**Proposal for inclusion of CoP requirements into global technical regulation No. 15 (Worldwide harmonized Light vehicles Test Procedures (WLTP)) and UN global technical regulation No. 19 (Evaporative emission test procedure for the Worldwide harmonized Light vehicles Test Procedure (WLTP EVAP))**

Author: Iddo Riemersma, Bart Thedinga, Rob Gardner

Version: 1.0 (draft)

Date: 11-2-2019

**UPDATED: 4th-Sept-2019 by CoP Drafting Task Force**

**Notes from the author:**

1. The text for this proposal is based on the CoP requirements in Section 4 of Annex I to Commission Regulation (EU) 2017/1151, as last amended by Regulation (EU) 2018/1832
2. The text has been edited to reflect the wording used in the GTR 15 and 19, and references to the applicable annexes and paragraphs have been revised
3. The text is presented in the format and style of GTR, while containing all elements that will be needed for the UNR WLTP
4. Editorial changes have been made to improve the text.
5. Issues that have to be discussed within the CoP TF are indicated in [text brackets]
6. Regional specific issues (such as for Europe on the OBFCM, eco-innovations, and family criteria for commercial vehicles etc.) are left out of this text, and will be added in a later stage.
7. The scope of vehicles is not specifically indicated in this text proposal, this is therefore identical to the scope and application specified for GTRs 15 and 19.
8. The final text proposal has to be in agreement with the outcome of discussions within the Transposition TF.
9. The administrative elements will be excluded from this text, to only reflect the technical elements for the GTRs

**Update to notes - R. Gardner 04-Sep-2019**

**The text included in this 04-Sep-19 draft has been prepared for UNR WLTP - and not GTR15 as was the case for earlier versions. The notes above have been left for reference purposes, with many now being obsolete.**

**CoP for GTR15 is a lower priority than CoP for UNR WLTP and will therefore now follow at a later stage. This is the same for the CoP for GTR19 and so the text proposal for GTR19 has been deleted from the end of this document.**

**For some sections there have been proposals from EC and MLIT for updated requirements. These have been introduced into this document in text boxes below the relevant section. Once discussed and agreed in the CoP task force the new requirements will be introduced into the main text.**

**NB: The paragraph numbering and associated x-refs within this document are not yet finalised.**

**NB2: This document does not include the ‘full package’ for UNR WLTP CoP. Other documents which will include CoP requirements are Annex B8 (in the post-processing tables) and Appendix 8 to Annex B8.**

**Proposal for Conformity of Production Requirements for UNR WLTP**

8. Conformity of Production (CoP)

8. Introduction

8.1. Every vehicle bearing an approval mark as prescribed under this Regulation shall conform with regard to criteria emissions, including evaporative emissions, CO2 emission, fuel consumption, and electric energy consumption (EC), to the vehicle type approved. The conformity of production procedures shall comply with those set out in the 1958 Agreement, Schedule 1 (E/ECE/324-E/ECE/TRANS/505/Rev.3), with the following requirements:

8.1.1. Every vehicle produced under a type approval according to this Regulation shall be so manufactured as to conform to the type approval requirements of this Regulation. The manufacturer shall implement adequate arrangements and documented control plans and carry-out, at intervals specified in this Regulation, the necessary tests to verify continued conformity with the approved type. The manufacturer shall obtain agreement for these arrangements and control plans from the responsible authority. The responsible authority shall perform audits at specific intervals. This audit shall include production and test facilities as part of the product conformity and continued verification arrangements. Where necessary the responsible authority may require additional tests to be conducted.

8.1.2. The manufacturer shall check the conformity of production by conducting the appropriate tests for criteria emissions, including evaporative emissions, CO2 emission, fuel consumption and electric energy consumption (EC) as described in Table A of this Regulation. These conformity of production tests shall be performed in accordance with the requirements of paragraphs x.x and x.y.

The specific procedures for conformity of production are set out in paragraphs 2. to 4. and Appendices 1 and 2.

8.1.3. For the purposes of the manufacturer's conformity of production check, the family means the conformity of production (CoP) families as specified in paragraphs 8.1.3.1. and 8.1.3.2.

8.1.3.1. For the Type 1 test, the CoP family shall be identical to the interpolation family, as described in paragraph 5.x. of this Regulation.

xxx

|  |
| --- |
| **REQUIREMENTS UNDER DISCUSSION – TO BE DECIDED**  **1) Definition of CoP family**   * Level 1a   + For Interpolation Families (IP) with a planned annual vehicle production volume > [1000 vehicles, bearing the same approval mark: *CoP Family = Interpolation Family (IP)];*   + For IP with a planned annual vehicle production volume < [1000 vehicles, bearing the same approval mark : CoP Family can include multiple IP families]. In this case, CoP family shall be smaller than [5000] vehicles.   + Manufacturer may divide CoP family into smaller group of vehicles. * Level 1b   (TBD by Japan)   * + For Interpolation Families (IP) with a planned annual vehicle production volume in a plant > [1000 vehicles, bearing the same approval mark: *CoP Family = Interpolation Family (IP) in a plant];*   + For IP with a planned annual vehicle production volume in a plant < [1000 vehicles, bearing the same approval mark: CoP Family can include multiple IP families]. In this case, CoP family shall be smaller than [5000] vehicles.   + Manufacturer may divide CoP family into smaller group of vehicles. * Level 2   (to be derived from above)   * + For Interpolation Families (IP) with a planned annual vehicle production volume in a plant > [1000 vehicles, bearing the same approval mark: *CoP Family = Interpolation Family (IP) in a plant];*   + For IP with a planned annual vehicle production volume in a plant < [1000 vehicles, bearing the same approval mark: CoP Family can include multiple IP families]. In this case, CoP family shall be smaller than [5000] vehicles.   + Manufacturer may divide CoP family into smaller group of vehicles. |

8.1.3.2. For the Type 4 test, the CoP family shall be identical to the evaporative emissions family, as described in paragraph 5.x. of this Regulation.

8.1.4. The frequency for product verification performed by the manufacturer shall be based on a risk assessment methodology consistent with the international standard ISO 31000:2018 — Risk Management — Principles and guidelines, for Type 1 with a minimum frequency per CoP family of [one verification per 5,000 vehicles produced] or [once per year], whichever comes first.

8.1.5. The responsible authority which has granted type-approval may at any time verify the conformity control methods applied in each production facility.

For the purpose of this GTR the responsible authority shall perform audits for verifying the manufacturers arrangements and documented control plans at the facility of the manufacturer on a risk assessment methodology consistent with the international standard ISO 31000:2009 — Risk Management — Principles and guidelines, and, in all cases, with a minimum frequency of [one audit per year].

If the responsible authority is not satisfied with the auditing procedure of the manufacturer, physical tests shall directly be carried out on production vehicles as described in paragraphs 2. to 4.

8.1.6. The normal frequency of physical test verifications by the responsible authority shall be based on the results of the auditing procedure of the manufacturer on a risk assessment methodology and in all cases with a minimum frequency of [one verification test per three years]. The responsible authority shall conduct these physical emission tests on production vehicles as described in paragraphs 2. to 4.

In the case of the manufacturer running the physical tests, the responsible authority shall witness the tests at the manufacturer's facility.

|  |
| --- |
| **REQUIREMENTS UNDER DISCUSSION – TO BE DECIDED**  **Frequency of vehicle sampling**   * Level 1a   + The minimum number of CoP checks (each check is performed on a minimum number of 3 vehicles) per year is determined by dividing the planned annual vehicle production volume of the CoP family by 5000 and mathematically rounding the outcome to the nearest integer;   + In case of CoP families with a planned annual vehicle production volume less than 5000 vehicles, one CoP check (minimum 3 vehicles) each year;   + [In case of CoP families with a planned annual vehicle production volume ≥ 17500 vehicles, after 3 successful CoP checks, continue for the remaining part of the calendar year with tests on 1 vehicle/month if within specifications (\*), otherwise restart normal CoP checks] * Level 1b   (TBD by Japan)   * + The minimum number of CoP checks (each check is performed on a minimum number of 3 vehicles) per year is determined by dividing the planned annual vehicle production volume of the CoP family by 5000 and mathematically rounding the outcome to the nearest integer;   + In case of CoP families with a planned annual vehicle production volume less than 5000 vehicles, one CoP check (minimum 3 vehicles) each year;   + No exemption for bigger CoP family. * Level 2   (to be derived from above)   * + The minimum number of CoP checks (each check is performed on a minimum number of 3 vehicles) per year is determined by dividing the planned annual vehicle production volume of the CoP family by 5000 and mathematically rounding the outcome to the nearest integer;   + In case of CoP families with a planned annual vehicle production volume less than 5000 vehicles, one CoP check (minimum 3 vehicles) each year; |

8.1.7. The responsible authority shall report the results of all audit checks and physical tests performed on verifying conformity of the manufacturers and file it for a period of a minimum of 10 years. These reports should be available for other responsible authorities.

8.1.8. In case of non-conformity [Article 4 of the 1958 Agreement] shall apply.

8.2. Checking the conformity for a Type 1 test

8.2.1. The Type 1 test shall be carried out on production vehicles of a valid member of the CoP family as described in paragraph 1.3.1. The test results shall be the values after all corrections according to this Regulation are applied. Conformity against the applicable criteria emissions limits shall be checked using the pass/fail criteria specified in Table xxx in paragraph xxx. As regards CO2 emissions, fuel consumption and energy consumption, the limit value shall be the value determined by the manufacturer for the selected vehicle in accordance with the interpolation methodology set out in Annex B7. Verification of the interpolation calculation shall be carried out by the responsible authority as part of the audit process described in paragraph 1.2.

8.2.2. Vehicles shall be selected at random in the CoP family. The manufacturer shall not undertake any adjustment to the vehicles selected.

[sample frequency : JPN procedure need to be added]

|  |
| --- |
| **REQUIREMENTS UNDER DISCUSSION – TO BE DECIDED**  **6) Test vehicles**   * Level 1a:   COP test vehicles shall be randomly sampled. The vehicles shall be selected evenly over the different assembly plants, if applicable.   * Level 1b:   (TBD by Japan)  Same as 1a   * Level 2 * (to be derived from above)   Same as 1a |

8.2.3. The statistical method for calculating the test criteria is described in Appendix 1a for [EU] and 1b [JPN].

The production of a CoP family shall be deemed to not conform when a fail decision is reached for one or more of the criteria emissions, CO2 values, fuel consumption values or energy consumption values, in accordance with the test criteria in Appendix 1a for [EU] and 1b [JPN].

The production of a CoP family shall be deemed to conform once a pass decision is reached for all the criteria emissions, CO2 values, fuel consumption values and electric energy consumption values, in accordance with the test criteria in Appendix 1a for [EU] and 1b [JPN].

When a pass decision has been reached for one criteria emission, that decision shall not be changed by any additional tests carried out to reach a decision for the other criteria emissions, CO2 values, fuel consumption values and electric energy consumption values.

If a pass decision is not reached for all the criteria emissions, CO2 values, fuel consumption values and electric energy consumption values, a test shall be carried out on another vehicle. After selection by the responsible authority, the manufacturer shall not undertake any adjustment to the vehicle selected. Once the Type 1 test has been performed, the procedure described in Appendix 1 for taking a pass or fail decision shall be repeated (see Figure A10/1). If a pass decision is still not reached for all the criteria emissions, CO2 values, fuel consumption values and energy consumption values, an additional vehicle is added to the sample, up to the maximum of [16 vehicles].

Figure A10/1



8.2.4. At the request of the manufacturer and with the acceptance of the responsible authority, tests may be carried out on a vehicle of the CoP family with a maximum of [15,000 km] in order to establish measured evolution coefficients EvC for criteria emissions/EC/FC/CO2 for each CoP family. The running-in procedure shall be conducted by the manufacturer, who shall not to make any adjustments to these vehicles.

8.2.4.1. [In order to establish a measured evolution coefficient with a run-in vehicle the procedure shall be as follows:

(a) the criteria emissions/EC/FC/CO2 shall be measured at a mileage of at most 80 km and at ‘x’ km of the first tested vehicle;

(b) the evolution coefficients (EvCi,meas) of the criteria emissions/EC/FC/CO2 between 80 km and ‘x’ km shall be calculated as:

EvCi,meas= values at ‘x’ km / values at 80 km

where:

i is the measured criteria emission compound, CO2, fuel consumption (FC) or energy consumption (EC)

(c) the other vehicles in the CoP family shall not be run in, but their zero km criteria emissions/FC/CO2 shall be multiplied by the evolution coefficient of the first run-in vehicle. In this case, the values to be taken for verification as in Appendix 1 shall be:

1. the values at ‘x’ km for the first vehicle;
2. the values at zero km multiplied by the relevant evolution coefficient EvCi,meas for the other vehicles.]

|  |
| --- |
| **REQUIREMENTS UNDER DISCUSSION – TO BE DECIDED**  **5) Run-in**   * Level 1a:   EC is considering introducing some elements of the Japanese run-in procedure, in particular point 1 (test vehicle), point 3(ii), point 4, point 5, point 8 and point 9. The DPA method is not supported in Level 1a.   * Level 1b:   Japan run-in procedure   * Level 2 * To be derived from the above, likely similar to Level 1a? |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **REQUIREMENTS UNDER DISCUSSION – TO BE DECIDED**  ３．Run-in Factor  The following factor (either a or b) shall be applied to correct the vehicle “run-in” impact.  a : assigned “run-in” factor, 1.020  b : derived “run-in” factor according to appendix  prior to usage of derived “run-in” factor, need to consult with MLIT regarding   1. evidence of derived “run-in” factor including the possession of statistical significance on fitting slope (refer Fig1) 2. validation method after start of production   ４．Data Processing  FC or EC (m)＝FC or EC (j)×RI(j)  FC or EC (m)：Final value  FC or EC (j)：Test results according to  GTR#15 Annex7 TableA7/1 \_Step\_4a or Annex8 TableA8/5 \_Step\_4a  RI(j)：derived ”run-in” factor at start point of cold Type I test or 1.020  ５．Road Load Setting on a Chassis Dynamometer  It is manufacture’s choice to select the following methods. When derived “run-in” factor is applied, however, the method during COP shall be same as that during derived “run-in” factor development.   1. DPA method : apply dynamometer setting value derived during homologation test 2. Individual setting method : derive dynamometer setting value for each individual vehicle   ６．Test Site Correction  It is allowed to apply test site correction between homologation and COP only when clear technical difference is observed.  ７．Others  It is allowed to conduct COP only for WLTP official value in case that two official values for WLTP and JC08 are available.  Appendix  Procedure to derive “run-in” factor   1. Test vehicle  * Same vehicle shall be used before and after “run-in” test. No part and no ECU calibration which have an impact on FC/EC shall be replaced and/or modified. * Any parts which have an impact on Fuel Consumption shall not have any operation prior to “run-in” procedure * It is allowed to use the vehicles in which all of the following parts are newly installed simultaneously.  1. internal combustion engine 2. driven parts (e.g. transmission, tyre) 3. brake parts (e.g. tyre)  * Preferably Vehicle\_H condition shall be tested within interpolation family. * At the request of the vehicle manufacturer and with confirmation by MLIT , it is allowed for manufacture to run the test with multiple vehicles.  1. Derived “Run-in” Factor family  * At the request of the vehicle manufacturer including technical evidence and with confirmation by MLIT, the derived “run-in” factor can be extended to other interpolation family.  1. Road Load Setting on a Chassis Dynamometer   It is manufacture’s choice to select the following methods. However, the method used for derived “run-in” factor development shall be applied for COP testing.   1. DPA method: same dynamometer setting value (including dynamometer mechanical loss and absorption power) shall be applied before and after “run-in” test.   In case that testing is performed on different test site, the dynamometer setting value shall be adjusted so that total power (dynamometer mechanical loss and absorption power) is identical for all tests.   1. Individual setting method : derive dynamometer setting value for each individual test according to GTR#15 Annex4 paragraph7. 2. Driving pattern and conditions during “run-in” procedure   Driving pattern and conditions during “run-in” is up to manufacture’s good engineering judgment. System odometer after “run-in” shall not exceed the minimum odometer during homologation tests within applicable derived “run-in” family  system odometer : set system odometer zero (0) at the point when vehicle parts which have impact on fuel consumption is newly exchanged or installed.   1. Procedure   5-1. System odometer at initial test points  Initial tests prior to “run-in” shall be performed until three valid results were obtained. It is recommended that system odometer during 1st or 2nd test is within ±10km of vehicle odometer during COP testing.  5-2. Testing after “run-in”  Testing after “run-in” shall be performed until at least two valid results were obtained.   1. Test site   It is strongly recommended to use same test site for both testing before and after “run-in”. In case that testing is performed on different test site, the dynamometer setting value shall be adjusted so that total power (dynamometer mechanical loss and absorption power) is identical for all tests  7．Test procedure  7-1.　 DPA method : according to Table1  7-2.　 Individual setting method : according to Table2  8．Derived “run-in” factor  The following methodology can be applied only when MLIT confirmed based on the documents submitted by vehicle manufacture.  RI(j)＝1+(a×(ln(Dk) - ln(Dj)))／FC(j)  RI(j)：derived “run-in” factor at Dj, Rounding to 3 places of decimal  a：sloop derived from FC(i) and Di or Dk, refer Fig1.  FC (i) : Test results at Di or Dk according to  GTR#15 Annex7 TableA7/1 \_Step\_4a or Annex8 TableA8/5 \_Step\_4a  Di : system odometer at start point of cold Type I test before “run-in”  Dk : average system odometer at start point of cold Type I test after “run-in”  Dj : odometer at start point of cold Type I test during COP  In case that Dj is less than minimum Di, Dj shall be set to minimum Di.  FC(j) : Test results at Dj according to  GTR#15 Annex7 TableA7/1 \_Step\_4a or Annex8 TableA8/5 \_Step\_4a  In case that derived “run-in” factor is obtained by multiple vehicles test results, final “a” and “Dk” shall be averaged.  9. others  ・apply REESS factor derived from either test vehicles after “run-in” or other vehicle within derived “run-in” family  ・apply DTI defined in GTR#15 (i.e. RMSSE < 0.8, -2% < IWR < +4%)  Fig１　sample  Table１ : **DPA method**   |  |  |  | | --- | --- | --- | |  | items | contents, notes, others | | 1 | Warm up chassis dynamometer | follow GTR#15  do NOT use the test vehicles for chassis dynamometer warm up | | 2 | Vehicle restrain | follow GTR#15 | | 3 | Road Load Setting | follow appendix para. 3 (i) | | 4 | Preconditioning driving | follow GTR#15 | | 5 | Vehicle soak | follow GTR#15 | | 6 | Warm up chassis dynamometer | follow GTR#15  do NOT use the test vehicles for chassis dynamometer warm up | | 7 | Road Load Setting | follow appendix para.3 (i) | | 8 | Vehicle restrain | follow GTR#15 | | 9 | Initial test prior to “run-in” | follow GTR#15  record Di (system odometer at start point of cold Type I) | | 10 | Repeat 1 to 9 until three valid data is obtained | procedure 1, 2, 3 and 4 can be omitted when conducted immediately after completion of procedure 9 | | 11 | “run-in” | follow appendix para.4 | | 12 | Warm up chassis dynamometer | follow GTR#15  do NOT use the test vehicles for chassis dynamometer warm up | | 13 | Vehicle restrain | follow GTR#15 | | 14 | Road Load Setting | follow appendix para.3 (i) | | 15 | Preconditioning driving | follow GTR#15 | | 16 | Vehicle soak | follow GTR#15 | | 17 | Warm up chassis dynamometer | follow GTR#15  do NOT use the test vehicles for chassis dynamometer warm up | | 18 | Road Load Setting | follow appendix 3 (i) | | 19 | Vehicle restrain | follow GTR#15 | | 20 | Testing after “run-in” | follow GTR#15  record Dk (system odometer at start point of cold Type I) | | 21 | Repeat 12 to 20 until at least two valid data is obtained | procedure 12, 13, 14 and 15 can be omitted when conducted immediately after completion of procedure 20 |     Table 2 : Individual setting method   |  |  |  | | --- | --- | --- | |  | items | contents, notes, others | | 1 | Warm up chassis dynamometer | follow GTR#15  do NOT use the test vehicles for chassis dynamometer warm up | | 2 | Vehicle restrain | follow GTR#15 | | 3 | Road Load Setting | follow appendix para. 3 (ii) | | 4 | Preconditioning driving | follow GTR#15 or modified driving cycle confirmed by MLIT | | 5 | Vehicle soak | follow GTR#15 | | 6 | Warm up chassis dynamometer | follow GTR#15  do NOT use the test vehicles for chassis dynamometer warm up | | 7 | Road Load Setting | set the same absorption value derived from procedure 3  (in case of procedure 10, the setting value shall be different for each test) | | 8 | Vehicle restrain | follow GTR#15 | | 9 | Initial test prior to “run-in” | follow GTR#15  record Di (system odometer at start point of cold Type I) | | 10 | Repeat 1 to 9 until three valid data is obtained | procedure 1, 2 and 4 can be omitted when conducted immediately after completion of procedure 8. Procedure 3 (road load setting) shall be performed for every single test since vehicle conditions are dramatically changed at this stage. | | 11 | “run-in” | follow appendix para.4 | | 12 | Warm up chassis dynamometer | follow GTR#15  do NOT use the test vehicles for chassis dynamometer warm up | | 13 | Vehicle restrain | follow GTR#15 | | 14 | Road Load Setting | follow appendix para. 3 (ii) | | 15 | Preconditioning driving | follow GTR#15 | | 16 | Vehicle soak | follow GTR#15 | | 17 | Warm up chassis dynamometer | follow GTR#15  do NOT use the test vehicles for chassis dynamometer warm up | | 18 | Vehicle restrain | follow GTR#15 | | 19 | Road Load Setting | set the same absorption value derived from procedure 14 | | 20 | Testing after “run-in” | follow GTR#15  record Dk (system odometer at start point of cold Type I) | | 21 | Repeat 12, 13, 19, 15, 16, 17, 18, 19 and 20 until at least two valid data is obtained | procedure 12, 13, 19 and 15 can be omitted when conducted immediately after completion of procedure 20 | |

8.2.4.2. [JPN procedure needs to be added]

8.2.4.3. [All these tests shall be conducted with commercial fuel. However, at the manufacturer’s request, the reference fuels described in Annex 3 may be used.]

|  |
| --- |
| **COP test fuels**   * Level 1a   + Commercial fuel or Reference fuel * Level 1b   + Reference fuel * Level 2   Reference fuel |

8.2.4.4. Level 1a

When checking the conformity of production for CO2, as an alternative to the procedure mentioned in paragraph 2.4.1. the vehicle manufacturer may use a fixed evolution coefficient EvC of 0.98 for CO2 and multiply all values of CO2 measured at zero km by this factor.

Level 1b

When checking the conformity of production for fuel consumption, as an alternative to the procedure mentioned in paragraph 2.4.1. the vehicle manufacturer may use a fixed evolution coefficient EvC of 1.02 for fuel consumption and multiply all values of fuel consumption measured at zero km by this factor.

Level 2

BOTH THE ABOVE

|  |
| --- |
| **4) Default evolution coefficients (where applicable)**   * Level 1a   + 0,98 for CO2 (WLTP 4 phases) * Level 1b   + 1,02 for FC (WLTP 3 phases) * Level 2   1. 0,98 for CO2 (WLTP 4 phases) and 1.02 for FC (WLTP 3 phases) |

8.2.5. Tests for conformity of production of vehicles fuelled by LPG or NG/biomethane may be performed with a commercial fuel of which the C3/C4 ratio lies between those of the reference fuels in the case of LPG, or of one of the high or low caloric fuels in the case of NG/biomethane. In all cases a fuel analysis shall be presented to the responsible authority.

8.2.6. Acceptance of CoP test

|  |
| --- |
| **REQUIREMENTS UNDER DISCUSSION – TO BE DECIDED**  **7) Acceptance of CoP test**   * Level 1a   In order to avoid a too high risk to repeat tests for DTI infringement, we propose that for all Levels the DTI should be as in Level 1a for type approval (i.e. RMSSE < 1.3; -2% < IWR < +4%).  Lv.1b,  In order to avoid a too high risk to repeat tests for DTI infringement, we propose that for all Levels the DTI should be as in Level 1a for type approval (i.e. RMSSE < 0.8; -2% < IWR < +4%).  Level 2: In order to avoid a too high risk to repeat tests for DTI infringement, we propose that for all Levels the DTI should be as in Level 1a for type approval (i.e. RMSSE < 0.8 for 3-phase and < 1.3 for 4-phase; -2% < IWR < +4%). |

|  |
| --- |
| **TEXT FROM SG-EV DOCUMENT “190819\_Annex 10\_COP\_Draft text proposal Annex 10-v1.0\_draft\_MaN\_1522” TO BE INCORPORATED – WITH APPROPRIATE RENUMBERING OF PARAGRAPHS**  3. Pure ICE vehicles: Verification of CO2 mass emission and fuel consumption for conformity of production  3.1. The vehicle shall be tested according to (…)  3.2. During this test, the CO2 mass emission (if required by the contracting party) shall be determined according to Table A7/x of Annex 8 of this GTR.  During this test, the fuel consumption (if required by the contracting party) shall be determined according to Table A7/x of Annex 8 of this GTR.  3.3. Measures to ensure the conformity of production with regard to CO2 mass emission and fuel consumption shall be checked on the basis of the values for the tested vehicle as described in paragraph 3.3.1. for CO2 mass emission and in paragraph 3.3.2. for fuel consumption applying an evolution coefficient as defined in paragraph 2.4. of this Annex.  3.3.1. CO2 mass emission values for CoP  In the case the interpolation method is not applied, the CO2 mass emission value according to step 6 of Table A7/1 of Annex 7 shall be used for verifying the conformity of production.  In the case the interpolation method is applied, the CO2 mass emission value MCO2,c,,ind for the individual vehicle according to step 10 of Table A7/1 shall be used for verifying the conformity of production.  3.3.2. Fuel consumption values for CoP  [will be added]  3.4. Conformity for CO2 mass emission and fuel consumption shall be checked using the statistical procedures described in paragraph 2 and either in Appendix 1a or Appendix 1b, whichever is applicable.  4. NOVC-HEVs: Verification of CO2 mass emission and fuel consumption for conformity of production  4.1. The vehicle shall be tested according to (…)  4.2. During this test, the CO2 mass emission (if required by the contracting party) of the NOVC-HEV shall be determined according to Table A8/x of Annex 8 of this GTR.  During this test, the fuel consumption (if required by the contracting party) of the NOVC-HEV shall be determined according to Table A8/x of Annex 8 of this GTR.  4.3. Measures to ensure the conformity of production with regard to CO2 mass emission and fuel consumption shall be checked on the basis of the values for the tested vehicle as described in paragraph 4.3.1. for CO2 mass emission and in paragraph 4.3.2. for fuel consumption applying an evolution coefficient as defined in paragraph 2.4. of this Annex.  4.3.1. CO2 mass emission values for CoP  In the case the interpolation method is not applied, the charge-sustaining CO2 mass emission value according to step 7 of Table A8/5 of Annex 8 shall be used for verifying the conformity of production.  In the case the interpolation method is applied, the charge-sustaining CO2 mass emission value for the individual vehicle according to step 10 of Table A8/5 shall be used for verifying the conformity of production.  4.3.2. Fuel consumption values for CoP  [will be added]  4.4. Conformity for CO2 mass emission and fuel consumption shall be checked using the statistical procedures described in paragraph 2 and either in Appendix 1a or Appendix 1b, whichever is applicable.  5. PEVs: Verification of electric energy consumption for conformity of production  5.1. The vehicle shall be tested as described in paragraph 3.4. of Annex 8 to GTR 15. During the conformity of production, the break-off criterion for the Type 1 test procedure according to paragraph 3.4.4.1.3 of Annex 8 of this GTR (consecutive cycle procedure) and paragraph 3.4.4.2.3. of Annex 8 of this GTR (Shortened Test Procedure) shall be reached with having finished the first applicable WLTP test cycle.  During this first applicable WLTP test cycle, the DC energy from the REESS(s) shall be measured according to the method described in Appendix 3 of Annex 8 of this GTR and divided by the actual driven distance in this applicable WLTP test cycle.  5.2. Measures to ensure the conformity of production with regard to electric energy consumption (EC) shall be checked on the basis of the values for the tested vehicle as described in paragraph 5.3.1. for the consecutive cycle type 1 test procedure and in paragraph 5.3.2. for the shortened type 1 test procedure.  5.3. Electric energy consumption values for CoP  5.3.1. Consecutive Cycle Type 1 Test Procedure values  In the case the interpolation method is not applied, the electric energy consumption value according to step 9 of Table A8/10 of Annex 8 shall be used for verifying the conformity of production.  In the case the interpolation method is applied, the electric energy consumption value for the individual vehicle according to step 9 of Table A8/10 shall be used for verifying the conformity of production.  5.3.2. Shortened Type 1 Test Procedure values  In the case the interpolation method is not applied, the electric energy consumption value according to step 8 of Table A8/11 of Annex 8 shall be used for verifying the conformity of production.  In the case the interpolation method is applied, the electric energy consumption value for the individual vehicle according to step 9 of Table A8/11 shall be used for verifying the conformity of production.  5.4. Conformity for EC shall be checked using the statistical procedures described in paragraph 2. and either Appendix 1a or Appendix 1b, whichever is applicable. For the purposes of this conformity check, in the statistical procedures, the terms criteria emissions/CO2 shall be replaced by EC.  6. OVC-HEVs: Verification of CO2 mass emission, fuel consumption and electric energy consumption for the conformity of production  6.1. General information  6.1.1. At the request of the manufacturer, it is allowed to use different test vehicles for the charge-sustaining test and charge-depleting test.  6.1.2.    6.2. Verification of the charge-sustaining CO2 mass emission and charge-sustaining fuel consumption for conformity of production  6.2.1. The vehicle shall be tested according to the charge-sustaining Type 1 test as described in paragraph 3.2.5. of Annex 8 of GTR 15.  6.2.2. During this test, the charge-sustaining CO2 mass emission (if required by the contracting party) shall be determined according to Table A8/5 of Annex 8 of this GTR.  During this test, the charge-sustaining fuel consumption (if required by the contracting party) shall be determined according to Table A8/x of Annex 8 of this GTR.  6.2.3. Measures to ensure the conformity of production with regard to charge-sustaining CO2 mass emission and charge-sustaining fuel consumption shall be checked on the basis of the values for the tested vehicle as described in paragraph 6.2.3.1. for charge-sustaining CO2 mass emission and in paragraph 6.2.3.2. for charge-sustaining fuel consumption applying an evolution coefficient as defined in paragraph 2.4. of this Annex.  6.2.3.1. Charge-Sustaining CO2 mass emission values for CoP  In the case the interpolation method is not applied, the charge-sustaining CO2 mass emission value according to step 7 of Table A8/5 of Annex 8 shall be used for verifying the conformity of production.  In the case the interpolation method is applied, the charge-sustaining CO2 mass emission value for the individual vehicle according to step 10 of Table A8/5 shall be used for verifying the conformity of production.  6.2.3.2. Charge-Sustaining Fuel consumption values for CoP  [will be added]  6.2.4. Conformity for the charge-sustaining CO2 mass emission and charge-sustaining fuel consumption shall be checked using the statistical procedures described in paragraph 2. and Appendix 1a..  6.4. Verification of charge-depleting electric energy consumption for conformity of production  6.4.1. The vehicle shall be tested according to the charge-depleting Type 1 test as described in paragraph 3.2.4. of Annex 8 of GTR 15. During the conformity of production, the break-off criterion of the charge-depleting Type 1 test procedure shall be reached with having finished the first applicable WLTP test cycle and replace the break-off criterion of the charge-depleting Type 1 test procedure according to paragraph 3.2.4.4. of Annex 8 of this GTR.  During this first applicable WLTP test cycle, the DC energy from the REESS(s) shall be measured according to the method described in Appendix 3 Annex 8 of this GTR and divided by the actual driven distance in this applicable WLTP test cycle.  6.4.2. Measures to ensure the conformity of production with regard to the charge-depleting electric energy consumption shall be checked on the basis of the values for the tested vehicle:  In the case the interpolation method is not applied, the charge-depleting electric energy consumption value according to step 16 of Table A8/8 of Annex 8 shall be used for verifying the conformity of production.  In the case the interpolation method is applied, the charge-depleting electric energy consumption value for the individual vehicle according to step 17 of Table A8/8 shall be used for verifying the conformity of production.  6.4.3. Conformity for EC shall be checked using the statistical procedures described in paragraph 2. and Appendix 1a for EU and 1b for JPN. For the purposes of this conformity check, the terms criteria emissions/CO2 in the statistical procedures shall be replaced by EC with the exception of the fixed evolution coefficient. |

**Checking the conformity of the vehicle for a Type 4 test**

|  |
| --- |
| **Proposal from EU – TBD**  4.6.1. Once per year a vehicle shall be randomly taken from the family[[1]](#footnote-2) and subjected to the three tests described in paragraph 7 of Annex 7 of UN Regulation 83 (i.e. the test for leakage, the test for venting and the purge test).  4.6.1.1. The production shall be deemed to conform if this vehicle meets the requirements of the tests described in paragraph 7 of Annex 7 of UN Regulation 83.  4.6.1.2. If the vehicle tested does not satisfy the requirements of section 4.6.1.1, a further random sample shall be taken from the same family and subjected to the tests described in Annex VI. The tests may be carried out on vehicles which have completed a maximum of 15 000 km with no modifications.  4.6.1.3. If the vehicle tested does not satisfy the requirements of Annex VI, a further random sample of four vehicles shall be taken from the same family and subjected to the tests described in Annex VI. The tests may be carried out on vehicles which have completed a maximum of 15 000 km with no modifications.  4.6.1.4. The production shall be deemed to conform if at least three vehicles meet the requirements of the tests described in Annex VI. |

|  |
| --- |
| **REQUIREMENTS TO BE DECIDED**  **Type 4 test**  **General rules**  **1) Definition of CoP EVAP family**   * Level 1a   CoP EVAP family = Type approval EVAP Family (GTR19)   * Level 1b   CoP EVAP family = Type approval EVAP Family (GTR19)   * Level 2   CoP EVAP family = Type approval EVAP Family (GTR19)  **2) Frequency of sampling**   * Level 1a   The minimum number of CoP checks is once per year on a vehicle randomly taken from the family;   * Level 1b   (TBD by Japan)   * Level 2   (to be derived from above)  **Specific rules**  **Tests of selected vehicles**   * Level 1a: * **Initially test 1 vehicle. In case of fail test up to 5 more to reach a pass/fail decision**   + Pass if the selected vehicle complies to the requirements of the simplified tests (described in paragraph 7 of Annex 7 of UN Regulation 83):  1. test for leakage 2. test for venting, if appropriate 3. purge test    * Otherwise, a further random sample shall be taken from the same family and subjected to a full type 4 test. Pass if this vehicle complies.    * Otherwise, a further random sample of four vehicles shall be taken from the same family and subjected to a full type 4 test. Pass if at least three vehicles meet the requirements, otherwise Fail.  * Level 1b   (TBD by Japan)   * Level 2   (to be derived from above) |

Annex 10 - Appendix 1

Verification of conformity of production for Type 1 test—statistical method for EU

1. This Appendix describes the procedure to be used to verify the production conformity requirements for the Type 1 test for criteria emissions/CO2, including conformity requirements for PEVs and OVC-HEVs.

Measurements of the applicable criteria emissions, and the emission of CO2 shall be carried out on a minimum number of [3 vehicles], and consecutively increase until a pass or fail decision is reached.

2. For the total number of N tests and the measurement results of the tested vehicles, x1, x2, … xN, the average Xtests and the variance VAR shall be determined:

Xtests = (x1 + x2 + x3 + … + xN)/N

and

VAR = ((x1 -Xtests)2 + (x2 –Xtests)2 + … + (xN – Xtests)2)/(N-1)

3. For each number of tests, one of the three following decisions (see (i) to (iii) below) can be reached for criteria emissions, based on the criteria emission limit value L:

[(i) Pass the family if Xtests < A \* L – VAR/L

(ii) Fail the family if Xtests > A \* L – ((N-3)/13) \* VAR/L

(iii) Take another measurement if:

A × L – VAR/L ≤ Xtests ≤ A × L – ((N–3)/13) × VAR/L

For the measurement of criteria emissions the factor A is set at 1.05 in order to take into account inaccuracies in the measurements. ]

4. For the evaluation of CO2 and EC the normalised values for CO2 and EC shall be used:

[𝑥𝑖= 𝐶𝑂2 𝑡𝑒𝑠𝑡-𝑖/𝐶𝑂2 𝑑𝑒𝑐𝑙𝑎𝑟𝑒d-i

𝑥𝑖= EC𝑡𝑒𝑠𝑡-𝑖/ECDC, COP-i

where:

CO2 test-i is the CO2 measured for individual vehicle i

CO2 declared-i is the declared CO2 value for the individual vehicle

ECtest-i is the energy consumption measured for individual vehicle i

ECDC, COP-i is the declared energy consumption for the individual vehicle i, according to Appendix 2

In the case of CO2 and EC the factor A is set at 1.01 and the value for L is set at 1. So in the case of CO2 and EC the criteria are simplified to:

(i) Pass the family if Xtests < A – VAR

(ii) Fail the family if Xtests > A – ((N-3)/13) \* VAR

(iii) Take another measurement if:

A – VAR ≤ Xtests ≤ A – ((N–3)/13) × VAR]

The responsible authority shall keep a record of the determined accuracies for each COP family tested.

**Annex 10 - Appendix 1b**

**Verification of conformity of production for Type 1 test—statistical method for JPN**

[ JPN procedure need to be added]

|  |
| --- |
| **REQUIREMENTS UNDER DISCUSSION – TO BE DECIDED**  **Specific rules for ICE vehicles**  **Tests of all selected vehicles (initially 3, then 1 more until pass/fail)**   * **Level 1a:**    + Chassis Dyno setting for individual vehicles selected   + 1 WLTP (4 phases) preconditioning   + 1 WLTP (4 phases) test     - Take results (CO2, FC, regulated pollutants) from 4 phases * **Level 1b:**   + Chassis Dyno setting for individual vehicles selected   + 1 WLTP (3 phases) preconditioning   + 1 WLTP (3 phases) test     - Take results (CO2, FC, regulated pollutants) from 3 phases * **Level 2**   + Chassis Dyno setting for individual vehicles selected   + 1 WLTP (4 phases) preconditioning   + 1 WLTP (4 phases) test     - Take results (CO2, FC, regulated pollutants) from 3 phases     - Take results (CO2, FC, regulated pollutants) from 4 phases * **Level 1a**   + Correct results according to WLTP 4 phases (ex. REESS, Ki, ATCT) * **Level 1b**   + Correct results according to WLTP 3 phases (ex. REESS, Ki) * **Level 2**   + Correct results according to WLTP 3 phases and WLTP 4 phases   **Computation of test statistics – Regulated pollutants**   * **Level 1a – check emissions of regulated pollutants from 4 phases against EU emission limits (L)**   + Pass if Xtest < A\*L – VAR/L   + Fail if Xtest > A\*L – ((N-3)/13 \* VAR/L   + Test more if result is in between   In addition to the above, in case of tests of single vehicles according to point 2 (Frequency of sampling) Level 1a, sub-point iii:  Pass if Xi < L\*A  where Xi is the result of the test, after all the applicable corrections; A= 1.05 and L is the emission limit for each pollutant.  Otherwise repeat normal CoP checks with 3 vehicles.   * **Level 1b - check emissions of regulated pollutants from 3 phases against Japanese emission limits**   (TBD by Japan)  Apply R83 statistical method.   * **Level 2**   + Carry out both above mentioned checks. A level 2 pass is reached only if the test has reached a pass decision both for Level 1a and Level 1b.   + If a pass decision is reached only for Level 1a, the test more for the Level 1b pass/fail decision shall continue only on the WLTP (3 phases);   + If a pass decision is reached only for Level 1b, the test more for the Level 1a pass/fail decision shall continue only on the WLTP (4 phases).   **Computation of test statistics – CO2/FC**   * **Level 1a – check CO2 emissions from 4 phases**   + Pass if Xtest < A – ((ti-1,Cl(i)/√i) + (tN-1,Cl/ √N)) \* s(i)   + Fail if Xtest > A + ((ti-1,Cl/√i) - (tN-1,Cl/ √N)) \* s(i)   + Test more if result is in between   In addition to the above, in case of tests of single vehicles according to point 2 (Frequency of sampling) Level 1a, sub-point iii:  Pass if Xi is within +2\*sigma from Declared Value.  Otherwise repeat normal CoP checks with 3 vehicles.   * **Level 1b - check FC from 3 phases**   (TBD by Japan)  If N <= 10   * + Pass if FEave(N) >= Declared Value   + Fail none   + Test more if not pass   If N > 10  Pass if all the criteria are satisfactory  i. Year average criteria: FE average of yearly production of IP family > DV – 3sigma / √yearly sampling volume of IP family  ii. COP family criteria: FE average of COP family > DV – 3sigma / √yearly sampling volume of COP family  iii. individual criteria: FE of individual vehicle > DV – 3sigma  Fail if one of the criteria is not satisfactory  ii. shall be judged only when IP family and COP family are different.   * **Level 2**   + Carry out both above mentioned checks. A level 2 pass is reached only if the test has reached a pass decision both for Level 1a and Level 1b.   + If a pass decision is reached only for Level 1a, the test more for the Level 1b pass/fail decision will continue only on the WLTP (3 phases);   + If a pass decision is reached only for Level 1b, the test more for the Level 1a pass/fail decision will continue only on the WLTP (4 phases);   **Specific rules for NOVC-HEV vehicles**  (TBD: probably these rules are exactly the same as for ICE vehicles: to be checked with Subgroup-EV)  **Specific rules for OVC-HEV vehicles**  (For OVC-HEV it is necessary to discuss with Subgroup-EV. Expected that the selected vehicles should be tested in VH road load conditions (\*). In this way it is possible to compare the results from the single WLTP test (4 phases) with the first WLTP test at type approval). For OVC-HEV it is necessary to carry out 1 WLTP test in CD conditions and 1 WLTP in CS conditions. Considering the preconditioning test, it should be allowed to use 2 similar OVC-HEV vehicles, one for the preconditioning + CD test, one for the preconditioning + CS test. |

1. i.e. the EVAP family <TBD> [↑](#footnote-ref-2)