►B COMMISSION IMPLEMENTING REGULATION (EU) 2017/1153

of 2 June 2017

setting out a methodology for determining the correlation parameters necessary for reflecting the change in the regulatory test procedure and amending Regulation (EU) No 1014/2010

(Text with EEA relevance)

(OJ L 175, 7.7.2017, p. 679)

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COMMISSION IMPLEMENTING REGULATION (EU) 2017/1153

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setting out a methodology for determining the correlation parameters necessary for reflecting the change in the regulatory test procedure and amending Regulation (EU) No 1014/2010

(Text with EEA relevance)

Article 1

Subject matter

This Regulation provides for:

(a) a methodology for the correlation of the CO_2 emissions measured in accordance with Annex XXI to Regulation (EU) 2017/1151 with those determined in accordance with Annex XII to Regulation (EC) No 692/2008;

(b) a procedure for applying the methodology referred to in point (a) for the purpose of determining each manufacturer's average specific emissions of CO_2;

(c) the amendments to Regulation (EU) No 1014/2010 required for the purpose of adapting the monitoring of CO_2 emissions data to reflect the change in emission values.

Article 2

Definitions

For the purposes of this Regulation, the following definitions shall apply:

(1) 'NEDC CO_2 values' means the CO_2 emissions determined in accordance with Annex I and entered into the certificates of conformity;

(2) 'Measured NEDC CO_2 values' means the CO_2 emissions (phases and combined) determined in accordance with Annex XII to Regulation (EC) No 692/2008 by way of physical vehicle tests;

(3) 'WLTP CO_2 values' means the CO_2 emissions (combined) determined in accordance with the test procedure set out in Annex XXI to Regulation (EU) 2017/1151;

(4) 'WLTP interpolation family' means the interpolation family as determined in accordance with point 5.6 of Annex XXI to Regulation (EU) 2017/1151;

(5) 'Correlation tool' means the simulation model referred to in point 2 of Annex I.

Article 3

Determination of average specific emissions of CO_2 for target compliance purpose in the period 2017 to 2020

1.   For the calendar years 2017 to 2020 inclusive, the average specific emissions of a manufacturer shall be determined using the following CO_2 mass emissions (combined) values:

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(a) with regard to M1 passenger cars type-approved in accordance with Annex XXI to Regulation (EU) 2017/1151, the NEDC CO_2 values;

(b) with regard to existing types of M1 passenger cars that have been type-approved in accordance with Annex XII to Regulation (EC) No 692/2008, the measured NEDC CO_2 values for the calendar year 2017 until 31 August 2018 and the NEDC CO_2 values from 1 September 2018 to 31 December 2020;

(c) with regard to end-of-series vehicles referred to in Article 27 of Directive 2007/46/EC of the European Parliament and of the Council (¹), the measured NEDC CO_2 values.

2. Manufacturers responsible for more than 1 000 but fewer than 10 000 new passenger cars registered in the Union in each of the calendar years 2017 to 2020 inclusive may use either the NEDC CO_2 values or the measured NEDC CO_2 values.

Article 4

Determination of average specific emissions based on WLTP CO_2 values

1. The WLTP CO_2 emissions (combined) or, where applicable, (weighted combined) specified in entry 49.4 of the certificate of conformity shall be monitored for all new registered vehicles starting from 1 January 2018.

2. For each manufacturer, the average specific emissions based on WLTP CO_2 values shall be determined starting from 1 January 2018.

With effect from 1 January 2021, those average specific emissions shall be used to determine the manufacturer's compliance with its specific emission target.

Article 5

Application of Article 5a of Regulation (EC) No 443/2009 — super-credits

Where the measured NEDC CO_2 value of a new passenger car is less than 50 g CO_2/km, the manufacturer shall, for the purpose of the application of Article 5a of Regulation (EC) No 443/2009, record that value in the certificate of conformity of the vehicles concerned until 31 December 2022.

With effect from 1 January 2021:

(a) the specific emissions of those vehicles shall be calculated in accordance with Article 5a of that Regulation, using the WLTP CO_2 values of those vehicles;

(b) the 7,5 g CO_2/km cap provided for in Article 5a of that Regulation shall be taken into account as follows:

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(¹) Directive 2007/46/EC of the European Parliament and of the Council of 5 September 2007 establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles (OJ L 263, 9.10.2007, p. 1).

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$$Cap_{n,r} = \left(\frac{7,5 - SC_{n2020}}{7,5} \right)$$

$$Cap_w = Cap_{n,r} \cdot \left(\frac{SC_{w2020} \cdot 7,5}{SC_{n2020}} \right)$$

Where:

$Cap_{n,r}$ is the proportion of the remaining cap on NEDC in 2020;

SC_{n2020} is the super-credit savings on NEDC in 2020;

SC_{w2020} is the super-credit savings on WLTP in 2020;

Cap_w is the remaining super-credit savings cap to be taken into account for the calculation of the average specific emissions in 2021 and 2022.

Article 6

Application of Article 12 of Regulation (EC) No 443/2009 — eco-innovations

1. With effect from 1 January 2021, only CO_2 savings due to eco-innovations, within the meaning of Article 12 of Regulation (EC) No 443/2009, that are not covered by the test procedure set out in Annex XXI to Regulation (EU) 2017/1151, shall be taken into account for the calculation of the average specific emissions of a manufacturer.

2. A manufacturer's total eco-innovation CO_2 savings in the following calendar years shall be adjusted as follows:

(a) in 2021: $EI\ savings_{adjusted\ 2021} = WLTP_{EI\ savings\ 2021} \cdot 1,9$

(b) in 2022: $EI\ savings_{adjusted\ 2022} = WLTP_{EI\ savings\ 2022} \cdot 1,7$

(c) in 2023: $EI\ savings_{adjusted\ 2023} = WLTP_{EI\ savings\ 2023} \cdot 1,5$

Where:

$EI\ savings_{adjusted20xx}$ are the eco-innovation savings in the relevant year to be taken into account for the calculation of the average specific emissions;

$WLTP_{EI\ savings\ 20xx}$ are the eco-innovation savings in the relevant year determined in relation to the WLTP and recorded in the certificate of conformity.

From calendar year 2024 eco-innovation savings shall be taken into account for the calculation of the specific average emissions without adjustment.

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Article 7

Determination and correction of NEDC CO$_2$ values for the calculation of the specific average emissions

1.   Starting from the calendar year 2017 until 2020 inclusive, the average specific CO$_2$ emissions of a manufacturer shall be calculated using the NEDC CO$_2$ values determined in accordance with the procedure laid down in Section 4 of Annex I, unless paragraph (1)(b) or (c) or paragraph (2) of Article 3 applies.

2.   Where for a WLTP interpolation family the deviation factor De, determined in accordance with point 3.2.8 of Annex I, exceeds the value 0,04, or in the presence of a verification factor '1' as determined in that point, the average specific NEDC CO$_2$ emissions of the manufacturer responsible for that interpolation family shall be multiplied by the following correction factor:

$$correction\ factor = 1 + \frac{\sum_{i=1}^{N} De_i \cdot r_i}{\sum_{i=1}^{N} \delta_{3,i} \cdot r_i}$$

Where:

De_i is the value determined in accordance with point 3.2.8 of Annex I;

r_i is the number of annual registrations of vehicles belonging to the respective WLTP interpolation family i concerned;

$\delta_{3,i}$ is equal to 0 if De_i is missing and equal to 1 otherwise;

N is the number of WLTP interpolation families for which a manufacturer is responsible.

Article 8

Amendments to Regulation (EU) No 1014/2010

Regulation (EU) No 1014/2010 is amended as follows:

(1) Article 5 is amended as follows:

(a) point (b) is replaced by the following:

'(b) for each vehicle, the deviation factor (De) and the verification factor determined in accordance with point 3.2.8 of Annex I to Commission Implementing Regulation (EU) 2017/1153 (*)

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(*) Commission Implementing Regulation (EU) 2017/1153 of 2 June 2017 setting out a methodology for determining the correlation parameters necessary for reflecting the change in the regulatory test procedure and amending Regulation (EU) No 1014/2010 (OJ L 175, 7.7.2017, p. 679).';

(b) the following third paragraph is added:

'Notwithstanding the detailed data parameters referred to in Annex II to Regulation (EC) No 443/2009, a Member State shall, with regard to the data monitored until 31 December 2017, in addition to the already required parameters, report

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only the deviation factor "De" and the verification factor. From 1 January 2018 all detailed monitoring data specified in Annex II shall be monitored and reported.';

(2) Article 6 is deleted;

(3) the following Article 9a is inserted:

'*Article 9a*

Preparation of the provisional dataset

1. The provisional dataset to be notified to a manufacturer in accordance with the second subparagraph of Article 8(4) of Regulation (EC) No 443/2009 shall include the records which, on the basis of the manufacturer's name and, from 1 January 2018, the vehicle identification number, can be attributed to that manufacturer.

The central register referred to in the first subparagraph of Article 8(4) of Regulation (EC) No 443/2009 shall not include any data on vehicle identification numbers.

2. The processing of the vehicle identification numbers shall not include the processing of any personal data that could be linked to those numbers or any other data that could permit the linking of vehicle identification numbers with personal data.';

(4) Annex I is replaced by the text in Annex II to this Regulation.

Article 9

Entry into force

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

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ANNEX I

1.   INTRODUCTION

        This Annex sets out the methodology for determining the NEDC CO_2 value of individual M1 vehicles.

2.   DETERMINATION OF THE NEDC CO_2 VALUE FOR THE WLTP INTERPOLATION FAMILY

2.1.   **Correlation tool**

        The type-approval authority shall ensure that the NEDC CO_2 values to be used as reference for the purpose of Section 3 are determined by way of simulations in accordance with the provisions set out in this Annex.

        The Commission shall provide a simulation tool for that purpose (hereinafter the 'correlation tool') in the form of downloadable, executable, software. The Commission shall also provide guidance on the capacity of the correlation tool to simulate vehicles with advanced technologies, and, where necessary, recommend the use of physical measurements instead of simulations.

2.1.1. *Access to the correlation tool*

        The correlation tool shall be installed on a computer of the type-approval authority or, where applicable, the technical service, following the instructions provided in the following website:

        (http://ec.europa.eu/clima/policies/transport/vehicles/cars/documentation_en.htm)

        The type-approval authority shall ensure that the correlation tool is operated in accordance with the requirements of this Regulation and the user instructions set out in the user manual (¹).

        Support to the approval authorities and technical services using the correlation tool for the purpose of this Regulation shall be provided by the Commission on request. Requests for support shall be addressed to the following functional mailbox:

        co2mpas@jrc.ec.europa.eu (²)

        The correlation tool shall be accessible to other users, however, support shall only be provided to those users within the limits of available resources.

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2.1.2. *Designation of correlation tool users*

        Member States shall inform the Commission of the respective contact points responsible for executing the correlation tool runs at the approval authority and, where applicable, at the technical services. Only one contact point per authority or service shall be designated. The information provided to the Commission shall include the following (the name of the organisation, the name of the person responsible, the postal address, the email address and the telephone number). This information shall be sent to the following functional mailbox (³):

        EC-CO2-LDV-IMPLEMENTATION@ec.europa.eu

        Electronic signing keys for the purpose of the execution of the correlation tool shall be provided only at the request of the contact point (⁴). The Commission shall publish guidance on the procedure to follow for such requests.

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(¹) https://co2mpas.io/
(²) From 1 August 2017 jrc-co2mpas@ec.europa.eu
(³) Any up-dates of the mailbox address will be made available on the website.
(⁴) Electronic signing keys to be provided by the European Commission Joint Research Centre

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2.1.3. *Annual update of the correlation tool*

The performance of the correlation tool shall be continuously reviewed, taking into account information provided, in particular, by the contact persons referred to in point 2.1.2. Where appropriate, the Commission shall prepare a new version of the tool to be released annually on 1 September. The new version shall not affect the validity of results provided by previous versions.

The new version may be applied for the purpose of the procedure set out in Section 3 of this Annex from the date of its release. With the agreement of the type-approval authority or the technical service, the previous version of the correlation tool may, however, continue to be used during a maximum period of two months following the release of the new version.

The version used as well as the operating system of the computer on which the correlation tool has been run by the type-approval authority or technical service shall be indicated in the electronically signed correlation tool output report.

Where the applicability of the new version requires the adjustment of any provisions set out in this Regulation, the release of the new version shall not take place until the Regulation has been amended accordingly.

2.1.4. *Ad-hoc adjustments of the correlation tool*

Notwithstanding point 2.1.3, in case of serious malfunctioning of the correlation tool for the purpose of the procedure set out in Section 3, a new version of the tool shall be prepared and released as soon as possible following the detection of the malfunction. The new version shall apply from the date of its release and shall not affect the validity of results provided by previous versions.

Where the applicability of the new version requires the adjustment of any provisions set out in this Regulation, the release of the new version shall not take place until the Regulation has been amended accordingly.

2.2. **Identification of the WLTP test results to be used for the purpose of defining the input data for the simulation model**

The input data for the correlation tool simulations shall be taken from the relevant WLTP test results for vehicle H and, where applicable, vehicle L as defined in accordance with point 4.2.1 of Sub-Annex 4 to Annex XXI to Regulation (EU) 2017/1151. Where more than one WLTP type-approval test of vehicle H or L is performed in accordance with Table A6/2 of Annex XXI to that Regulation, the following test results shall be used for the purpose of determining the input data:

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(a) In the case two type approval tests are performed, the test results with the highest combined CO_2 emissions shall be used;

(b) In the case three type approval tests are performed, the test results with the median combined CO_2 emissions shall be used.

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2.3. **Determination of the input data and conditions for the operation of the correlation tool**

The test conditions referred to in Annex XII to Regulation (EC) No 692/2008 shall be taken into account in the correlation tool simulations, including the precisions provided for in points 2.3.1 to 2.3.7 of this Annex.

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> The physical vehicle measurements referred to in point 3 shall be performed in accordance with the conditions referred to in that Regulation, with the precisions given in this Annex, and, where applicable, the input data defined in point 2.4.

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2.3.1. *Determination of the NEDC vehicle inertia*

> The NEDC reference mass of vehicles H and, where applicable, of vehicles L and R shall be determined as follows:

> $RM_{n,L} = (MRO_L - 75 + 100)$ [kg]

> $RM_{n,H} = (MRO_H - 75 + 100)$ [kg]

> $RM_{n,R} = (MRO_R - 75 + 100)$ [kg]

> Where,

> Vehicle R is the representative vehicle of the Road Load Matrix Family as defined in point 5.1 of Sub-Annex 4 to Annex XXI to Commission Regulation (EU) 2017/1151 ([1]);

> MRO is the mass in running order as defined in Article 2(4)(a) of Commission Regulation (EU) No 1230/2012 ([2]) for vehicles H, L and R respectively.

> The reference mass to be used as input for the simulations and, where applicable, for a physical vehicle test shall be the inertia value set out in Table 3 of Annex 4a to UN/ECE Regulation No 83 which is equivalent to the reference mass, RM, determined in accordance with this point and referred to as $TM_{n,L}$, $TM_{n,H}$ and $TM_{n,R}$.

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2.3.2. *Determination of the pre-conditioning effect*

> In preparing the chassis-dynamometer for the execution of a type-approval test, the vehicle is pre-conditioned in order to reach similar conditions to those used in the coast-down test. The pre-conditioning procedure used in the WLTP test differs from that used for the purpose of NEDC so that, with equal road loads, the vehicle is considered subject to higher forces under the WLTP. That difference shall be set at 6 Newton and that value shall be used for the calculation of the NEDC road loads in accordance with point 2.3.8.

2.3.3. *Ambient conditions referred to in point 3.1.1 of UN/ECE Regulation No 83*

> For the purpose of the correlation tool, the test cell temperature shall be set at 25 °C.

> Also in the case of a physical vehicle measurement pursuant to point 3, the test cell temperature shall be set at 25 °C. However, on request by the manufacturer, the test cell temperature may be set at a value between 20 to 25 °C for the physical measurement.

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[1] Commission Regulation (EU) 2017/1151 of 1 June 2017 supplementing Regulation (EC) No 715/2007 of the European Parliament and of the Council on type-approval of motor vehicles with respect to emissions from light passenger and commercial vehicles (Euro 5 and Euro 6) and on access to vehicle repair and maintenance information, amending Directive 2007/46/EC of the European Parliament and of the Council, Commission Regulation (EC) No 692/2008 and Commission Regulation (EU) No 1230/2012 and repealing Regulation (EC) No 692/2008 (OJ L 175, 7.7.2017, p. 1).

[2] Commission Regulation (EU) No 1230/2012 of 12 December 2012 implementing Regulation (EC) No 661/2009 of the European Parliament and of the Council with regard to type-approval requirements for masses and dimensions of motor vehicles and their trailers and amending Directive 2007/46/EC of the European Parliament and of the Council (OJ L 353, 21.12.2012, p. 31.)

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2.3.4. *Determination of the initial battery state of charge*

The initial battery state of charge shall be set to at least 99 per cent for the purpose of the correlation tool test. The same shall apply in the case of a physical vehicle test.

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2.3.5. *Determination of the difference in tyre pressure prescriptions*

According to point 6.6.3 of Appendix 3 to Annex I to Regulation (EU) 2017/1151, the lowest recommended tyre pressure for the vehicle test mass shall be used during the coast down for the road load determination, while this is not specified in the NEDC. The tyre pressure to be taken into account for the purpose of calculating the NEDC road load in accordance with point 2.3.8 shall be the average between the two axles of the average between the minimum and maximum tyre pressure permitted for the selected tyres on each axle for the NEDC reference mass of the vehicle. The calculation shall be carried out for vehicle H and, where applicable, for vehicles L and R with the following formulae:

For vehicle H: $P_{avg,H} = \left(\dfrac{P_{max,H} + P_{min,H}}{2} \right)$

For vehicle L: $P_{avg,L} = \left(\dfrac{P_{max,L} + P_{min,L}}{2} \right)$

For vehicle R: $P_{avg,R} = \left(\dfrac{P_{max,R} + P_{min,R}}{2} \right)'$

Where,

$P_{max,}$ is the average of the maximum tyre pressures of the selected tyres for the two axles;

$P_{min,}$ is the average of the minimum tyre pressures of the selected tyres for the two axles.

The corresponding effect in terms of resistance applied to the vehicle shall be calculated using the following formulae for vehicles H, L and R:

For vehicle H: $TP_H = \left(\dfrac{P_{avg,H}}{P_{min,H}} \right)^{-0,4}$

For vehicle L: $TP_L = \left(\dfrac{P_{avg,L}}{P_{min,L}} \right)^{-0,4}$

For vehicle R: $TP_R = \left(\dfrac{P_{avg,R}}{P_{min,R}} \right)^{-0,4}$

2.3.6. *Determination of the tyre tread depth (TTD)*

According to point 4.2.2.2 of Sub-Annex 4 to Annex XXI to Regulation (EU) 2017/1151 the minimum tyre tread depth is 80 % for the WLTP test, while pursuant to point 4.2 of Appendix 7 to Annex 4a to UN/ECE Regulation No 83, the minimum allowed tyre tread depth for the purpose of the NEDC test is 50 % of the nominal value. That results in an average difference of 2 mm in tread depth between the two procedures. The corresponding effect in terms of the resistance applied to the vehicle shall be determined for the purpose of the NEDC road load calculation in point 2.3.8 in accordance with the following formulae for vehicles H, L and R:

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For vehicle H: $TTD_H = \left(2 \cdot \dfrac{0,1 \cdot RM_{n,H} \cdot 9,81}{1\,000}\right)$

For vehicle L: $TTD_L = \left(2 \cdot \dfrac{0,1 \cdot RM_{n,L} \cdot 9,81}{1\,000}\right)$

For vehicle R: $TTD_R = \left(2 \cdot \dfrac{0,1 \cdot RM_{n,R} \cdot 9,81}{1\,000}\right)$

Where,

$RM_{n,H}$, $RM_{n,L,}$ and $RM_{n,R}$ are the reference masses of vehicles H, L and R determined in accordance with point 2.3.1.

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2.3.7. *Determination of the inertia of rotating parts*

For the purpose of the correlation tool:

During the simulation of the WLTP test four rotating wheels are to be considered, while for the purpose of the NEDC tests only two rotating wheels are to be considered. The effect this has on the forces applied to the vehicle shall be taken into account in accordance with the formulae set out in point 2.3.8.1.1(a)(3).

The acceleration and deceleration forces in the correlation tool shall be calculated for the NEDC simulation by considering the inertia of only two rotating wheels.

For the purpose of a physical test:

During the WLTP coastdown setting, coastdown times are to be transferred to forces and vice versa by taking into account the applicable test mass plus the effect of rotational mass (3 % of the sum of the MRO and 25 kg). For the NEDC coastdown setting, coastdown times are to be transferred to forces and vice versa by neglecting the effect of rotational mass (only NEDC vehicle inertia calculated in point 2.3.1 is used).

2.3.8. *Determination of the NEDC road loads*

2.3.8.1. In the case of road loads being determined in accordance with points 1-4 and 6 of Sub-Annex 4 of Annex XXI to Regulation (EU) 2017/1151.

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The NEDC road load coefficients shall be calculated in accordance with the formulae specified in point 2.3.8.1.1 (for vehicle H) and in point 2.3.8.1.2 (for vehicle L).

Unless otherwise specified, those formulae shall apply both in the case of simulations and in the case of physical vehicle tests.

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2.3.8.1.1. Determination of the NEDC road load coefficients for vehicle H

(a) The road load coefficient $F_{0,n}$ expressed in Newton (N) for vehicle H shall be determined as follows:

(1) Effect of different inertia:

$$F_{0n,H}^{1} = F_{0w,H} \cdot \left(\frac{RM_{n,H}}{TM_{w,H}}\right)$$

Where the factors in the formula are as defined in point 2.3.1, with the exception of the following:

$F_{0w,H}$ is the road load coefficient F_0 determined for the WLTP test of vehicle H; $TM_{w,H}$ is the test mass used for the WLTP test of vehicle H.

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(2) Effect of different tyre pressure:

$$F_{0n,H}^2 = F_{0n,H}^1 \cdot TP_H$$

Where the factors in the formula are as defined in point 2.3.5.

(3) Effect of the inertia of rotating parts:

$$F_{0n,H}^3 = F_{0n,H}^2 \cdot \left(\frac{1,015}{1,03} \right)$$

In the case of a physical vehicle test, the following formula applies:

$$F_{0n,H}^3 = F_{0n,H}^2 \cdot \left(\frac{1}{1,03} \right)$$

(4) Effect of different tyre tread depth:

$$F_{0n,H}^4 = F_{0n,H}^3 - TTD_H$$

Where the factors in the formula are as defined in point 2.3.6.

(5) Effect of preconditioning:

$$F_{0n,H} = F_{0n,H}^4 - 6$$

In the case of a physical vehicle test, the correction for the effect of preconditioning shall not be applied

(b) The road load coefficient F_{1n} for vehicle H shall be determined as follows:

Effect of the inertia of rotating parts

$$F_{1n,H} = F_{1w,H} \cdot \left(\frac{1,015}{1,03} \right)$$

In the case of a physical vehicle test, the following formula applies:

$$F_{1n,H} = F_{1w,H} \cdot \left(\frac{1}{1,03} \right)$$

(c) The road load coefficient F_{2n} for vehicle H shall be determined as follows:

Effect of the inertia of rotating parts

$$F_{2n,H} = F_{2w,H}^* \cdot \left(\frac{1,015}{1,03} \right)$$

In the case of a physical vehicle test, the following formula applies:

$$F_{2n,H} = F_{2w,H}^* \cdot \left(\frac{1}{1,03} \right)$$

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Where the factor $F_{2w,L}$ is the road load coefficient F_2 determined for the WLTP test of vehicle H from which the effect of all aerodynamic optional equipment has been removed.

2.3.8.1.2. Determination of the NEDC road load coefficients for vehicle L

(a) The road load coefficient $F_{0,n}$ for vehicle L shall be determined as follows:

(1) Effect of different inertia:

$$F_{0n,L}^1 = F_{0w,L} \cdot \left(\frac{RM_{n,L}}{TM_{w,L}} \right)$$

Where the factors in the formula are as defined in point 2.3.1, with the exception of $F_{0w,L}$ which is the road load coefficient F_0 determined for the WLTP test of vehicle L, and $TM_{w,L}$ which is the test mass used for the WLTP test of vehicle L.

(2) Effect of different tyre pressure:

$$F_{0n,L}^2 = F_{0n,L}^1 \cdot TP_L$$

Where the factors in the formula are as defined in point 2.3.5.

(3) Effect of the inertia of rotating parts:

$$F_{0n,L}^3 = F_{0n,L}^2 \cdot \left(\frac{1,015}{1,03} \right)$$

In the case of a physical vehicle test, the following formula applies:

$$F_{0n,L}^3 = F_{0n,L}^2 \cdot \left(\frac{1}{1,03} \right)$$

(4) Effect of different tyre tread depth:

$$F_{0n,L}^4 = F_{0n,L}^3 - TTD_L$$

Where the factors in the formula are as defined in point 2.3.6.

(5) Effect of preconditioning:

$$F_{0n,L} = F_{0n,L}^4 - 6$$

In the case of a physical vehicle test, the correction for the effect of preconditioning shall not be applied.

(b) The road load coefficient F_{1n} for vehicle L shall be determined as follows:

Effect of the inertia of rotating parts

$$F_{1n,L} = F_{1w,L} \cdot \left(\frac{1,015}{1,03} \right)$$

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In the case of a physical vehicle test, the following formula applies:

$$F_{1n,L} = F_{1w,L} \cdot \left(\frac{1}{1,03} \right)$$

Where the factor $F_{1w,L}$ is the road load coefficient F_1 determined for the WLTP test of vehicle L.

(c) The road load coefficient F_{2n} for vehicle L shall be determined as follows:

Effect of the inertia of rotating parts

$$F_{2n,L} = F_{2w,L}^* \cdot \left(\frac{1,015}{1,03} \right)$$

In the case of a physical vehicle test, the following formula applies:

$$F_{2n,L} = F_{2w,L}^* \cdot \left(\frac{1}{1,03} \right)$$

Where the factor $F_{2w,L}$ is the road load coefficient F_2 determined for the WLTP test of vehicle L from which the effect of all aerodynamic optional equipment has been removed.

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2.3.8.2. Determination of the road loads where, for the purpose of the WLTP test, the road loads have been determined in accordance with point 5 of Sub-Annex 4 of Annex XXI to Regulation (EU) 2017/1151.

2.3.8.2.1. Road load matrix family in accordance with point 5.1 of Sub-Annex 4 to Annex XXI to Regulation (EU) 2017/1151.

Where the road load of a vehicle has been calculated in accordance with point 5.1 of Sub-Annex 4 to Annex XXI to Regulation (EU) 2017/1151, the NEDC road load to be used as input for the correlation tool simulations shall be determined as follows:

(a) NEDC tabulated road load values in accordance with Table 3 of Annex 4a to Regulation UN/ECE No 83

Vehicle H:

$$F_{0n,H} = T_{0n,H} + (F_{0w,H} - A_{w,H})$$

$$F_{1n,H} = F_{1w,H} - B_{w,H}$$

$$F_{2n,H} = T_{2n,H} + (F_{2w,H} - C_{w,H})$$

Vehicle L:

$$F_{0n,L} = T_{0n,L} + (F_{0w,L} - A_{w,L})$$

$$F_{1n,L} = F_{1w,L} - B_{w,L}$$

$$F_{2n,L} = T_{2n,L} + (F_{2w,L} - C_{w,L})$$

Where,

$F_{0n,i}$, $F_{1n,i}$, $F_{2n,i}$, with i = H,L,   are the NEDC road load coefficients for vehicle H or L;

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$T_{0n,i}$, $T_{2n,i}$, with i = H,L	are the NEDC chassis dynamometer coefficients for vehicles H or L determined in accordance with Table 3 of Annex 4a to UN/ECE Regulation No 83;
$A_{W,H/L}$, $B_{W,H/L}$, $C_{W,H/L}$	are the chassis dynamometer coefficients for the vehicle used for the purpose of the preparation of the chassis dynamometer in accordance with points 7 and 8 of Sub-Annex 4 to Annex XXI to Regulation (EU) 2017/1151;

(b) NEDC road loads derived from the representative vehicle

In the case of vehicles designed for a technically permissible maximum laden mass equal to or exceeding 3 000 kg, the NEDC road loads may, at the request of the manufacturer, be determined in accordance with the following:

(1) Determination of the road load coefficients of the representative vehicle of the road load matrix family

(i) Effect of different inertia:

$$F_{0n,R}^1 = F_{0w,R} \cdot \left(\frac{RM_{n,R}}{TM_{w,R}} \right)$$

Where the factors in the formula are as defined in point 2.3.1, with the exception of the following:

$F_{0w,R}$ is the road load coefficient F_0 determined for the WLTP test of vehicle R; $TM_{w,R}$ is the WLTP test mass used for the representative vehicle R.

(ii) Effect of different tyre pressure:

$$F_{0n,R}^2 = F_{0n,R}^1 \cdot TP_R$$

Where the factors in the formula are as defined in point 2.3.5.

(iii) Effect of the inertia of rotating parts:

$$F_{0n,R}^3 = F_{0n,R}^2 \cdot \left(\frac{1,015}{1,03} \right)$$

In the case of a physical vehicle test, the following formula shall apply:

$$F_{0n,R}^3 = F_{0n,R}^2 \cdot \left(\frac{1}{1,03} \right)$$

(iv) Effect of different tyre tread depth:

$$F_{0n,R}^4 = F_{0n,R}^3 - TTD_R$$

Where the factors in the formula are as defined in point 2.3.6.

(v) Effect of preconditioning:

$$F_{0n,R} = F_{0n,R}^4 - 6$$

In the case of a physical vehicle test, the correction for the effect of preconditioning shall not be applied.

▼M1

(vi) The road load coefficient F_{1n} for vehicle R shall be determined as follows:

Effect of the inertia of rotating parts:

$$F_{1n,R} = F_{1w,R} \cdot \left(\frac{1,015}{1,03}\right)$$

In the case of a physical vehicle test, the following formula shall apply:

$$F_{1n,R} = F_{1w,R} \cdot \left(\frac{1}{1,03}\right)$$

(vii) The road load coefficient F_{2n} for vehicle R shall be determined as follows:

Effect of the inertia of rotating parts:

$$F_{2n,R} = F_{2w,R}^* \cdot \left(\frac{1,015}{1,03}\right)$$

In the case of a physical vehicle test, the following formula shall apply:

$$F_{2n,R} = F_{2w,R}^* \cdot \left(\frac{1}{1,03}\right)$$

Where the factor $F_{2w,R}^*$ is the road load coefficient F_2 determined for the WLTP test of vehicle R from which the effect of all aerodynamic optional equipment has been removed.

(2) Determination of the NEDC road load coefficients for vehicle H

For the calculation of the NEDC road loads of vehicle H the following formulae shall be used:

(i) The $F_{0n,H}$ for vehicle H shall be determined as follows:

$$F_{0n,H} = Max\left(\left(0,05 \cdot F_{0n,R} + 0,95 \cdot \left(F_{0n,R} \cdot \frac{RM_{n,H}}{RM_{n,R}} + \left(\frac{RR_H - RR_r}{1\,000}\right) \cdot 9,81 \cdot RM_{n,H}\right)\right); \right.$$
$$\left. \left(0,2 \cdot F_{0n,R} + 0,8 \cdot \left(F_{0n,R} \cdot \frac{RM_{n,H}}{RM_{n,R}} + \left(\frac{RR_H - RR_r}{1\,000}\right) \cdot 9,81 \cdot RM_{n,H}\right)\right)\right)$$

Where,

$F_{0n,R}$ is the constant road load coefficient of vehicle R in N;

$RM_{n,H}$ is the reference mass of vehicle H,

$RM_{n,R}$ is the reference mass of vehicle R;

RR_H is the tyre rolling resistance of vehicle H in kg/tonne;

RR_R is the tyre rolling resistance of vehicle R in kg/tonne;

▼**M1**

(ii) The $F_{2n,H}$ for vehicle H shall be determined as follows:

$$F_{2n,H} = Max\left(\left(0{,}05 \cdot F_{2n,R} + 0{,}95 \cdot F_{2n,R} \cdot \frac{A_{f,H}}{A_{f,R}}\right); \left(0{,}2 \cdot F_{2n,R} + 0{,}8 \cdot F_{2n,R} \cdot \frac{A_{f,H}}{A_{f,R}}\right)\right)$$

Where,

$F_{2n,R}$ is the second order road load coefficient of vehicle R in $N/(km/h)^2$;

$A_{f,H}$ is the frontal area of vehicle H in m^2;

$A_{f,R}$ is the frontal area of vehicle R in m^2.

(iii) The $F_{1n,H}$ for vehicle H shall be set to 0.

(3) Determination of the NEDC road load coefficient for vehicle L

For the calculation of NEDC road loads of vehicle L the following formulae shall be used:

(i) The $F_{0n,L}$ for vehicle L shall be determined as follows:

$$F_{0n,L} = Max\left(\left(0{,}05 \cdot F_{0n,R} + 0{,}95 \cdot \left(F_{0n,R} \cdot \frac{RM_{n,L}}{RM_{n,R}} + \left(\frac{RR_L - RR_r}{1\,000}\right) \cdot 9{,}81 \cdot RM_{n,L}\right)\right);\right.$$
$$\left.\left(0{,}2 \cdot F_{0n,R} + 0{,}8 \cdot \left(F_{0n,R} \cdot \frac{RM_{n,L}}{RM_{n,R}} + \left(\frac{RR_L - RR_r}{1\,000}\right) \cdot 9{,}81 \cdot RM_{n,L}\right)\right)\right)$$

Where,

$F_{0n,R}$ is the constant road load coefficient of vehicle R in N;

$RM_{n,L}$ is the reference mass of vehicle L;

$RM_{n,R}$ is the reference mass of vehicle R;

$RR_{,L}$ is the tyre rolling resistance of vehicle L in kg/tonne;

RR_R is the tyre rolling resistance of vehicle R in kg/tonne;

(ii) The $F_{2n,L}$ for vehicle L shall be determined as follows:

$$F_{2n,L} = Max\left(\left(0{,}05 \cdot F_{2n,R} + 0{,}95 \cdot F_{2n,R} \cdot \frac{A_{f,L}}{A_{f,R}}\right); \left(0{,}2 \cdot F_{2n,R} + 0{,}8 \cdot F_{2n,R} \cdot \frac{A_{f,L}}{A_{f,R}}\right)\right)$$

Where,

$F_{2n,R}$ is the second order road load coefficient of vehicle R in $N/(km/h)^2$;

$A_{f,L}$ is the frontal area of vehicle L in m^2;

$A_{f,R}$ is the frontal area of vehicle R in m^2.

(iii) The $F_{1n,L}$ for vehicle L shall be set to 0.

2.3.8.2.2. Default road loads in accordance with point 5.2 of Sub-Annex 4 to Annex XXI to Regulation (EU) 2017/1151

Where default road loads have been calculated in accordance with point 5.2 of Sub-Annex 4 to Annex XXI to Regulation (EU) 2017/1151, the NEDC road loads shall be calculated in accordance with point 2.3.8.2.1.(a) of this Annex.

▼__M1__

In the case of physical vehicle testing, the test shall be performed with the NEDC chassis dynamometer coefficients for vehicles H or L determined in accordance with Table 3 of Annex 4a to UN/ECE Regulation No 83.

▼__B__

2.4.   **Input data matrix**

The manufacturer shall determine the input data for each vehicle H and vehicle L in accordance with point 2.2 and submit the completed matrix set out in Table 1 to the type-approval authority or, where applicable, the technical service appointed to perform the test, with the exception of entries 31, 32 and 33 (the NEDC road loads) which shall be calculated by the type-approval authority or the technical service in accordance with the formulae specified in point 2.3.8.

The type-approval authority or technical service shall independently verify and confirm the correctness of the input data provided by the manufacturer. In case of doubt, the type-approval authority or technical service shall determine the relevant input data independently of the information provided by the manufacturer or, where appropriate, act in accordance with point 3.2.7 and 3.2.8.

Table 1

Matrix of input data for the correlation tool

No	Input parameters for the correlation tool	Unit	Source	Remarks
1	Fuel type	—	Point 3.2.2.1 of Appendix 3 to Annex I to Regulation (EU) 2017/1151	Diesel/Petrol/LPG/NG or Biomethane/Ethanol(E85)/ Biodiesel
2	Fuel lower heating value	kJ/kg	Declaration by manufacturer and/or technical service	
3	Fuel carbon content	%	Idem	% of carbon in the fuel by weight, e.g. 85,5 %
4	Engine type		Point 3.2.1.1 of Appendix 3 to Annex I to Regulation (EU) 2017/1151	Positive ignition or compression ignition
5	Engine capacity	cc	Point 3.2.1.3 of Appendix 3 to Annex I to Regulation (EU) 2017/1151	
6	Engine stroke	mm	Point 3.2.1.2.2 Appendix 3 to Annex I to Regulation (EU) 2017/1151	
7	Rated engine power	kW…min^{-1}	Point 3.2.1.8 of Appendix 3 to Annex I to Regulation (EU) 2017/1151	

▼__B__

No	Input parameters for the correlation tool	Unit	Source	Remarks
8	Engine speed at rated engine power	min⁻¹	Point 3.2.1.8 in Appendix 3 to Annex I to Regulation (EU) 2017/1151	Engine speed at maximum net power
9	High engine idling speed (*)	min⁻¹	Point 3.2.1.6.1 Appendix 3 to Annex I to Regulation (EU) 2017/1151	
10	Maximum net torque (*)	Nm at… min⁻¹	Point 3.2.1.10 Appendix 3 to Annex I to Regulation (EU) 2017/1151	
11	T1 map speed (*)	rpm	Sub-Annex 2 to Annex XXI to Regulation (EU) 2017/1151	Array
12	T1 map torque (*)	Nm	Sub-Annex 2 to Annex XXI to Regulation (EU) 2017/1151	Array
13	T1 map power (*)	kW	Sub-Annex 2 to Annex XXI to Regulation (EU) 2017/1151	Array
14	Engine idle speed	rpm	Sub-Annex 2 to Annex XXI to Regulation (EU) 2017/1151	Idle speed in warm condition
15	Engine idle fuel consumption	g/s	Manufacturer declaration	Idle fuel consumption in warm condition
16	Final drive ratios	—	Point 4.6 in Appendix 3 to Annex I to Regulation (EU) 2017/1151	Final drive ratio
17	Tyre code (*)	—	Point 6 of Appendix 3 to Annex I to Regulation (EU) 2017/1151	Tyre code (e.g. P195/55R1685H) of the tyres used in the WLTP test
18	Gearbox type	—	Point 4.5 of Appendix 3 to Annex I to Regulation (EU) 2017/1151	automatic/manual/CVT
19	Torque converter	—	Manufacturer declaration	0 = No, 1 = Yes; Does the vehicle use torque converter?
20	Fuel saving gear for automatic trans-mission	—	Manufacturer declaration	0 = No, 1 = Yes Setting this value to 1 will allow the correlation tool to use a higher gear at constant speed driving than in the case of transient conditions
21	Drive mode	—	Point 2.3.1 of Sub-Annex 5 to Annex XXI to Regulation (EU) 2017/1151	Two-wheel drive, four-wheel drive.

▼ **B**

No	Input parameters for the correlation tool	Unit	Source	Remarks
22	Start-stop activation time	sec	Manufacturer declaration	Start-stop activation time elapsed from test start
23	Nominal voltage of the alternator	V	Point 3.4.4.5 of Appendix 3 to Annex I to Regulation (EU) 2017/1151	
24	Battery capacity	Ah	Point 3.4.4.5 of Appendix 3 to Annex I to Regulation (EU) 2017/1151	
25	Starting ambient temperature WLTP	°C		Default value = 23 °C WLTP test measurement
26	Alternator maximum power	kW	Manufacturer declaration	
27	Efficiency of the alternator	—	Manufacturer declaration	Default value = 0,67
28	Gearbox ratios	—	Point 4.6 of Appendix 3 to Annex I to Regulation (EU) 2017/1151	Array: ratio gear 1, ratio gear 2, etc.
29	Ratio of vehicle speed to engine speed (*)	(km/h)/rpm	Manufacturer declaration	Array: [constant velocity speed ratio gear 1, constant velocity speed ratio gear 2, ...]; Alternative to gear box ratios
30	Vehicle inertia NEDC	kg	►**M1** Table 3 of Annex 4a to UN/ECE Regulation No 83. *To be completed by the type approval authority or Technical Service* ◄	To be derived in accordance with point 2.3.1 of this Annex.
31	F0 NEDC	N	Point 2.3.8 of this Annex, To be completed by the type-approval authority or Technical Service	F0 road load coefficient
32	F1 NEDC	N/(km/h)	Idem	F1 road load coefficient
33	F2 NEDC	N/(km/h)^2	Idem	F2 road load coefficient

▼ **M1**

No	Input parameters for the correlation tool	Unit	Source	Remarks
34	Inertia setting WLTP	kg	Point 2.5.3 of sub-Annex 4 to Annex XXI to Regulation (EU) 2017/1151	Chassis dynamometer inertia applied during WLTP test

▼ **B**

No	Input parameters for the correlation tool	Unit	Source	Remarks
35	F0 WLTP	N	Point 2.4.8 of the Appendix to the information document in Appendix 3 to Annex I to Regulation (EU) 2017/1151	F0 road load coefficient
36	F1 WLTP	N/(km/h)	Idem	F1 road load coefficient

▼__B__

No	Input parameters for the correlation tool	Unit	Source	Remarks
37	F2 WLTP	$N/(km/h)^2$	Idem	F2 road load coefficient
38	WLTP CO_2 value phase 1	gCO_2/km	Point 2.1.1 of test report of Annex I, Appendix 8a of Regulation (EU) 2017/1151	Phase low, bag values not corrected for RCB, not rounded WLTP test measurement
39	WLTP CO_2 value phase 2	gCO_2/km	Idem	Phase medium, bag values not corrected for RCB, not rounded WLTP test measurement
40	WLTP CO_2 value phase 3	gCO_2/km	Idem	Phase high, bag values not corrected for RCB, not rounded WLTP test measurement
41	WLTP CO_2 value phase 4	gCO_2/km	Idem	Phase extra high, bag values not corrected for RCB, not rounded WLTP test measurement
42	Turbo- or Super-charger	—	Manufacturer declaration	0 = No | 1 = Yes — Is the engine equipped with any kind of charging system?
43	Start-stop	—	Manufacturer declaration	0 = No | 1 = Yes — Does the vehicle have start-stop system?
44	Brake energy Recu-peration	—	Manufacturer declaration	0 = No | 1 = Yes — Does the vehicle have energy recu-peration technologies?
45	Variable valve actuation	—	Manufacturer declaration	0 = No | 1 = Yes — Does the engine feature variable valve actuation?
46	Thermal management	—	Manufacturer declaration	0 = No | 1 = Yes — Does the vehicle have technologies that actively manage temperature at the gear box?
47	Direct injection/Port Fuel Injection	—	Manufacturer declaration	0 = PFI | 1 = DI
48	Lean burn	—	Manufacturer declaration	0 = No | 1 = Yes — Does the engine use lean burn?

▼__B__

No	Input parameters for the correlation tool	Unit	Source	Remarks
49	Cylinder deactivation	—	Manufacturer declaration	0 = No | 1 = Yes — Does the engine use a cylinder deactivation system?
50	Exhaust gas recirculation	—	Manufacturer declaration	0 = No | 1 = Yes — Does the vehicle have an external EGR system?
51	Particulate filter	—	Manufacturer declaration	0 = No | 1 = Yes — Does the vehicle have a particulate filter?
52	Selective Catalytic Reduction	—	Manufacturer declaration	0 = No | 1 = Yes — Does the vehicle have an SCR system?
53	NOx storage catalyst	—	Manufacturer declaration	0 = No | 1 = Yes — Does the vehicle have a NOx storage catalyst?
54	WLTP Time	sec	WLTP test measurement (identified in accordance to Point 2.2 of this Annex)	Array: OBD and Chassis Dynamometer data, 1hz
55	WLTP Velocity (theoretical)	km/h	As defined in sub-Annex 1 to Annex XXI to Regulation (EU) 2017/1151	Array: 1hz, resolution 0,1 km/h. If not provided the speed profile defined in Point 6 of sub-Annex 1 to Annex XXI to Regulation (EU) 2017/1151 and in particular to Tables A1/7-A1/9, A1/11, and A1/12 applies
56	WLTP Velocity (actual)	km/h	WLTP test measurement (identified in accordance to Point 2.2 of this Annex)	Array: OBD and Chassis Dynamometer data, 1hz, resolution 0,1 km/h
57	WLTP Gear (theoretical)	—	As defined in sub-Annex 2 to Annex XXI to Regulation (EU) 2017/1151	Array: 1hz. If not provided, the calculation by the correlation tool applies
58	WLTP Engine Speed	rpm	WLTP test measurement (identified in accordance to Point 2.2 of this Annex)	Array: 1hz, 10 RPM resolution from OBD
59	WLTP Engine Coolant Temperature	°C	Idem	►__M1__ Array: OBD Data, 1hz, 1 °C resolution ◄
60	WLTP Alternator Current	A	As defined, for the low-voltage battery current, in Appendix 2 to Sub-Annex 6 to Annex XXI to Regulation (EU) 2017/1151	Array: 1hz, 0,1 A resolution, external measurement device synchronised with the chassis dynamometer
61	WLTP Low-Voltage Battery Current	A	As defined in Appendix 2 to Sub-Annex 6 to Annex XXI to Regulation (EU) 2017/1151	Array: 1hz, 0,1 A resolution, external measurement device synchronised with the chassis dynamometer

▼**B**

No	Input parameters for the correlation tool	Unit	Source	Remarks
62	WLTP calculated load	—	As defined in Annex 11 of UN/ECE Regulation No 83	Array: OBD data, 1hz at least (higher frequencies possible, 1 % resolution) WLTP test measurement

▼**M1**

63	Declared combined NEDC CO_2 emissions for vehicle H and L	gCO_2/km		Declared value for NEDC test. In case of vehicles with periodically regenerative systems the value shall be Ki corrected
64	NEDC velocity (theoretical)	km/h	As defined in point 6 of Annex 4 to Un/ECE Regulation No 83	Array: 1 hz, resolution 0,1 km/h. If not provided the speed profile defined in point 6 of Annex 4 to UN/ECE Regulation No 83 shall apply
65	NEDC gear (theoretical)	—	Idem	Array: 1 hz. If not provided the speed profile defined in point 6 of Annex 4 to UN/ECE Regulation No 83 shall apply
66	Vehicle family identification number	—	Point 5.0 of Annex XXI to Regulation (EU) 2017/1151	
67	K_i regenerative factor	—	Appendix 1 to Sub-Annex 6 to Annex XXI to Regulation (EU) 2017/1151	For vehicles without periodically regenerating systems this value is equal to 1. For vehicles with periodically regenerating systems this value if not provided is set to 1,05

▼**B**

 (*) Either normal engine idling speed, high engine idling speed and maximum net torque or T1 maps speed torque and power are necessary (for gearshift)
(**) Either tyre dimensions or velocity speed ratio is necessary (for gearshift)

3. DETERMINATION OF NEDC CO_2 EMISSION AND FUEL CONSUMPTION VALUES FOR VEHICLE H AND L

3.1. **Determination of NEDC CO_2 reference values, phase-specific values and fuel consumption values for vehicle H and L**

The type-approval authority shall ensure that the NEDC CO_2 reference value for the respective vehicle H and, where applicable, vehicle L of a WLTP interpolation family as well as the phase-specific values and the fuel consumption is determined in accordance with points 3.1.2 and 3.1.3.

▼**M1**

Where the difference between vehicle H and vehicle L is due only to a difference in optional equipment (i.e. MRO, bodyshape and road load coefficients are the same) the NEDC CO_2 reference value shall be determined for vehicle H only.

▼__M1__

3.1.1. *Correlation tool input and output*

3.1.1.1. Original correlation output report

The type approval authority or designated technical service shall ensure that the input data file for the correlation tool is complete. Following a completed test run on the correlation tool, an original correlation output report shall be issued and attributed with a hash code. The report shall include the following sub-files:

(a) the input data as specified in point 2.4;

(b) the output data resulting from the execution of the simulation;

(c) the summary file, including

(i) the vehicle family identification number;

(ii) the delta between the manufacturer declared CO_2 value and the value resulting from the correlation tool (CO_2 combined);

(iii) non-confidential technical data (i.e. fuel type, engine capacity, gear-box type, turbo).

3.1.1.2. Complete correlation file

Where the original correlation output report has been issued in accordance with point 3.1.1.1, the type approval authority, or where applicable the designated technical service shall use the relevant commands in the correlation tool to send the summary file to a time stamp-server from which a time stamped reply is returned to the sender (with the relevant services of the Commission in copy), including a randomly generated integer number between 1 and 99.

A complete correlation file shall be created, including the time-stamped reply and the original correlation output report referred to in point 3.1.1.1. A hash code shall be attributed to the complete correlation file. The file shall be maintained by the type approval authority as a test report in accordance with Annex VIII to Directive 2007/46/EC.

3.1.2. *NEDC CO_2 reference value for vehicle H*

The correlation tool shall be used to execute the simulated NEDC test of vehicle H using the relevant input data referred to in point 2.4.

The NEDC CO_2 reference value for vehicle H shall be determined as follows:

$$CO_{2,H} = NEDC\ CO_{2,C,H} \cdot K_{i,H}$$

Where,

$CO_{2,H}$ is the NEDC CO_2 reference value for vehicle H;

$NEDC\ CO_{2,C,H}$ is the correlation tool simulated combined NEDC CO_2 result for vehicle H;

$K_{i,H}$ is the value determined in accordance with appendix 1 to Sub-Annex 6 to Annex XXI to Regulation (EU) 2017/1151 for vehicle H.

In addition to the NEDC CO_2 reference value, the correlation tool shall also provide the phase-specific CO_2 values for vehicle H.

▼__M1__

3.1.3. *NEDC CO$_2$ reference value for vehicle L*

Where applicable, the simulated NEDC test of vehicle L shall be performed using the correlation tool and the relevant input data referred to in point 2.4.

The NEDC CO$_2$ reference value for vehicle L shall be determined as follows:

$$CO_{2,L} = \text{NEDC } CO_{2,C,L} \cdot K_{i,L}$$

Where,

$CO_{2,L}$ is the NEDC CO$_2$ reference value for vehicle L;

NEDC CO$_{2,C,L}$ is the correlation tool simulated combined NEDC CO$_2$ result for vehicle L;

$K_{i,L}$ is the value determined in accordance with appendix 1 to Sub-Annex 6 to Annex XXI to Regulation (EU) 2017/1151 for vehicle L.

In addition to the NEDC CO$_2$ reference value, the correlation tool shall also provide the phase-specific CO$_2$ values for vehicle L.

▼__B__

3.2. **Interpretation of the NEDC CO$_2$ reference values determined for vehicle H and L**

For each WLTP interpolation family, the manufacturer shall declare the NEDC CO$_2$ mass emissions combined value for vehicle H, and, where applicable, vehicle L, to the approval authority. The type-approval authority shall ensure that the NEDC CO$_2$ reference values for vehicle H and, where applicable, vehicle L are determined in accordance with point 3.1.2 and 3.1.3, and that the reference values for the respective vehicle is interpreted in accordance with points 3.2.1 to 3.2.5.

3.2.1. The NEDC CO$_2$ value for test vehicle H or L to be used for the purpose of the calculations set out in point 4 shall be the manufacturer-declared value, if the NEDC CO$_2$ reference value does not exceed that value by more than 4 per cent. The reference value may be lower without any limitation.

3.2.2. If the NEDC CO$_2$ reference value exceeds the manufacturer-declared value by more than 4 per cent, the reference value may be used for the purpose of the calculations set out in point 4 for test vehicle H or L, or the manufacturer may request that a physical measurement is performed under the responsibility of the type-approval authority in accordance with the procedure referred to in Annex XII to Regulation (EC) No 692/2008, taking into account the precisions specified in point 2 of this Annex.

3.2.3. If the physical measurement referred to in point 3.2.2, amplified by the Ki-factor, does not exceed the manufacturer-declared value by more than 4 per cent, the declared value shall be used for the purpose of the calculations set out in point 4.

3.2.4. If the physical measurement, amplified by the Ki-factor, exceeds the manufacturer-declared value by more than 4 per cent, another physical measurement of the same vehicle shall be performed and the results shall be amplified by the Ki-factor. If the average of those two measurements does not exceed the declared value by more than 4 per cent, the declared value shall be used for the purpose of the calculations set out in point 4.

3.2.5. If the average of the two measurements referred to in point 3.2.4 exceeds the manufacturer-declared value by more than 4 per cent, a third measurement shall be performed and the results shall be amplified by the Ki-factor. The average of the three measurements shall be used for the purpose of the calculations set out in point 4.

▼**M1**

3.2.6. Where the randomly generated number referred to in point 3.1.1.2 is in the range of 90 to 99 the vehicle shall be selected for one physical measurement in accordance with the procedure referred to in Annex XII to Regulation (EC) No 692/2008, taking into account the precisions set out in section 2 of this Annex. The test results shall be documented in accordance with Annex VIII to Directive 2007/46/EC.

Where the NEDC CO_2 value for both vehicles H and L is determined in accordance with point 3.2.1, the vehicle configuration selected for physical measurement shall be vehicle L, if the random number is in the range 90 to 94, and vehicle H, if the random number is in the range 95 to 99.

Where the NEDC CO_2 value is determined in accordance with point 3.2.1 for only one of the vehicles H or L in the interpolation family, that vehicle shall be selected for one physical measurement if the random number is in the range 90 to 99.

Where the NEDC CO_2 values are not determined in accordance with point 3.2.1, but both vehicle H and L are physically tested, the random number shall be disregarded.

▼**B**

3.2.7. Notwithstanding point 3.2.6, a type-approval authority shall, where applicable, based on a proposal by a technical service, in those cases where the NEDC CO_2 value is determined in accordance with point 3.2.1, request that a vehicle undergoes one physical measurement where, based on their independent expertise, there are justified reasons to consider that the declared NEDC CO_2 value is too low in relation to a measured NEDC CO_2 value. The test results shall be documented in accordance with Annex VIII to Directive 2007/46/EC.

3.2.8. Where a physical test is performed in accordance with point 3.2.6 or point 3.2.7, the type-approval authority shall for each WLTP interpolation family record the relative deviation (De) between the measured value and the manufacturer-declared value determined as follows:

$$De = \frac{RTr - DV}{DV}$$

Where:

RTr is the random test result, amplified by the Ki-factor;

DV is the manufacturer-declared value.

▼**M1**

The De factor shall be calculated with three decimals and shall be recorded in the type approval certificate and in the certificate of conformity.

▼**B**

Where the type-approval authority finds that the physical test results do not confirm the input data provided by the manufacturer and, in particular, the data referred to in points 20, 22 and 44 of Table 1 in point 2.4, a verification factor shall be set to 1 and be recorded in the type-approval certificate and in the certificate of conformity. Where the input data is confirmed or where the error in the input data is not to the benefit of the manufacturer the verification factor shall be set to 0.

3.3. **Calculation of the NEDC phase-specific CO₂ values and fuel consumption values for vehicle H and L**

The type-approval authority or, where applicable, the technical service shall determine the NEDC phase-specific values and the fuel consumption values for vehicle H and L in accordance with points 3.3.1 to 3.3.4.

▼ __M1__

3.3.1. *Calculation of the NEDC phase-specific CO_2 values for vehicle H*

The NEDC phase-specific values for vehicle H shall be calculated as follows:

$$NEDC\ CO_{2,p,H} = NEDC\ CO_{2,p,H,c} \cdot CO_{2,AF,H}$$

Where:

p   is the NEDC phase 'UDC' or 'EUDC';

NEDC $CO_{2,p,H,c}$ is the correlation tool simulated NEDC CO_2 value for the phase p referred to in point 3.1.2 or, where applicable, the physical measurement result as referred to in point 3.2.2;

NEDC $CO_{2,p,H}$ is the NEDC phase-specific value for vehicle H of the applicable phase p, gCO_2/km;

$CO_{2,AF,H}$ is the adjustment factor for vehicle H calculated by the ratio between the NEDC CO_2 value determined in accordance with point 3.2 and the correlation tool simulated NEDC test result referred to in point 3.1.2 or, where applicable, the physical measurement result.

3.3.2. *Calculation of the NEDC phase-specific CO_2 values for vehicle L*

The NEDC phase-specific values for vehicle L shall be calculated as follows:

$$NEDC\ CO_{2,p,L} = NEDC\ CO_{2,p,L,c} \cdot CO_{2,AF,L}$$

Where:

p   is the NEDC phase 'UDC' or 'EUDC';

NEDC $CO_{2,p,L,c}$ is the correlation tool simulated NEDC CO_2 value for the phase p referred to in point 3.1.2 or, where applicable, the physical measurement result as referred to in point 3.2.2;

NEDC $CO_{2,p,L}$ is the NEDC phase-specific value for vehicle L of the applicable phase p, gCO_2/km;

$CO_{2,AF,L}$ is the adjustment factor for vehicle L calculated by the ratio between the NEDC CO_2 value determined in accordance with point 3.2 and the correlation tool simulated NEDC test result referred to in point 3.1.2 or, where applicable, the physical measurement result.

3.3.3. *Calculation of the NEDC fuel consumption for vehicle H and L*

3.3.3.1. Calculation of the NEDC fuel consumption (combined)

The NEDC fuel consumption (combined) for vehicles H and L shall be calculated using the combined NEDC CO_2 emissions determined in accordance with point 3.2 and the provisions set out in Annex XII to Regulation (EC) No 692/2008. The emissions of other pollutants relevant to the fuel consumption calculation (hydrocarbons, carbon monoxide) shall be considered equal to 0 (zero) g/km.

3.3.3.2. Calculation of the NEDC phase-specific fuel consumption

The NEDC phase-specific fuel consumption for vehicles H and L shall be calculated using the phase-specific NEDC CO_2 emissions determined in accordance with point 3.3 and the provisions set out

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in Annex XII to Regulation (EC) No 692/2008. The emissions of other pollutants relevant to the fuel consumption calculation (hydrocarbons, carbon monoxide) shall be considered equal to 0 (zero) g/km.

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3.3.4.   *Calculation of the NEDC fuel consumption for vehicle L*

3.3.4.1.   Calculation of the NEDC fuel consumption (combined) for vehicle L

The NEDC combined fuel consumption for vehicle L shall be calculated as follows:

$$NEDC\ FC_L = NEDC\ FC_{L,c} \cdot CO_{2,AF,L}$$

Where:

$NEDC\ FC_{L,c}$ is the NEDC fuel consumption (combined) test result determined in accordance with Annex XII to Regulation (EC) No 692/2008 using the CO_2 emissions determined in accordance with point (b) of paragraph 3.1.3 or a physical measurement result as referred to in point 3.2.2; the emissions of other pollutants relevant to the fuel consumption calculation (hydrocarbons, carbon monoxide) shall be considered equal to 0 (zero) g/km;

$NEDC\ FC_L$ is the NEDC fuel consumption (combined) for the vehicle L, l/100km;

$CO_{2,AF,L}$ is the adjustment factor for the vehicle L calculated by the ratio between the NEDC CO_2 value determined in accordance with point 3.2 and the NEDC test result referred to in point (b) of paragraph 3.1.3;

3.3.4.2.   Calculation of the NEDC phase-specific fuel consumption for vehicle L

The NEDC phase-specific fuel consumption for vehicle L shall be calculated as follows:

$$NEDC\ FC_{p,L} = NEDC\ FC_{p,L,c} \cdot CO_{2,AF,L}$$

Where:

p is the NEDC phase 'UDC' or 'EUDC';

$NEDC\ FC_{p,L,c}$ is the NEDC fuel consumption test result for the phase p determined in accordance with Annex XII to Regulation (EC) No 692/2008 using the CO_2 emissions determined in accordance with point (b) of paragraph 3.1.2 or a physical measurement result as referred to in point 3.2.2; the emissions of other pollutants relevant to the fuel consumption calculation (hydrocarbons, carbon monoxide) shall be considered equal to 0 (zero) g/km;

$NEDC\ FC_{p,L}$ is the NEDC phase-specific fuel consumption for the vehicle L of the applicable phase p, l/100km;

$CO_{2,AF,L}$ is the adjustment factor for the vehicle L calculated by the ratio between the NEDC CO_2 value determined in accordance with point 3.2 and the NEDC test result referred to in point (b) of paragraph 3.1.3.

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4. CALCULATION OF THE NEDC CO_2 VALUES AND FUEL CONSUMPTION VALUES TO BE ATTRIBUTED TO INDIVIDUAL M1 VEHICLES

The manufacturer shall calculate the (phase-specific and combined) NEDC CO_2 values and the fuel consumption values to be attributed to individual passenger cars in accordance with points 4.1 and 4.2 and record those values in the certificates of conformity.

The provisions on rounding set out in point 1.3 of Sub-Annex 7 to Annex XXI to Regulation (EU) 2017/1151 shall apply.

4.1. **Determination of the NEDC CO_2 values in the case of a WLTP interpolation family based on vehicle H**

Where the CO_2 emissions of the WLTP interpolation family are determined by reference to vehicle H only in accordance with point 1.2.3.1 of Sub-Annex 6 to Annex XXI to Regulation (EU) 2017/1151, the NEDC CO_2 value to be recorded in the certificates of conformity of the vehicles belonging to that family shall be the NEDC CO_2 emissions determined in accordance with point 3.2 of this Annex and recorded in the type-approval certificate of the vehicle H in question.

4.2. **Determination of the NEDC CO_2 value in the case of a WLTP interpolation family based on vehicle L and vehicle H**

4.2.1. *Road load calculation of an individual vehicle*

4.2.1.1. Mass of the relevant vehicle

The NEDC reference mass of the individual vehicle ($RM_{n,ind}$) shall be determined as follows:

$$RM_{n,ind} = (MRO_{ind} - 75 + 100) \text{ [kg]}$$

Where: MRO_{ind} is the mass in running order as defined in Article 3(d) of Regulation (EC) No 443/2009 of the individual vehicle.

The mass to be used for the calculation of the NEDC CO_2 values of the individual vehicle shall be the inertia value set out in Table 3 of Annex 4a to UN/ECE Regulation No 83 which is equivalent to the reference mass determined in accordance with this point and referred to as. $TM_{n,ind.}$

4.2.1.2. Rolling resistance of the individual vehicle

The tyre rolling resistance values determined in accordance with point 3.2.3.2.2.2 of sub-Annex 7 to Annex XXI to Regulation (EU) 2017/1151 shall be used for the purpose of the interpolation of the NEDC CO_2 value of the individual vehicle.

4.2.1.3. Aerodynamic drag of an individual vehicle

The aerodynamic drag of the individual vehicle shall be calculated by considering the difference in aerodynamic drag between an individual vehicle and vehicle L, due to a difference in body shape (m^2):

$$\Delta[C_d \cdot A_f]_{ind-L,n}$$

Where:

C_d is the aerodynamic drag coefficient;

A_f is the frontal area of the vehicle, m^2.

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The type-approval authority or, where applicable, the technical service shall verify if the wind tunnel facility referred to in 3.2.3.2.2.3. in Sub-Annex 7 to Annex XXI to Regulation (EU) 2017/1151 is qualified to accurately determine the $\Delta(C_d \times A_f)$ for body shapes that differ between vehicle L and H. If the wind tunnel facility is not qualified, the $\Delta[C_d \cdot A_f]_{H-L,n}$ for vehicle H shall apply for the individual vehicle.

If vehicles L and H have the same body shape, the value of $\Delta[C_d \cdot A_f]_{ind-L,n}$ for the interpolation method shall be set to zero.

4.2.1.4. Calculation of the road load for an individual vehicle in a WLTP interpolation family

The road load coefficients $F_{0,n}$, $F_{1,n}$ and $F_{2,n}$ for test vehicles H and L determined in accordance with point 2.3.8 are referred to as $F_{0n,H}$, $F_{1n,H}$ and $F_{2n,H}$ and $F_{0n,L}$, $F_{1n,L}$ and $F_{2n,L}$ respectively.

The road load coefficients $f_{0n,ind}$, $f_{1n,ind}$ and $f_{2n,ind}$ for an individual vehicle shall be calculated in accordance with the following formula:

Formula 1

$$f_{0n,ind} = F_{0n,H} - \Delta F_{0n} \cdot \frac{(TM_{n,H} \cdot RR_{n,H} - TM_{n,ind} \cdot RR_{n,ind})}{(TM_{n,H} \cdot RR_{n,H} - TM_{n,L} \cdot RR_{n,L})}$$

Or, if $(TM_{n,H} \cdot RR_{n,H} - TM_{n,L} \cdot RR_{n,L}) = 0$ Formula 2 shall apply:

Formula 2

$$f_{0n,ind} = F_{0n,H} - \Delta F_{0n}$$

$$f_{1n,ind} = F_{1n,H}$$

$$f_{2n,ind} = F_{2n,H} - \Delta F_{2n} \cdot \frac{(\Delta[C_d \times A_f]_{LH,n} - \Delta[C_d \times A_f]_{ind,n})}{(\Delta[C_d \times A_f]_{LH,n})}$$

or, if $\Delta[C_d \times A_f]_{n,LH} = 0$, Formula 3 shall apply:

Formula 3

$$f_{2n,ind} = F_{2n,H} - \Delta F_{2n}$$

where:

$$\Delta F_{0,n} = F_{0n,H} - F_{0n,L}$$

$$\Delta F_{2,n} = F_{2n,H} - F_{2n,L}$$

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4.2.1.4a. NEDC road loads derived from the representative vehicle of a road load matrix family

Where the NEDC road load of the representative vehicle has been calculated from a WLTP representative vehicle in accordance with point 2.3.8.2.1(b), the NEDC road load of an individual vehicle shall be calculated using the following formulae:

(a) The $F_{0n,ind}$ for the individual vehicle shall be determined as follows:

$$F_{0n,ind} = Max\left(\left(0{,}05 \cdot F_{0n,R} + 0{,}95 \cdot \left(F_{0n,R} \cdot \frac{RM_{n,ind}}{RM_{n,R}} + \left(\frac{RR_{ind} - RR_r}{1\,000}\right) \cdot 9{,}81 \cdot RM_{n,ind}\right)\right);\right.$$
$$\left.\left(0{,}2 \cdot F_{0n,R} + 0{,}8 \cdot \left(F_{0n,R} \cdot \frac{RM_{n,ind}}{RM_{n,R}} + \left(\frac{RR_{ind} - RR_r}{1\,000}\right) \cdot 9{,}81 \cdot RM_{n,ind}\right)\right)\right)$$

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Where,

$F_{0n,R}$ is the constant road load coefficient of the vehicle R in N;

$RM_{n,ind}$ is the reference mass of the individual vehicle;

$RM_{n,R}$ is the reference mass of vehicle R;

$RR_{,ind}$ is the tyre rolling resistance of individual vehicle in kg/tonne;

RR_R is the tyre rolling resistance of vehicle R in kg/tonne.

(b) The $F_{2n,ind}$ for the individual vehicle shall be determined as follows:

$$F_{2n,ind} = Max\left(\left(0,05 \cdot F_{2n,R} + 0,95 \cdot F_{2n,R} \cdot \frac{A_{f,ind}}{A_{f,R}}\right); \left(0,2 \cdot F_{2n,R} + 0,8 \cdot F_{2n,R} \cdot \frac{A_{f,ind}}{A_{f,R}}\right)\right)$$

Where,

$F_{2n,R}$ is the second order road load coefficient of the vehicle R in $N/(km/h)^2$;

$A_{f,ind}$ is the frontal area of the individual vehicle in m^2;

$A_{f,R}$ is the frontal area of the vehicle R in m^2.

(c) The $f_{1n,ind}$ for the individual vehicle shall be set to 0.

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4.2.1.5. Calculation of cycle energy demand

The cycle energy demand of the applicable NEDC $E_{k,n}$ and the energy demand for all applicable cycle phases $E_{k,p,n}$ applicable for individual vehicles in the WLTP interpolation family shall be calculated according to the procedure in paragraph 5 of Sub-Annex 7 to Annex XXI to Regulation (EU) 2017/1151, for the following sets k of road load coefficients and masses:

k = 1: $F_0 = F_{0n,L}, F_1 = F_{1n,H}, F_2 = F_{2n,L}, m = TM_{n,L}$

(test vehicle L)

k = 2: $F_0 = F_{0n,H}, F_1 = F_{1n,H}, F_2 = F_{2n,H}, m = TM_{n,H}$

(test vehicle H)

k = 3: $F_0 = f_{0n,ind}, F_1 = F_{1n,H}, F_2 = f_{2n,ind}, m = TM_{n,ind}$

(an individual vehicle in the WLTP interpolation family)

In case the chassis dynamometer coefficients specified in Table 3 of Annex 4a of UN/ECE Regulation No 83 are applied, the following formulae shall be used:

$$f_{0n,ind} = F_{0n,H} - \Delta F_{0n} \cdot \frac{TM_{n,H} - TM_{n,ind}}{TM_{n,H} - TM_{n,L}}$$

$$f_{1n,ind} = F_{1n,H} - \Delta F_{1n} \cdot \frac{TM_{n,H} - TM_{n,ind}}{TM_{n,H} - TM_{n,L}}$$

$$f_{2n,ind} = F_{2n,H} - \Delta F_{2n} \cdot \frac{TM_{n,H} - TM_{n,ind}}{TM_{n,H} - TM_{n,L}}$$

4.2.1.6. Calculation of the NEDC CO_2 value for an individual vehicle by the CO_2 interpolation method

For each cycle phase p of the NEDC applicable for individual vehicles in the WLTP interpolation family, the contribution to the total mass of CO_2 for an individual vehicle shall be calculated as follows:

$$M_{CO_2-ind,p,n} = M_{CO_2-L,p,n} + \left(\frac{E_{3,p,n} - E_{1,p,n}}{E_{2,p,n} - E_{1,p,n}}\right) \cdot (M_{CO_2-H,p,n} - M_{CO_2-L,p,n})$$

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The mass of CO_2 emissions, g/km, attributed to an individual vehicle of the WLTP interpolation family $M_{CO_2-ind,n}$ shall be calculated as follows:

$$M_{CO_2-ind,n} = M_{CO_2-L,n} + \left(\frac{E_{3,n} - E_{1,n}}{E_{2,n} - E_{1,n}}\right) \cdot (M_{CO_2-H,n} - M_{CO_2-L,n})$$

The terms $E_{1,p,n}$, $E_{2,p,n}$, $E_{3,p,n}$, and $E_{1,n}$, $E_{2,n}$, $E_{3,n}$ respectively are defined in paragraph 4.2.1.5.

4.2.1.7. Calculation of the NEDC fuel consumption value for an individual vehicle by the interpolation method

For each cycle phase p of the NEDC applicable for individual vehicles in the WLTP interpolation family, the fuel consumption, l/100km, shall be calculated as follows:

$$FC_{p,n} = FC_{L,p,n} + \left(\frac{E_{3,p,n} - E_{1,p,n}}{E_{2,p,n} - E_{1,p,n}}\right) \cdot (FC_{H,p,n} - FC_{L,p,n})$$

The fuel consumption, l/100km, of the complete cycle for an individual vehicle of the WLTP interpolation family shall be calculated as follows:

$$FC_{ind,n} = FC_{L,n} + \left(\frac{E_{3,n} - E_{1,n}}{E_{2,n} - E_{1,n}}\right) \cdot (FC_{H,n} - FC_{L,n})$$

The terms $E_{1,p,n}$, $E_{2,p,n}$, $E_{3,p,n}$, and $E_{1,n}$, $E_{2,n}$, $E_{3,n}$ respectively are defined in paragraph 4.2.1.5.

5. RECORDING OF DATA

The type-approval authority or the designated Technical Service shall ensure that the following information is recorded:

(a) the ►__M1__ complete correlation file ◄ referred to in point 3.1.1 including the NEDC CO_2 reference value referred to in points 3.1.2 and 3.1.3 and the manufacturer-declared value, as a test report in accordance with Annex VIII to Directive 2007/46/EC;

(b) the NEDC CO_2 values resulting from physical measurements referred to in point 3.2 in this Annex, in the type-approval certificate specified in the Appendix to the Addendum to the type-approval certificate set out in Appendix 4 to Annex I to Regulation (EU) 2017/1151;

(c) the deviation factor (De) and the verification factor determined in accordance with point 3.2.8 of this Annex (if available), in the type-approval certificate as specified in the Appendix to the Addendum to the type-approval certificate set out in Appendix 4 to Annex I to Regulation (EU) 2017/1151 and in entry 49.1 of the certificate of conformity as specified in Annex IX to Directive 2007/46/EC;

(d) the NEDC phase-specific values and the phase-specific and combined fuel consumption values determined in accordance with point 3.3, as specified in the Appendix to the Addendum to the type-approval certificate set out in Appendix 4 to Annex I to Regulation (EU) 2017/1151;

(e) the NEDC CO_2 (all phases and combined) and fuel consumption values (all phases and combined) determined in accordance with point 4.2 of this Annex, in entry 49.1 of the certificate of conformity as specified in Annex IX to Directive 2007/46/EC.

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ANNEX II

'ANNEX I

Data sources

Parameter	Certificate of conformity (Part 1, Model B set out in Annex IX of Directive 2007/46/EC)	Type-approval documentation (Directive 2007/46/EC)
Manufacturer	Section 0.5	Section 0.5 of Part I of Annex III
Type-approval number and its extension	Section 0.10	Type-approval certificate as specified in Annex VI
Type	Section 0.2	Section 0.2 of Part I of Annex III (where applicable)
Variant	Section 0.2	Section 3 of Annex VIII (where applicable)
Version	Section 0.2	Section 3 of Annex VIII (where applicable)
Make	Section 0.1	Section 0.1 of Part I of Annex III
Commercial name	Section 0.2.1	Section 0.2.1 of Part I of Annex III
Category of the vehicle type-approved	Section 0.4	Section 0.4 of Part I of Annex III
Category of the vehicle registered	n/a	n/a
Mass in running order (kg)	Section 13	Section 2.6 of Part I of Annex III ([1])
Footprint — Wheel base (mm)	Section 4	Section 2.1 of Part I of Annex III ([2])
Footprint — Track width (mm)	Section 30	Section 2.3.1 and 2.3.2 of Part I of Annex III ([3])
Specific NEDC CO_2 emissions (g/km) ([4])	Section 49.1	Section 3 of Annex VIII
Specific WLTP CO_2 emissions (g/km) ([14])	Section 49.4	n/a
Fuel type	Section 26	Section 3.2.2.1 of Part I of Annex III
Fuel mode	Section 26.1	Section 3.2.2.4 of Part I of Annex III
Engine capacity (cm^3)	Section 25	Section 3.2.1.3 of Part I of Annex III
Electric energy consumption (Wh/km)	Section 49.2	Section 3 of Annex VIII
Code of the eco-innovation(s)	Section 49.3.1	Section 4 of Annex VIII
Total NEDC CO_2 emissions savings due to the eco-innovation(s)	Section 49.3.2.1	Section 4 of Annex VIII
Total emissions WLTP CO_2 savings due to the eco-innovation(s)	Section 49.3.2.2	
Vehicle identification number	Section 0.10	Point 9.17 of Part I of Annex III

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Parameter	Certificate of conformity (Part 1, Model B set out in Annex IX of Directive 2007/46/EC)	Type-approval documentation (Directive 2007/46/EC)
Test mass [WLTP]	Section 47.1.1	n/a
Deviation factor De	Section 49.1	Appendix to the Addendum to the type-approval certificate set out in Appendix 4 to Annex I to Regulation (EU) 2017/1151
Verification factor ("1" or "0")	Section 49.1	Appendix to the Addendum to the type-approval certificate set out in Appendix 4 to Annex I to Regulation (EU) 2017/1151

(¹) In accordance with Article 3(8) of this Regulation
(²) In accordance with Article 3(8) of this Regulation
(³) In accordance with Articles 3(7) and 3(8) of this Regulation
(⁴) In accordance with Articles 3 and 4 of Implementing Regulation (EU) 2017/1152'.