)
	China	Tol1_High: 25% Tol1_Low: -25% Tol2_High: 50% Tol2_Low: -50%	Normality: 50% of windows within Tol1_High and Tol1_Low for Low, Medium and High speed MAWs  Completeness: TBC

# Item#9 – Excess of dynamics verification

Item	Region(s)	Settings/Requirements		
9. Excess of dynamics verification <b>- <math>v \cdot a_{pos}</math> [95]</b>	EU, South Korea, China (all speed bins)  Japan (low and medium speed bins only)	EU N1-N2 vehicles with power-to-mass < 44W/kg  $v \leq 74.6$ km/h, Valid if: $(v \cdot a_{pos})_{95} < 0.136 \cdot v + 14.44$  $v > 74.6$ km/h, Valid if: $(v \cdot a_{pos})_{95} < 0.0742 \cdot v + 18.966$  Minimum 150 counts in the Low, medium speed bins, 100 in the high speed bin		$v \leq 74.6$ km/h, Valid if: $(v \cdot a_{pos})_{95} < 0.136 \cdot v + 14.44$  $v > 74.6$ km/h, Valid if: $(v \cdot a_{pos})_{95} < -0.097 \cdot v + 31.635$  Minimum 150 counts in the Low, medium speed bins, 100 in the high speed bin
	India	M vehicles  $v \leq 56.9$ km/h, Valid if: $(v \cdot a_{pos})_{95} < 0.0467 \cdot v + 12.2490$  $v > 56.9$ km/h, , Valid if: $(v \cdot a_{pos})_{95} < 0.1665 \cdot v + 5.4352$  Minimum 150 counts in the Low, medium speed bins, 100 in the high speed bin	N1 vehicles  $v \leq 51.4$ km/h, Valid if: $(v \cdot a_{pos})_{95} < -0.0614 \cdot v + 6.9439$  $v > 51.4$ km/h, , Valid if: $(v \cdot a_{pos})_{95} < 0.0045 \cdot v + 9.8664$  Minimum 150 counts in the Low, medium speed bins, 100 in the high speed bin	M1 and N1 Low powered vehicles  Valid if: $(v \cdot a_{pos})_{95} < 0.0142 \cdot v + 4.6214$  Minimum 150 counts in the Low speed bins, 100 in the medium speed bin

# Item#10 – Absence of dynamics verification

Item	Region(s)	Settings/Requirements		
10. Absence of dynamics verification <b>- RPA</b>	EU, South Korea, China (all speed bins)	$v \leq 94,05 \text{ km/h}$ , Valid if: $RPA > -0,0016 \cdot v + 0,1755$  $v > 94,05 \text{ km/h}$ , Valid if: $RPA > 0,025$		
	Japan (low and medium speed bins only)			
	India	M vehicles  $v \leq 55,9 \text{ km/h}$ , Valid if: $RPA > -0,001825v + 0,1755$  $v > 55,9 \text{ km/h}$ , , Valid if: $RPA > -0,0011 \cdot v + 0,1350$	N1 vehicles  $RPA > -0,0016v + 0,1406$	M1 and N1 Low powered vehicles  $v \leq 54,76 \text{ km/h}$ , Valid if: $RPA > -0,0022v + 0,1271$  $v > 54,76 \text{ km/h}$ , , Valid if: $RPA > 0,0066$

# Item#10 – Final Emissions Calculation

Item	Region(s)	Method
11. Final Emissions Calculation	EU, Japan, South Korea	- Low speed and total emissions regulated - In line with EU RDE4 (CO2 based correction)
	China	- In line with EU RDE3 (MAW weighing)? - TBC
	India	- TBC