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European  
Automobile  
Manufacturers  
Association

# Combined Approach Family Definition for EV

ACEA EV Group

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ACEA

# ACEA WLTP E-Lab group

## Combined approach family definition

### Current GTR for conventional vehicles only.

- 5.6. CO<sub>2</sub> vehicle family
- 5.6.1. Unless vehicles are identical with respect to the following vehicle/powertrain/transmission characteristics, they shall not be considered to be part of the same CO<sub>2</sub> vehicle family:
- (a) Type of internal combustion engine: fuel type, combustion type, engine displacement, full-load characteristics, engine technology, and charging system shall be identical, but also other engine subsystems or characteristics that have a non-negligible influence on CO<sub>2</sub> under WLTP conditions;
  - (b) Operation strategy of all CO<sub>2</sub>-influencing components within the powertrain;
  - (c) Transmission type (e.g. manual, automatic, CVT);
  - (d) n/v ratios (engine rotational speed divided by vehicle speed). This requirement shall be considered fulfilled if, for all transmission ratios concerned, the difference with respect to the transmission ratios of the most commonly installed transmission type is within 8 per cent;
  - (e) Number of powered axles;
  - (f) [RESERVED: family criteria for EVs].

- ▶ The main idea is to categorize vehicles within a family to reduce the test burden.
- ▶ The consumption of vehicles within a CO<sub>2</sub> family can be interpolated between “low” and “high” vehicle (small extrapolation also possible).
- ▶ The approach is based on the cycle energy and regards all impacts caused by different driving resistances.
- ▶ The family definition ensures that other CO<sub>2</sub> influencing impacts outside of typical measurement tolerance can not be within a family.

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### Current Japanese proposal for an addition for N-/OVC-HEVs.

In addition above, the following specification/characteristics shall be identical for NOVC-HEV and OVC-HEV.

- (f) Hybrid system configuration (series/parallel/split)
- (g) Battery specification (type, voltage, output)
- (h) Motor specification (type, voltage, output)
- (i) Inverter specification
- (j)  $R_{CDC}$  value

### Current proposal from ACEA for an addition for N-/OVC-HEVs.

- (f) Architecture of the hybrid power train (serial, parallel, power split, ...)
- (g) Type of traction battery including the type of battery cells and the assembly, kind of cooling as well as the battery positioning within the vehicle;
- (h) Type and amount of electric machines: full-load characteristic, type of used current (AC/DC), construction type (asynchronous/ synchronous / ...), kind of cooling (air, coolant, oil,...);
- (i) Type of converter between electric machine and traction battery;
- (j) Type of converter between traction battery and low voltage power supply;
- (k) Non- negligible deviation concerning the hybrid operation strategy of all CO<sub>2</sub>-influencing components
- (l) ...?

#### ► ACEA position:

The finalization for the “combined approach for EV’s” is planned for April/May 2015. As long as the details of the application are discussed, ACEA recommend against the finalization of the criteria for combined approach family for EVs because it might be useful to add more criteria during the following discussions.

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### Current Japanese proposal for PEVs.

The basic concept for the PEV family definition is same with that of OVC-HEV & NOVC-HEV family definitions in regard to electric systems.

Unless vehicles are identical with respect to the following motor/transmission characteristics, they shall not be considered to be part of the same vehicle family for PEVs:

(a) motor type (e.g. UN R85)

Other software or characteristics that have a non-negligible influence on energy consumption and electric range under WLTP conditions shall be identical.

(b) battery type (e.g. Energy density for battery pack [Wh/kg] )

Other software or characteristics that have a non-negligible influence on energy consumption and electric range under WLTP conditions shall be identical.

(c) transmission type (e.g. manual, automatic, CVT);

(d) n/v ratios (motor rotational speed divided by vehicle speed). This requirement shall be considered fulfilled if, for all transmission ratios concerned, the difference with respect to the transmission ratios of the most commonly installed transmission type is within 8 per cent;

(e) number of powered axles;

### ▶ ACEA position:

The recommendation is equal to the statement for N-/OVC-HEVs.

We should start the discussion with respect to the formulated criteria, but we should not finalize them now, because it might be helpful the add criteria if we recognize that we have to consider more aspects.

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- ▶ The shown criteria are a suitable start for the discussions of the combined approach for EVs.
- ▶ To be able to use the opportunity to add more criteria to ensure the application of the combined approach we should keep this topic open until the finalization of the combined approach.
- ▶ Integration into the GTR:
  - 1.option:  
Change the subtitle 5.6 “CO<sub>2</sub> vehicle family” in “Combined approach vehicle family”.  
If we consider to add the criteria to that paragraph, we have to change the subtitle because its not longer only a topic of CO<sub>2</sub> but a topic of electric range and consumption too.
  - 2.option:  
Add 2 paragraphs; a first for N-/OVC-HEV and a second for PEV.