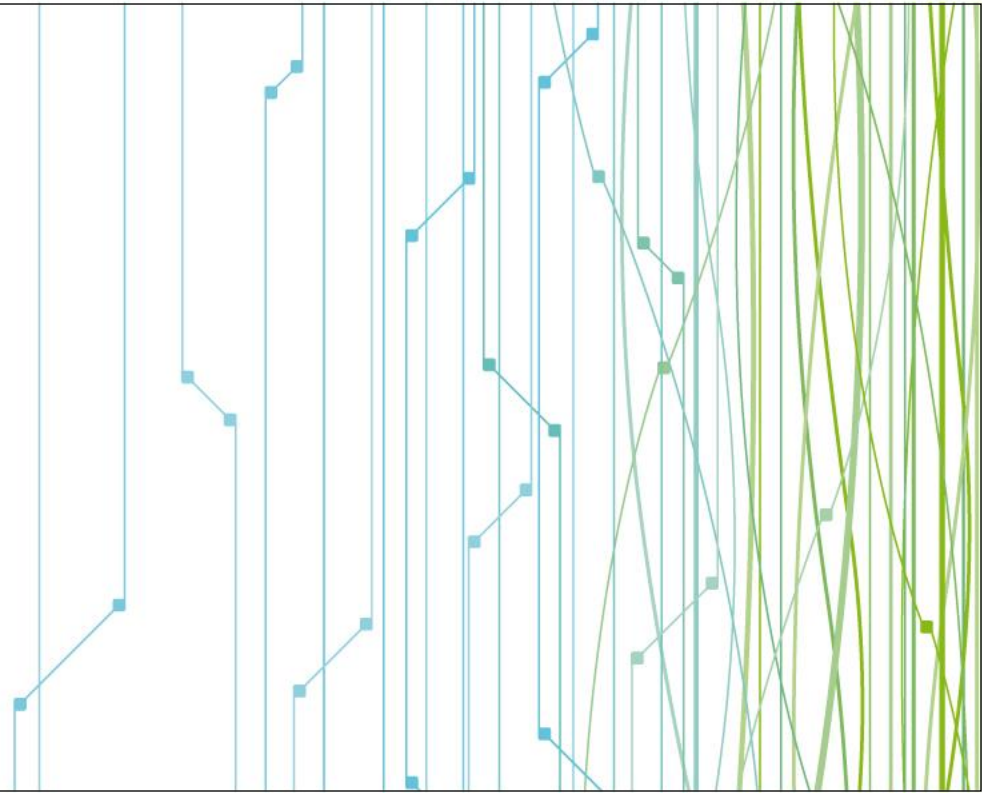


Renault presentation
discussed and agreed on
within
ACEA WLTP EV Group



European
Automobile
Manufacturers
Association

RENAULT
Z.E.



WLTP

PEV Range test procedure : End of test criteria

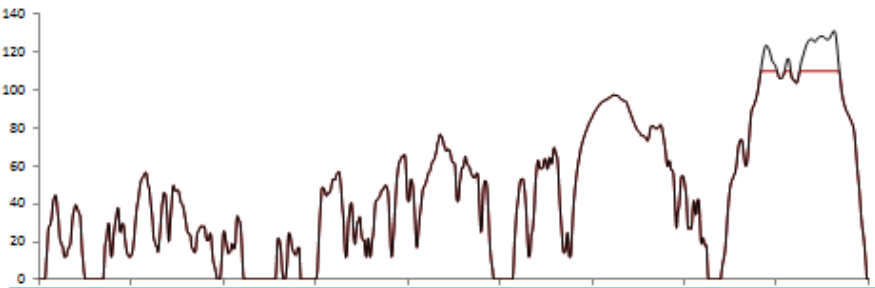


Content

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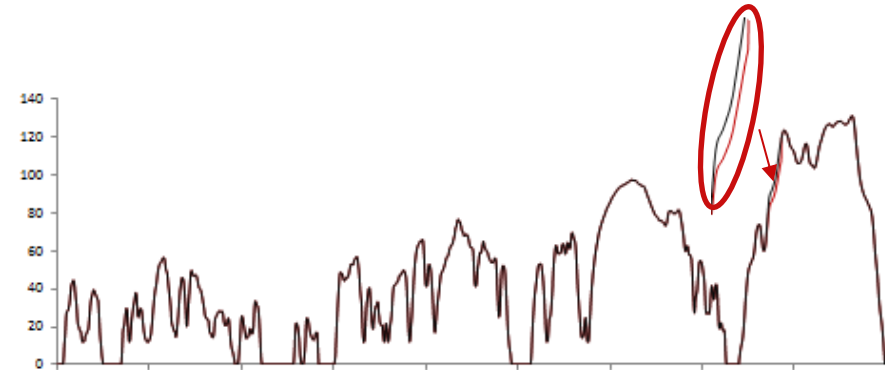
1 Problem definition

- Present GTR draft: 'Break up criteria is reached when vehicle **deviates from prescribed tolerance for 4 seconds or more**'
- In the present GTR-draft, the energy consumption is also calculated over the range test
- There are two possible situation where the '4second - end of test criteria' may lead to incoherent AER and electric energy consumption value



Problem 1: Low speed PEV (capped speed)

- Some times the maximum speed of 'utility vehicles' are capped (ex: 110 km/h)
- These kind of vehicle will certainly not be able to follow the drive cycle above the maximum speed of the vehicle ($V_{\max \text{ Vehicle}} < V_{\max \text{ WLTC}}$)
- *Example:* a vehicle with a maximum speed of 110 km/h will have a range 16.7 km (real range >200 km)



Problem 2: Low powered PEV

- If the vehicle power is lower than the required power, then vehicle will not be able to follow the drive cycle (Even if it has a high capacity battery)
- In this case the test has to be stopped before completing the first WLTC cycle even though the battery is capable of driving a very long range)
- *Example:* A vehicle with a real range of 150 km/h can have result in a range of 17 km/h

2 Possible solutions

- There are two possible solutions under discussion

		Solution 1 <i>(based on WLTP -ICE proposal)</i>	Solution 2 <i>(based on SAE J1634)</i>
Problem	Low speed vehicle	- 'End of test criteria' is not applicable to speed more than the 'maximum speed' of the vehicle	- Shall be operated at maximum available power (or full throttle) when the vehicle can not achieve the speed trace within the speed and time tolerance - First drive cycle will be used as reference cycle (best effort situation)
	Low powered vehicle	- Downscaling method according to the 'cycle modification method' for ICE vehicle should be used - In this case [peak power] of PEV should be used for calculation	

Comments	Advantage	- Coherent with the ICE vehicle in the present draft GTR	- One solution fits for all
	Disadvantage	- PEV power defined according to R85 (peak or 30 minutes) does not consider the battery capacity of the vehicle. In reality the available [peak power] can be less than the declared power. Hence the cycle modification will be a worst case situation for OEM	- Needs a pre-test to conform that the first cycle is the maximum power condition (best effort speed situation) - Not coherent with the ICE vehicle in the draft GTR

3 Text proposal for solution 1 (based on GTR draft on ICE)

add the following text in addition to 3.4.4.3.1.3. to annex 8

- A. If the maximum speed of the vehicle is lower than the maximum speed of the drive cycle, the vehicle shall be driven with its maximum speed in those cycle periods where the cycle speed is higher than the maximum speed of the vehicle. **For these type of vehicle the end of test criteria given in section 3.4.4.3.1.3 of Annex 8 does not apply above the maximum speed of the vehicle.”**
- B. If the vehicle is not able to follow the first drive cycle due to low power of the vehicle then cycle modification method described in section 7 of annex 1 should be applied. **In this case [peak power] should be used for calculation purpose.** If the vehicle cannot follow the speed trace of the downscaled cycle within the tolerance for specific periods, it shall be driven with the accelerator control fully activated during these periods. During such periods of operation, driving trace violations shall be permitted.

Only the sentence in **red** is specific to the PEV. Rest of the text is same as that for ICE vehicle in the GTR draft

4 Text proposal for solution 2 (based on SAE J1634)

add the following text in addition to 3.4.4.3.1.3. to annex 8

For vehicles that are not capable of meeting the prescribed speed vs. time relationship of the applicable WLTC drive cycle for the initial drive cycle (i.e., the first drive cycle that begins with the vehicle fully-charged) and operated at maximum available power, the test terminates when the following criterion is satisfied: 1) when the vehicle, while operated at maximum available power or “full throttle”, is unable to reproduce the best-effort speed vs. time relationship established by the vehicle in the first WLTC drive cycle of the test. The applicable drive tolerances for the best-effort trace are provided given in Section 1.2.6.6. of Annex 6 (+/- 2 km/h, +/- 1 sec).

Note: The speed tolerance violation criteria given in Section 1.2.6.6. of Annex 6 do not apply to the best-effort trace for low-power vehicles

Annex

Vehicle not able to follow the drive cycle: What about ICE ?

Ref: WLTP-2014-005 GTR Version 14.09.2014

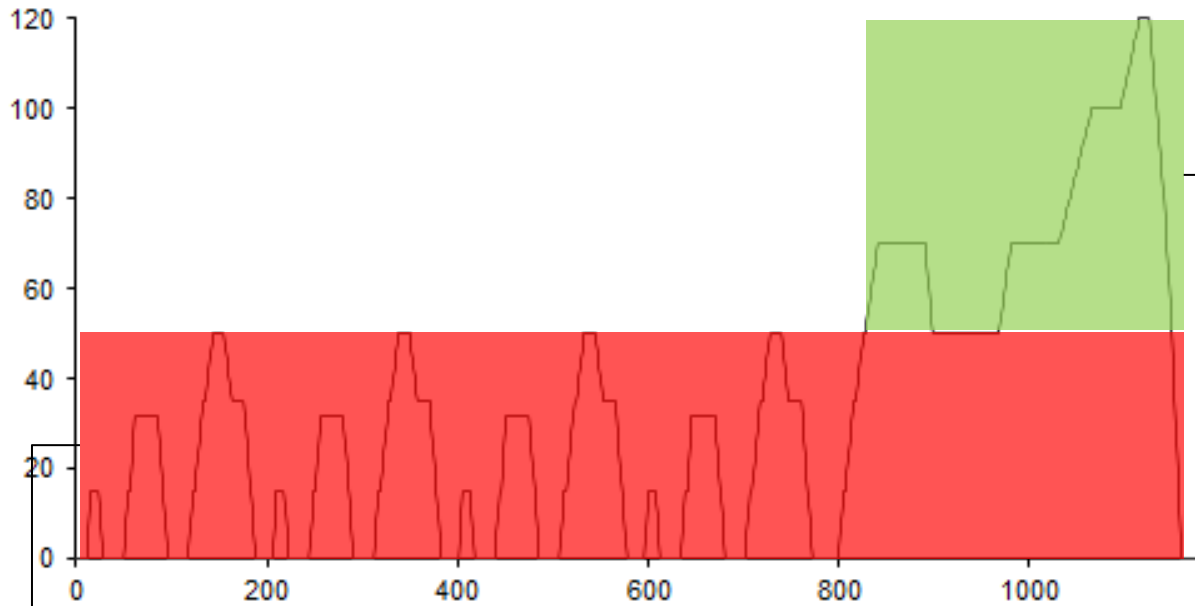
7.4. Additional requirements

If a vehicle is tested under different configurations in terms of test mass and driving resistance coefficients, ~~vehicle~~ vehicle H as defined in paragraph 4.2.1. of Annex 4 shall be used for the determination of the downscaling factor and the resulting downscaled cycle shall be used for all measurements.

If the maximum speed of the vehicle is lower than the maximum speed of the downscaled cycle, the vehicle shall be driven with its maximum speed in those cycle periods where the cycle speed is higher than the maximum speed of the vehicle.

If the vehicle cannot follow the speed trace of the downscaled cycle within the tolerance for specific periods, it shall be driven with the accelerator control fully activated during these periods. During such periods of operation, driving trace violations shall be permitted.

Electric Vehicle: NEDC end of test criteria



Required to follow the drive cycle trace
Violations is not ignored

Trace violations is acceptable if full
power is used

Downscaling application to PEV

- Down scaling works well for Kangoo ZE
- Need to justify the type of power used for calculation (net power or continuous power)
- Kangoo data: $P_{30\text{ min}} = P_{\text{peak}} = 44\text{ kw}$

