COMMISSION IMPLEMENTING REGULATION (EU) 2017/1231

of 6 June 2017

amending Implementing Regulation (EU) 2017/1153 setting out a methodology for determining the correlation parameters necessary for reflecting the change in the regulatory test procedure for the purpose of clarifying procedural elements and amending Regulation (EU) No 1014/2010

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EC) No 443/2009 of the European Parliament and of the Council of 23 April 2009 setting emission performance standards for new passenger cars as part of the Community's integrated approach to reduce CO_2 emissions from light-duty vehicles (¹), and in particular the first subparagraph of Article 8(9) and the first subparagraph of Article 13(7) thereof,

Whereas:

(1) The methodologies for determining the correlation parameters necessary for reflecting the change in the regulatory procedure are set out in Commission Implementing Regulation (EU) 2017/1153 (²) and, with regard to light commercial vehicles, in Commission Implementing Regulation (EU) 2017/1152 (³). To facilitate the transition to the new regulatory test procedure for measuring CO_2 emissions and fuel consumption from light duty vehicles (the Worldwide Harmonised Light Vehicles Test Procedure, the WLTP), the correlation procedure for passenger cars should be aligned with that for light commercial vehicles to the extent possible.

(2) The designation of contact points at type approval authorities and technical services by Member States should be clarified so that the electronic signing keys needed for the formal correlation tool runs can be provided in an efficient and secure way.

(3) In the case of M1 vehicles with a technically permissible maximum laden mass of 3 000 kg or more, it is appropriate to provide manufacturers with the same possibility as for N1 vehicles to either derive NEDC road load coefficients from the WLTP tests or use the tabulated values set out in Table 3 of Annex 4a to Regulation No 83 of the Economic Commission for Europe of the United Nations (UNECE) (UN/ECE Regulation No 83) (⁴). This should facilitate the type approval testing of this specific group of vehicles.

(4) Based on the further development of the correlation tool, certain input data parameters are no longer needed while other data of an administrative nature should be added to ensure a traceable and verifiable process.

(5) It is also appropriate to introduce the use of electronic hash codes for the correlation output files. Certain limited and non-confidential output of the correlation tool should be made available to the Commission to ensure the continuous development and improvement of the correlation tool and provide the means for further verification of the correlation results.

(6) The calculation of the NEDC CO_2 reference value should be simplified by removing the need for post-processing of the WLTP test results and the calculation of the delta between the correlation tool simulated WLTP CO_2 value and the NEDC CO_2 value. The new calculation method provides an absolute NEDC CO_2 reference value and any deviation of the correlation tool should be easily calculated and shown in the non-confidential summary output file. This approach reduces significantly the risk for errors in the calculation of the reference values.

(¹) OJ L 140, 5.6.2009, p. 1.
(²) 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).
(³) Commission Implementing Regulation (EU) 2017/1152 of 2 June 2017 setting out a methodology for determining the correlation parameters necessary for reflecting the change in the regulatory test procedure with regard to light commercial vehicles and amending Implementing Regulation (EU) No 293/2012 (OJ L 175, 7.7.2017, p. 644).
(⁴) Regulation No 83 of the Economic Commission for Europe of the United Nations (UNECE) — Uniform provisions concerning the approval of vehicles with regard to the emission of pollutants according to engine fuel requirements [2015/1038] (OJ L 172, 3.7.2015, p. 1).

(7)   It is moreover appropriate to simplify the calculation of the combined and phase-specific fuel consumption values. The fuel consumption should be calculated from the final NEDC CO_2 value (declared, correlation tool, or physical test values) using the formulae specified in Annex XII to Commission Regulation (EC) No 692/2008 [1].

(8)   Annexes I and II to Implementing Regulation (EU) 2017/1153 should therefore be amended accordingly.

(9)   The measures provided for in this Regulation are in accordance with the opinion of the Climate Change Committee,

HAS ADOPTED THIS REGULATION:

Article 1

Annex I to Implementing Regulation (EU) 2017/1153 is amended in accordance with Annex I to this Regulation.

Article 2

Annex I to Commission Regulation (EU) No 1014/2010 [2] is amended in accordance with Annex II to this Regulation.

Article 3

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.

Done at Brussels, 6 June 2017.

For the Commission
The President
Jean-Claude JUNCKER

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[1]   Commission Regulation (EC) No 692/2008 of 18 July 2008 implementing and amending 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 (OJ L 199, 28.7.2008, p. 1).
[2]   Commission Regulation (EU) No 1014/2010 of 10 November 2010 on monitoring and reporting of data on the registration of new passenger cars pursuant to Regulation (EC) No 443/2009 of the European Parliament and of the Council (OJ L 293, 11.11.2010, p. 15).

ANNEX I

Annex I to Implementing Regulation (EU) 2017/1153 is amended as follows:

(1) point 2.1.2 is replaced by the following:

'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 (*):

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 (**). The Commission shall publish guidance on the procedure to follow for such requests.

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(*) Any up-dates of the mailbox address will be made available on the website.
(**) Electronic signing keys to be provided by the European Commission Joint Research Centre';

(2) in point 2.2, points (a) and (b) are replaced by the following:

'(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.';

(3) point 2.3.1 is replaced by the following:

'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 (*);

MRO is the mass in running order as defined in Article 2(4)(a) of Commission Regulation (EU) No 1230/2012 (**) 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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(*) 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).
(**) 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.)';

(4) points 2.3.5 and 2.3.6 are replaced by the following:

'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:

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.';

(5) in point 2.3.8.1 the following two paragraphs are added:

'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.';

(6) point 2.3.8.2 is replaced by the following:

'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;
$T_{0n,i}$, $T_{2n,i}$, 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:

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

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

(iii) Effect of the inertia of rotating parts:

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

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

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

(iv) Effect of different tyre tread depth:

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

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

(v) Effect of preconditioning:

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

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

(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:

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

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;

(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 m²;

$A_{f,R}$ is the frontal area of vehicle R in m².

(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:

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

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 m²;

$A_{f,R}$ is the frontal area of vehicle R in m².

(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.

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.';

(7) in section 2.4, Table 1 is amended as follows:

(a) in the row for entry 30 ('Vehicle inertia NEDC') the reference in the column 'Source' is replaced by the following:

'Table 3 of Annex 4a to UN/ECE Regulation No 83. *To be completed by the type approval authority or Technical Service*';

(b) the row for entry 34 is replaced by the following:

'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'

(c) in the row for entry 59 ('WLTP Engine Coolant Temperature') the reference in the column 'Remarks' is replaced by the following:

'Array: OBD Data, 1hz, 1 °C resolution';

(d) the rows for entries 63 to 66 are replaced and row 67 is added as follows:

'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.'

(8) in point 3.1, the second paragraph is replaced by the following:

'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.';

(9) points 3.1.1, 3.1.2 and 3.1.3 are replaced by the following:

'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.

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:

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

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.';

(10) point 3.2.6 is replaced by the following:

'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.';

(11) in point 3.2.8, the second paragraph is replaced by the following:

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

(12) points 3.3.1, 3.3.2 and 3.3.3 are replaced by the following:

'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 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.';

(13) the following point 4.2.1.4a is inserted:

'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:

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

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.';

(14) in point (a) of section 5, the words 'correlation tool output report' is replaced by the words 'complete correlation file'.

ANNEX II

In Annex I to Regulation (EU) No 1014/2010, in the table 'Data Sources' the following row is added:

'Vehicle family identification number		Point 5.0 of Annex XXI to Commission Regulation (EU) 2017/1151 (*)

(*) 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 re-pealing Regulation (EC) No 692/2008 (OJ L 175, 7.7.2017, p. 1).'