UN Regulation No.83-05

Emissions Test Procedure for Hybrid Electric Vehicles (Annex 14)

The 58th Asia Expert Meeting in Indonesia

Date: August 26th – 27th , 2019

JAPAN AUTOMOBILE STANDARDS INTERNATIONALIZATION CENTER

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Annex 14
Emissions test procedure for Hybrid Electric Vehicles (HEV)

Explanation of the UNR83-05

Annex 14

Emissions test procedure for Hybrid Electric Vehicles (HEV)

1. Introduction

1.1. This annex defines the specific provisions regarding type-approval of a Hybrid Electric Vehicle (HEV) as defined in paragraph 2.21.2. of this Regulation.

1.2. As a general principle, for the tests of Types I, II, III, IV, V, VI and OBD, hybrid electric vehicles shall be tested according to Annexes 4a, 5, 6, 7, 9, 8 and 11 to this Regulation respectively, unless modified by this annex.

1.3. For the Type I test only, OVC vehicles (as categorized in paragraph 2. of this annex) shall be tested according to condition A and to condition B. The test results under both conditions A and B and the weighted values shall be reported in the communication form.

1.4. The emissions test results shall comply with the limits under all specified test conditions of this Regulation.

2. Categories of hybrid electric vehicles

Vehicle charging	*Off-vehicle charging*[1] *(OVC)*		*Not off-vehicle charging*[2] *(NOVC)*	
Operating mode switch	Without	With	Without	With

[1] Also known as "externally chargeable"

[2] Also known as "not externally chargeable"

3.	**Type I test methods**
3.1.	Externally chargeable (OVC HEV) without an operating mode switch
3.1.1.	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). 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.
3.1.2.	Condition A
3.1.2.1.	The procedure shall start with the discharge of the electrical energy/power storage device of the vehicle while driving (on the test track, on a chassis dynamometer, etc.):
(a)	At a steady speed of 50 km/h until the fuel consuming engine of the HEV starts up;
(b)	Or, if a vehicle cannot reach a steady speed of 50 km/h without starting up the fuel consuming engine, the speed shall be reduced until the vehicle can run a lower steady speed where the fuel consuming engine does not start up for a defined time/distance (to be specified between Technical Service and manufacturer);
(c)	Or with manufacturer's recommendation. The fuel consuming engine shall be stopped within 10 seconds of it being automatically started.

3.1.2.2. Conditioning of vehicle

3.1.2.2.1. For compression-ignition engined vehicles the Part Two cycle described in Table A4a/2 (and Figure A4a/3) of Annex 4a to this Regulation shall be used. Three consecutive cycles shall be driven according to paragraph 3.1.2.5.3. of this annex.

3.1.2.2.2. Vehicles fitted with positive ignition engines shall be preconditioned with one Part One and two Part Two driving cycles according to paragraph 3.1.2.5.3. of this annex.

3.1.2.3. After this preconditioning, and before testing, the vehicle shall be kept in a room in which the temperature remains relatively constant between 293 and 303 K (20 ° C and 30 ° C). This conditioning shall be carried out for at least six hours and continue until the engine oil temperature and coolant, if any, are within ±2 K of the temperature of the room, and the electrical energy/power storage device is fully charged as a result of the charging prescribed in paragraph 3.1.2.4. of this annex.

3.1.2.4. During soak, the electrical energy/power storage device shall be charged:

(a) With the on board charger if fitted; or

(b) With an external charger recommended by the manufacturer, using the normal overnight charging procedure.

This procedure excludes all types of special charges that could be automatically or manually initiated like, for instance, the equalization charges or the servicing charges.

The manufacturer shall declare that during the test, a special charge procedure has not occurred.

3.1.2.5. Test procedure

3.1.2.5.1. The vehicle shall be started up by the means provided for normal use to the driver. The first cycle starts on the initiation of the vehicle start-up procedure.

3.1.2.5.2. The test procedures defined in either paragraph 3.1.2.5.2.1. or 3.1.2.5.2.2. of this annex may be used in line with the procedure chosen in paragraph 3.2.3.2. of Annex 8 to Regulation No. 101.

3.1.2.5.2.1. BS begins before or at the initiation of the vehicle start up procedure and end on conclusion of the final idling period in the extra-urban cycle (Part Two, end of sampling (ES)).

3.1.2.5.2.2. BS begins before or at the initiation of the vehicle start up procedure and continue over a number of repeat test cycles. It shall end on conclusion of the final idling period in the first extra-urban (Part Two) cycle during which the battery reached the minimum state of charge according to the criterion defined below (end of sampling (ES)).

The electricity balance Q [Ah] is measured over each combined cycle, using the procedure specified in Appendix 2 of Annex 8 to Regulation No. 101, and used to determine when the battery minimum state of charge has been reached.

The battery minimum state of charge is considered to have been reached in combined cycle N if the electricity balance measured during combined cycle N+1 is not more than a 3 per cent discharge, expressed as a percentage of the nominal capacity of the battery (in Ah) in its maximum state of charge, as declared by the manufacturer. At the manufacturer's request additional test cycles may be run and their results included in the calculations in paragraphs 3.1.2.5.5. and 3.1.4.2. of this annex provided that the electricity balance for each additional test cycle shows less discharge of the battery than over the previous cycle.

Between each of the cycles a hot soak period of up to 10 minutes is allowed. The power train shall be switched off during this period.

3.1.2.5.3. The vehicle shall be driven according to provisions in Annex 4a to this Regulation, or in case of special gear shifting strategy, according to the manufacturer's instructions, as incorporated in the drivers' handbook of production vehicles and indicated by a technical gear shift instrument (for drivers' information). For these vehicles the gear shifting points prescribed in Annex 4a to this Regulation are not applied. For the pattern of the operating curve the description according to paragraph 6.1.3. of Annex 4a to this Regulation shall apply.

3.1.2.5.4. The exhaust gases shall be analyzed according to provisions in Annex 4a to this Regulation.

3.1.2.5.5. The test results shall be compared to the limits prescribed in paragraph 5.3.1.4. of this Regulation and the average emission of each pollutant in grams per kilometre for condition A shall be calculated (M1i).

In the case of testing according to paragraph 3.1.2.5.2.1. of this annex, (M1i) is simply the result of the single combined cycle run.

In the case of testing according to paragraph 3.1.2.5.2.2. of this annex, the test result of each combined cycle run (M1ia), multiplied by the appropriate deterioration and Ki factors, shall be less than the limits prescribed in paragraph 5.3.1.4. of this Regulation. For the purposes of the calculation in paragraph 3.1.4. of this annex, M1i shall be defined as:

$$M_{1i} = \frac{1}{N}\sum_{a=1}^{N} M_{1ia}$$

Where:

i: pollutant

a: cycle

3.1.3. Condition B

3.1.3.1. Conditioning of vehicle

3.1.3.1.1. For compression-ignition engined vehicles the Part Two cycle described in Table A4a/2 (and Figure A4a/3) of Annex 4a to this Regulation shall be used. Three consecutive cycles shall be driven according to paragraph 3.1.3.4.3. of this annex.

3.1.3.1.2. Vehicles fitted with positive ignition engines shall be preconditioned with one Part One and two Part Two driving cycles according to paragraph 3.1.3.4.3. of this annex.

3.1.3.2. The electrical energy/power storage device of the vehicle shall be discharged while driving (on the test track, on a chassis dynamometer, etc.):

(a) At a steady speed of 50 km/h until the fuel consuming engine of the HEV starts up;

(b) Or if a vehicle cannot reach a steady speed of 50 km/h without starting up the fuel consuming engine, the speed shall be reduced until the vehicle can run a lower steady speed where the fuel consuming engine just does not start up for a defined time/distance (to be specified between technical service and manufacturer);

(c) Or with manufacturer's recommendation.

The fuel consuming engine shall be stopped within 10 seconds of it being automatically started.

3.1.3.3. After this preconditioning, and before testing, the vehicle shall be kept in a room in which the temperature remains relatively constant between 293 and 303 K (20 ° C and 30 ° C). This conditioning shall be carried out for at least six hours and continue until the engine oil temperature and coolant, if any, are within ±2 K of the temperature of the room.

3.1.3.4. Test procedure

3.1.3.4.1. The vehicle shall be started up by the means provided for normal use to the driver. The first cycle starts on the initiation of the vehicle start-up procedure.

3.1.3.4.2. BS begins before or at the initiation of the vehicle start up procedure and end on conclusion of the final idling period in the extra-urban cycle (Part Two, end of sampling (ES)).

3.1.3.4.3. The vehicle shall be driven according to Annex 4a to this Regulation, or in case of special gear shifting strategy according to the manufacturer's instructions, as incorporated in the drivers' handbook of production vehicles and indicated by a technical gear shift instrument (for drivers information). For these vehicles the gear shifting points prescribed in Annex 4a to this Regulation are not applied. For the pattern of the operating curve the description according to paragraph 6.1.3. of Annex 4a to this Regulation shall apply.

3.1.3.4.4. The exhaust gases shall be analyzed according to Annex 4a to this Regulation.

3.1.3.5. The test results shall be compared to the limits prescribed in paragraph 5.3.1.4. of this Regulation and the average emission of each pollutant for condition B shall be calculated (M2i). The test results M2i, multiplied by the appropriate deterioration and Ki factors, shall be less than the limits prescribed in paragraph 5.3.1.4. of this Regulation.

3.1.4. Test results

3.1.4.1. In the case of testing according to paragraph 3.1.2.5.2.1. of this annex

. For communication, the weighted values shall be calculated as below:

Mi = (De • M1i + Dav •. M2i)/(De + Dav)

Where:		
M_i	=	mass emission of the pollutant i in grams per kilometre,
M_{1i}	=	average mass emission of the pollutant i in grams per kilometre with a fully charged electrical energy/power storage device calculated in paragraph 3.1.2.5.5. of this annex
M_{2i}	=	average mass emission of the pollutant i in grams per kilometre with an electrical energy/power storage device in minimum state of charge (maximum discharge of capacity) calculated in paragraph 3.1.3.5. of this annex
De	=	vehicle electric range, according to the procedure described in Regulation No. 101, Annex 9, where the manufacturer shall provide the means for performing the measurement with the vehicle running in pure electric mode,
Dav	=	25 km (average distance between two battery recharges).

3.1.4.2. In the case of testing according to paragraph 3.1.2.5.2.2. of this annex
For communication, the weighted values shall be calculated as below:
Mi = (Dovc • M1i + Dav • M2i)/(Dovc + Dav)

Where:		
M_i	=	mass emission of the pollutant i in grams per kilometre,
M_{1i}	=	average mass emission of the pollutant i in grams per kilometre with a fully charged electrical energy/power storage device calculated in paragraph 3.1.2.5.5. of this annex
M_{2i}	=	average mass emission of the pollutant i in grams per kilometre with an electrical energy/power storage device in minimum state of charge (maximum discharge of capacity) calculated in paragraph 3.1.3.5. of this annex
Dovc	=	OVC range according to the procedure described in Regulation No. 101, Annex 9.
Dav	=	25 km (average distance between two battery recharges).

3.2. <u>Externally chargeable (OVC HEV) with an operating mode switch</u>

3.2.1. Two tests shall be performed under the following conditions:

3.2.1.1. Condition A: Test shall be carried out with a fully charged electrical energy/power storage device.

3.2.1.2. Condition B: Test shall be carried out with an electrical energy/power storage device in minimum state of charge (maximum discharge of capacity).

3.2.1.3. The operating mode switch shall be positioned according to Table A14/1.

Table A14/1

Hybrid-modes / *Battery state of charge*	*- Pure electric* *- Hybrid*	*- Pure fuel consuming* *- Hybrid*	*- Pure electric* *- Pure fuel consuming* *- Hybrid*	*- Hybrid mode n[1]* *...* *- Hybrid mode m[1]*
	Switch in position	*Switch in position*	*Switch in position*	*Switch in position*
Condition A Fully charged	Hybrid	Hybrid	Hybrid	Most electric hybrid mode[2]
Condition B Min. state of charge	Hybrid	Fuel consuming	Fuel consuming	Most fuel consuming mode[3]

Notes:

1 For instance: sport, economic, urban, extra-urban position ...

2 *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 of paragraph 4. of Annex 8 to Regulation No. 101, to be established based on information provided by the manufacturer and in agreement with the technical service.

3 *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 of paragraph 4. of Annex 8 to Regulation No. 101, to be established based on information provided by the manufacturer and in agreement with the technical service.

3.2.2. Condition A

3.2.2.1. If the pure electric range of the vehicle is higher than one complete cycle, on the request of the manufacturer, the Type I test may be carried out in pure electric mode. In this case, engine preconditioning prescribed in paragraph 3.2.2.3.1. or 3.2.2.3.2. of this annex can be omitted.

3.2.2.2. The procedure shall start with the discharge of the electrical energy/power storage device of the vehicle while driving with the switch in pure electric position (on the test track, on a chassis dynamometer, etc.) at a steady speed of 70 per cent ±5 per cent of the maximum thirty minutes speed of the vehicle (determined according to Regulation No. 101).

Stopping the discharge occurs:

(a) When the vehicle is not able to run at 65 per cent of the maximum thirty minutes speed; or

(b) When an indication to stop the vehicle is given to the driver by the standard on-board instrumentation; or

(c) After covering the distance of 100 km.

If the vehicle is not equipped with a pure electric mode, the electrical energy/power storage device discharge shall be achieved by driving the vehicle (on the test track, on a chassis dynamometer, etc.):

(a) At a steady speed of 50 km/h until the fuel consuming engine of the HEV starts up; or

(b) If a vehicle cannot reach a steady speed of 50 km/h without starting up the fuel consuming engine, the speed shall be reduced until the vehicle can run a lower steady speed where the fuel consuming engine does not start up for a defined time/distance (to be specified between technical service and manufacturer); or

(c) With manufacturers' recommendation.

The fuel consuming engine shall be stopped within 10 seconds of it being automatically started.

3.2.2.3. Conditioning of vehicle

3.2.2.3.1. For compression-ignition engined vehicles the Part Two cycle described in Table A4a/2 (and Figure A4a/3) of Annex 4a to this Regulation shall be used. Three consecutive cycles shall be driven according to paragraph 3.2.2.6.3. of this annex.

3.2.2.3.2. Vehicles fitted with positive ignition engines shall be preconditioned with one Part One and two Part Two driving cycles according to paragraph 3.2.2.6.3. of this annex.

3.2.2.4. After this preconditioning, and before testing, the vehicle shall be kept in a room in which the temperature remains relatively constant between 293 and 303 K (20 ° C and 30 ° C). This conditioning shall be carried out for at least six hours and continue until the engine oil temperature and coolant, if any, are within ±2 K of the temperature of the room, and the electrical energy/power storage device is fully charged as a result of the charging prescribed in paragraph 3.2.2.5. of this annex.

3.2.2.5. During soak, the electrical energy/power storage device shall be charged:

(a) With the on board charger if fitted; or

(b) With an external charger recommended by the manufacturer, using the normal overnight charging procedure.

This procedure excludes all types of special charges that could be automatically or manually initiated like, for instance, the equalisation charges or the servicing charges.

The manufacturer shall declare that during the test, a special charge procedure has not occurred.

3.2.2.6. Test procedure

3.2.2.6.1. The vehicle shall be started up by the means provided for normal use to the driver. The first cycle starts on the initiation of the vehicle start-up procedure.

3.2.2.6.2. The test procedures defined in either paragraph 3.2.2.6.2.1. or 3.2.2.6.2.2. of this annex may be used in line with the procedure chosen in paragraph 4.2.4.2. of Annex 8 to Regulation No. 101,

3.2.2.6.2.1. BS begins before or at the initiation of the vehicle start up procedure and end on conclusion of the final idling period in the extra-urban cycle (Part Two, end of sampling (ES)).

3.2.2.6.2.2. BS begins before or at the initiation of the vehicle start up procedure and continues over a number of repeat test cycles. It shall end on conclusion of the final idling period in the first extra-urban (Part Two) cycle during which the battery has reached the minimum state of charge according to the criterion defined below (end of sampling (ES)).

(Conti. 3.2.2.6.2.2.)

The electricity balance Q [Ah] is measured over each combined cycle, using the procedure specified in Appendix 2 to Annex 8 to Regulation No. 101, and used to determine when the battery minimum state of charge has been reached.

The battery minimum state of charge is considered to have been reached in combined cycle N if the electricity balance measured during combined cycle N+1 is not more than a 3 per cent discharge, expressed as a percentage of the nominal capacity of the battery (in Ah) in its maximum state of charge, as declared by the manufacturer. At the manufacturer's request additional test cycles may be run and their results included in the calculations in paragraphs 3.2.2.7. and 3.2.4. of this annex provided that the electricity balance for each additional test cycle shows less discharge of the battery than over the previous cycle.

Between each of the cycles a hot soak period of up to 10 minutes is allowed. The power train shall be switched off during this period.

3.2.2.6.3. The vehicle shall be driven according to Annex 4a to this Regulation, or in case of special gear shifting strategy, according to the manufacturer's instructions, as incorporated in the drivers' handbook of production vehicles and indicated by a technical gear shift instrument (for drivers' information). For these vehicles the gear shifting points prescribed in Annex 4a to this Regulation are not applied. For the pattern of the operating curve the description according to paragraph 6.1.3. of Annex 4a to this Regulation shall apply.

3.2.2.6.4. The exhaust gases shall be analysed according to Annex 4a to this Regulation.

3.2.2.7. The test results shall be compared to the limits prescribed in paragraph 5.3.1.4. of this Regulation and the average emission of each pollutant in grams per kilometre for Condition A shall be calculated (M1i).

In the case of testing according to paragraph 3.2.2.6.2.1. of this annex, (M1i) is simply the result of the single combined cycle run.

In the case of testing according to paragraph 3.2.2.6.2.2. of this annex, the test result of each combined cycle run M1ia, multiplied by the appropriate deterioration and Ki factors, shall be less than the limits prescribed in paragraph 5.3.1.4. of this Regulation. For the purposes of the calculation in paragraph 3.2.4. of this annex, M1i shall be defined as:

$$M_{1i} = \frac{1}{N}\sum_{a=1}^{N} M_{1ia}$$

Where:

i: pollutant

a: cycle

3.2.3.	Condition B
3.2.3.1.	Conditioning of vehicle
3.2.3.1.1.	For compression-ignition engined vehicles the Part Two cycle described in Table A4a/2 and Figure A4a/2 of Annex 4a to this Regulation shall be used. Three consecutive cycles shall be driven according to paragraph 3.2.3.4.3. of this annex.
3.2.3.1.2.	Vehicles fitted with positive ignition engines shall be preconditioned with one Part One and two Part Two driving cycles according to paragraph 3.2.3.4.3. of this annex.
3.2.3.2.	The electrical energy/power storage device of the vehicle shall be discharged according to paragraph 3.2.2.2. of this annex.
3.2.3.3.	After this preconditioning, and before testing, the vehicle shall be kept in a room in which the temperature remains relatively constant between 293 and 303 K (20 ° C and 30 ° C). This conditioning shall be carried out for at least six hours and continue until the engine oil temperature and coolant, if any, are within ±2 K of the temperature of the room.
3.2.3.4.	Test procedure
3.2.3.4.1.	The vehicle shall be started up by the means provided for normal use to the driver. The first cycle starts on the initiation of the vehicle start-up procedure.
3.2.3.4.2.	Sampling shall begin (BS) before or at the initiation of the vehicle start up procedure and end on conclusion of the final idling period in the extra-urban cycle (Part Two, end of sampling (ES)).

3.2.3.4.3. The vehicle shall be driven according to Annex 4a to this Regulation, or in case of special gear shifting strategy, according to the manufacturer's instructions, as incorporated in the drivers' handbook of production vehicles and indicated by a technical gear shift instrument (for drivers' information). For these vehicles the gear shifting points prescribed in Annex 4a to this Regulation are not applied. For the pattern of the operating curve the description according to paragraph 6.1.3. of Annex 4a to this Regulation shall apply.

3.2.3.4.4. The exhaust gases shall be analysed according to provisions in Annex 4a to this Regulation.

3.2.3.5. The test results shall be compared to the limits prescribed in paragraph 5.3.1.4. of this Regulation and the average emission of each pollutant for condition B shall be calculated (M2i). The test results M2i, multiplied by the appropriate deterioration and Ki factors, shall be less than the limits prescribed in paragraph 5.3.1.4. of this Regulation.

3.2.4. Test results

3.2.4.1. In the case of testing according to paragraph 3.2.2.6.2.1. of this annex. For communication, the weighted values shall be calculated as below:

$$Mi = (De \cdot M1i + Dav \cdot M2i) / (De + Dav)$$

Where:		
M_i	=	mass emission of the pollutant i in grams per kilometre,
M_{1i}	=	average mass emission of the pollutant i in grams per kilometre with a fully charged electrical energy/power storage device calculated in paragraph 3.2.2.7. of this annex.
M_{2i}	=	average mass emission of the pollutant i in grams per kilometre with an electrical energy/power storage device in minimum state of charge (maximum discharge of capacity) calculated in paragraph 3.2.3.5. of this annex.
De	=	vehicle electric range with the switch in pure electric position, according to the procedure described in Regulation No. 101, Annex 9. If there is not a pure electric position, the manufacturer shall provide the means for performing the measurement with the vehicle running in pure electric mode.
Dav	=	25 km (average distance between two battery recharge).

3.2.4.2. In the case of testing according to paragraph 3.2.2.6.2.2. of this annex. For communication, the weighted values shall be calculated as below

Mi = (Dovc • M1i + Dav • M2i)/(Dovc + Dav)

Where:		
M_i	=	mass emission of the pollutant i in grams per kilometre,
M_{1i}	=	average mass emission of the pollutant i in grams per kilometre with a fully charged electrical energy/power storage device calculated in paragraph 3.2.2.7. of this annex
M_{2i}	=	average mass emission of the pollutant i in grams per kilometre with an electrical energy/power storage device in minimum state of charge (maximum discharge of capacity) calculated in paragraph 3.2.3.5. of this annex
Dovc	=	OVC range according to the procedure described in Regulation No. 101, Annex 9.
Dav	=	25 km (average distance between two battery recharges).

3.3. <u>Not externally chargeable (not-OVC HEV) without an operating mode switch</u>

3.3.1. These vehicles shall be tested according to Annex 4a.

3.3.2. For preconditioning, at least two consecutive complete driving cycles (one Part One and one Part Two) are carried out without soak.

3.3.3. The vehicle shall be driven according to Annex 4a, or in case of special gear shifting strategy according to the manufacturer's instructions, as incorporated in the drivers' handbook of production vehicles and indicated by a technical gear shift instrument (for drivers information). For these vehicles the gear shifting points prescribed in Annex 4a are not applied. For the pattern of the operating curve the description according to paragraph 6.1.3. of Annex 4a shall apply.

3.4. <u>Not externally chargeable (not-OVC HEV) with an operating mode switch</u>

3.4.1. These vehicles are preconditioned and tested in hybrid mode according to Annex 4a. If several hybrid modes are available, the test shall be carried out in the mode that is automatically set after turn on of the ignition key (normal mode). On the basis of information provided by the manufacturer, the Technical Service will make sure that the limit values are met in all hybrid modes.

3.4.2. For preconditioning, at least two consecutive complete driving cycles (one Part One and one Part Two) shall be carried out without soak.

3.4.3. The vehicle shall be driven according to Annex 4a to this Regulation, or in case of special gear shifting strategy according to the manufacturer's instructions, as incorporated in the drivers' handbook of production vehicles and indicated by a technical gear shift instrument (for drivers information). For these vehicles the gear shifting points prescribed in or Annex 4a to this Regulation are not applied. For the pattern of the operating curve the description according to paragraph 6.1.3. of Annex 4a to this Regulation shall apply.

4. Type II test methods

4.1. The vehicles shall be tested according to Annex 5 with the fuel consuming engine running. The manufacturer shall provide a "service mode" that makes execution of this test possible.

If necessary, the special procedure provided for in paragraph 5.1.6. to this Regulation shall be used.

5. Type III test methods

5.1. The vehicles shall be tested according to Annex 6 with the fuel consuming engine running. The manufacturer shall provide a "service mode" that makes execution of this test possible.

5.2. The tests shall be carried out only for conditions 1 and 2 of paragraph 3.2. of Annex 6. If for any reasons it is not possible to test on condition 2, alternatively another steady speed condition (with fuel consuming engine running under load) should be carried out.

6. Type IV test methods

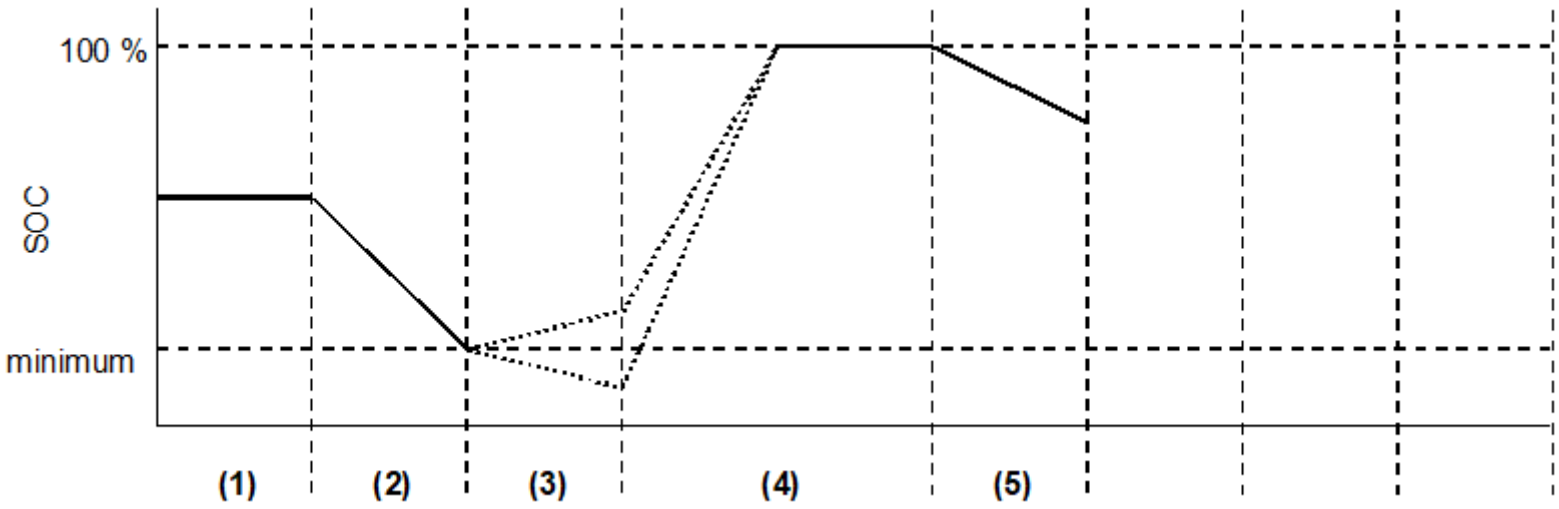
7. Type V test methods

8. Type VI test methods

9. OBD test methods

Annex 14 – Appendix 1
Electrical energy/power storage device State Of Charge (SOC) profile for OVC HEV Type I test

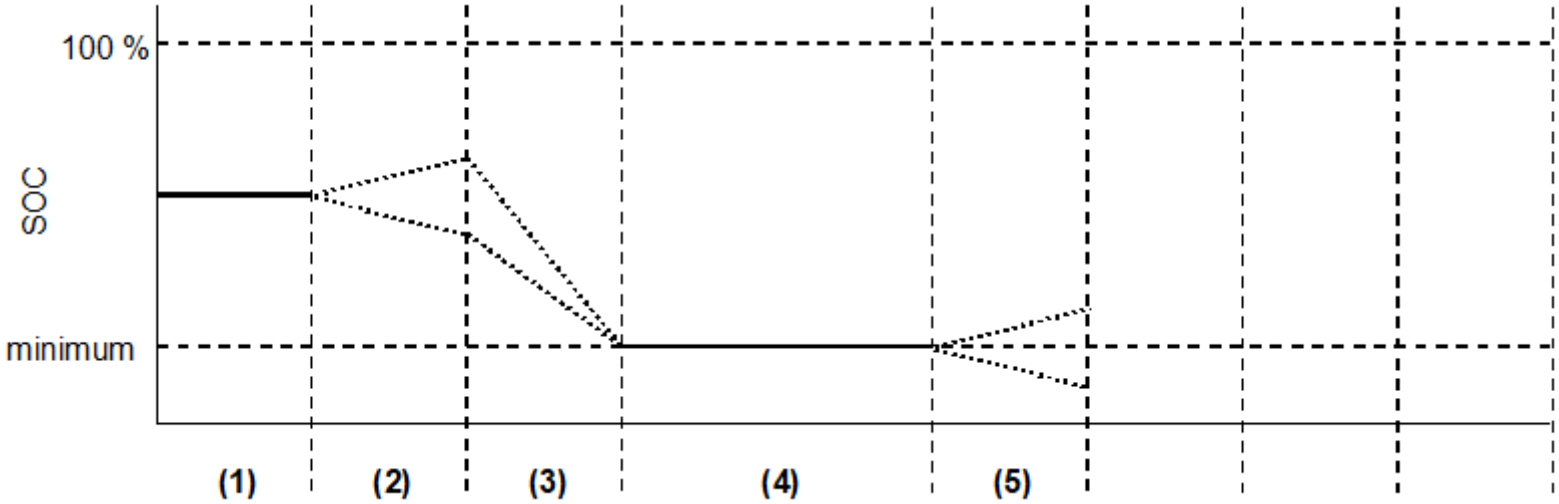
Condition A of the Type I test



Condition A:

(1) Initial electrical energy/power storage device state of charge
(2) Discharge according to paragraph 3.1.2.1. or 3.2.2.2. of this annex
(3) Vehicle conditioning according to paragraph 3.1.2.2. or 3.2.2.3. of this annex
(4) Charge during soak according to paragraphs 3.1.2.3. and 3.1.2.4. of this annex, or paragraphs 3.2.2.4. and 3.2.2.5. of this annex
(5) Test according to paragraph 3.1.2.5. or 3.2.2.6. of this annex

Condition B of the Type I test



Condition B:

(1) Initial state of charge

(2) Vehicle conditioning according to paragraph 3.1.3.1. or 3.2.3.1. of this annex

(3) Discharge according to paragraph 3.1.3.2. or 3.2.3.2. of this annex

(4) Soak according to paragraph 3.1.3.3. or 3.2.3.3. of this annex

(5) Test according to paragraph 3.1.3.4. or 3.2.3.4. of this annex

Thank you!