

Proposal for a new Supplement to the 06 and 07 series of amendments to Regulation No. 101 (Emissions of M₁ and N₁ vehicles)

The text reproduced below was prepared by the expert from the International Organization of Motor Vehicle Manufacturers (OICA) to clarify the rules related to the selection of driving modes for testing of OVC-HEV vehicles with a mode selection switch. The modifications to the current text of the Regulation are marked in bold for new or strikethrough for deleted characters.

I. Proposal

Annex 8, Paragraph 3., amend to read:

- "3. Externally chargeable (OVC electric HEV) without an operating mode switch
- 3.1. Two tests shall be performed under the following conditions:
- Condition A: Test shall be carried out with a fully charged electrical energy/power storage device.
- Condition B: Test shall be carried out with an electrical energy/power storage device in minimum state of charge (maximum discharge of capacity)- **and where energy/power stored in the energy/power storage device may fluctuate but, on average, is maintained at a neutral charging balance level while the vehicle is driven.**
- The profile of the State of Charge (SOC) of the electrical energy/power storage device during different stages of the Type I test is given in Appendix 1 to this annex."

Annex 8, Paragraph 4., amend to read:

- "4. Externally chargeable (OVC HEV) with an operating mode switch
- 4.1. Two tests shall be performed under the following conditions:
- 4.1.1. Condition A: Test shall be carried out with a fully charged electrical energy/power storage device.
- 4.1.2. Condition B: Test shall be carried out with an electrical energy/power storage device in minimum state of charge (maximum discharge of capacity)- **And the energy/power stored in the energy power/storage device may fluctuate but, on average, is maintained at a neutral charging balance level while the vehicle is driven.**
- 4.1.3. The operating mode switch shall be ~~positioned according to the table below~~ **selected as described in paragraphs 4.1.3.1. to 4.1.3.3.2.**
- 4.1.3.1. **Dedicated operating modes, such as 'mountain mode', 'maintenance mode' or 'REESS charging mode' which are not intended for normal daily operation but only for special limited purposes, shall not be considered. Operating modes which are not limited to vehicle propulsion but also to energy conversion such as 'charge mode' shall not be considered.**

| | | | | |
|---|---|---|---|--|
| <i>Hybrid-modes</i> | ↳ Pure electric ↳ Hybrid | ↳ Pure fuel consuming ↳ Hybrid | ↳ Pure electric ↳ Pure fuel consuming ↳ Hybrid | ↳ Hybrid mode n* ↳ ... ↳ Hybrid mode m* |
| <i>Battery state of charge</i> | <i>Switch-in position</i> | <i>Switch-in position</i> | <i>Switch-in position</i> | <i>Switch-in position</i> |
| Condition A Fully charged | Hybrid | Hybrid | Hybrid | Most electric hybrid mode** |
| Condition B Min. state of charge | Hybrid | Fuel consuming | Fuel Consuming | Most fuel consuming mode*** |

stance: sport, economic, urban, extra-urban position...

** Most electric hybrid mode:

The hybrid mode which can be proven to have the highest electricity consumption of all selectable hybrid modes when tested in accordance with condition A, to be established based on information provided by the manufacturer and in agreement with the technical service.

*** Most fuel consuming mode:

The hybrid mode which can be proven to have the highest fuel consumption of all selectable hybrid modes when tested in accordance with condition B, to be established based on information provided by the manufacturer and in agreement with the technical service.

4.1.3.2. Operating mode selection for Condition A

4.1.3.2.1. If there is a single operating mode under condition A that is automatically set after turn on of the ignition key (predominant mode for condition A), this mode shall be selected.

4.1.3.2.2. If there is no single operating mode under condition A that is automatically set after turn on of the ignition key (predominant mode for condition A), the mode for the test shall be selected according to the following provisions:

- (a) If there is only one operating mode available under condition A, this mode shall be selected;
- (b) If several operating modes are capable under condition A, the most electric energy consuming mode of those shall be selected.

4.1.3.3. Operating mode selection for Condition B

4.1.3.3.1. If there is a single operating mode under condition B that is automatically set after turn on of the ignition key (predominant mode for condition B), this mode shall be selected.

4.1.3.3.2. If there is no single operating mode under condition B that is automatically set after turn on of the ignition key (predominant mode for condition B), the mode for the test shall be selected according to the following provisions:

- (a) If there is only one operating mode available under condition B, this mode shall be selected;

- (b) **If several operating modes are capable under condition B, the most fuel consuming mode of those shall be selected."**

II. Justification

1. Annex 8, Paragraph 3. And Paragraph 4. defines condition A and Condition B under which an OVC-HEV shall be tested according to this regulation.

2. In addition to the definition of condition A and B, Annex 8 Paragraph 4 defines in a table the positioning of the operating mode switch for OVC-HEV with an operating mode switch, i.e. which operating mode has to be selected for condition A and condition B.

3. Paragraph 3. and 4. defines the conditions and (in case of an OVC-HEV with operating mode switch) the modes to be selected for condition A and condition B but nevertheless leave a lot of room for interpretation which could lead to physically unreasonable interpretations of the legislation.

E.g. is condition B defined as carrying out the test with an electric energy/power storage system device in minimum state of charge but is not excluding modes which only have the purpose of increasing the state of charge in addition to the spend energy for the vehicle propulsion.

4. The table under paragraph 4 offers specific mode set up vehicle configurations but there is not clear definition of 'pure electric', 'pure fuel consuming', 'hybrid'. E.g. there is the question if a 'pure electric' mode is still a pure electric mode when combustion engine is turning on after kick-down of the accelerator pedal which only is done in case of an emergency or by overtaking a car.

5. The offered mode set up in the table under Paragraph 4. leads, in the case of several hybrid modes, to a mode selection according to the most right column of the table. In the case that there is a mode which in addition to utilising the energy for vehicle propulsion also uses it for charging the electric power/energy storage device, this mode has to be selected. In the test result, this is reflected in a higher fuel consumption and CO2 mass emission but also in a lower electric consumption.

6. The current legislative text is not clear in case of the mode selection and in addition does not reflect the intention of the legislation concerning the purpose of condition B.

Condition B shall reflect a charging balance neutral SOC balance which means should reflect only the energy used for vehicle propulsion and not the energy stored in the energy/power storage device for a later use for vehicle propulsion. Such a later use is not reflected in the results. This has no reason to be.

7. The proposal adds a clear and more precise definition of condition B. The added wording in this proposal is already implemented in a similar way in the WLTP legislation.

8. The proposal contains a statement which excludes modes which are only implemented for special and limited use. The added wording in this proposal is already implemented in a similar way in the WLTP legislation.

9. The proposal removes the table under Paragraph 4 and replaces it with a clear guidance on which mode to select. The added wording in this proposal is already implemented in a similar way in the WLTP legislation.
