DECISIONS

COMMISSION IMPLEMENTING DECISION (EU) 2020/1339

of 23 September 2020

on the approval pursuant to Regulation (EU) 2019/631 of the European Parliament and of the Council of efficient vehicle exterior lighting using light emitting diodes as an innovative technology for reducing CO_2 emissions from certain light commercial vehicles in relation to the Worldwide Harmonised Light Vehicle Test Procedure

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

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

Having regard to Regulation (EU) 2019/631 of the European Parliament and of the Council of 17 April 2019 setting CO_2 emission performance standards for new passenger cars and for new light commercial vehicles, and repealing Regulations (EC) No 443/2009 and (EU) No 510/2011 ([1]), and in particular Article 11(4) thereof,

Whereas:

(1) On 19 December 2019, the manufacturers Toyota Motor Europe NV/SA, Opel Automobile GmbH-PSA, FCA Italy S.p.A., Automobiles Citroën, Automobiles Peugeot, PSA Automobiles SA, Audi AG, Ford-Werke GmbH, Jaguar Land Rover Ltd., Hyundai Motor Europe Technical Center GmbH, Škoda Auto a.s., BMW AG, Renault SA, Honda Motor Europe Ltd, Volkswagen AG and Volkswagen AG Nutzfahrzeuge submitted a joint application ('the application') in accordance with Article 11 of Regulation (EU) 2019/631 for the approval of efficient vehicle exterior lighting using light emitting diodes ('efficient exterior LED light') as an innovative technology for reducing CO_2 emissions from internal combustion engine powered light commercial vehicles capable of running on petrol, diesel and certain alternative fuels.

(2) On 20 February 2020, Renault SA, on behalf of the applicants, submitted an additional application concerning the use of the technology in certain not-off vehicle charging hybrid electric vehicles ('NOVC-HEV') of category N_1. Considering that the additional application refers to the same innovative technology and that the same conditions apply for its use in the vehicle categories concerned, it is appropriate to address both the application and the additional application in one decision.

(3) The application refers to CO_2 emission savings that cannot be demonstrated by measurements performed in accordance with World Harmonised Light Vehicles Test Procedure ('WLTP') as set out in Commission Regulation (EU) 2017/1151 ([2]).

(4) The application has been assessed in accordance with Article 11 of Regulation (EU) 2019/631, Commission Implementing Regulation (EU) No 427/2014 ([3]) as well as with the 'Technical Guidelines for the preparation of applications for the approval of innovative technologies pursuant to Regulation (EC) No 443/2009 and Regulation (EU) No 510/2011' (July 2018 Revision (V2)) ([4]). In accordance with Article 11(3) of Regulation (EU) 2019/631, the application was accompanied by verification reports undertaken by an independent and certified body.

([1]) OJ L 111, 25.4.2019, p. 13.

([2]) 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 Commission Regulation (EC) No 692/2008 (OJ L 175, 7.7.2017, p. 1).

([3]) Commission Implementing Regulation (EU) No 427/2014 of 25 April 2014 establishing a procedure for the approval and certification of innovative technologies for reducing CO_2 emissions from light commercial vehicles pursuant to Regulation (EU) No 510/2011 of the European Parliament and of the Council (OJ L 125, 26.4.2014, p. 57).

([4]) https://circabc.europa.eu/sd/a/a19b42c8-8e87-4b24-a78b-9b70760f82a9/July%202018%20Technical%20Guidelines.pdf

(5) The use of certain efficient exterior LED lights has already been approved for passenger cars by Commission Implementing Decisions 2014/128/EU ([5]), (EU) 2015/206 ([6]), (EU) 2016/160 ([7]) and (EU) 2016/587 ([8]) referring to the New European Driving Cycle (NEDC) and by Commission Implementing Decision (EU) 2019/1119 ([9]) referring to the WLTP ('past approval Implementing Decisions') as an innovative technology capable of reducing CO_2 emissions in a way that is not covered by the measurements performed as part of the NEDC, respectively the WLTP.

(6) Based on the experience gained from the past approval Implementing Decisions as well as on the reports and information provided with the application, it has been satisfactorily and conclusively demonstrated that an efficient exterior LED light or appropriate combinations thereof meet the eligibility criteria referred to in Article 11 of Regulation (EU) 2019/631 and Implementing Regulation (EU) No 427/2014 and provide a reduction in CO_2 emissions of at least 0,5 g CO_2/km as compared to the same set of baseline exterior lights.

(7) In addition to the exterior vehicle lighting for which the use of efficient LED lights has already been approved as an innovative technology in the past approval Implementing Decisions, the application also refers to end-outline marker and side marker lights. As those lights are not turned on during the measurements performed as part of the WLTP test, it is also appropriate to approve the use of efficient exterior LED lights in those lights.

(8) The application sets out a methodology for determining the CO_2 savings from the use of efficient exterior LED lights in a range of vehicle lights for use in light commercial vehicles powered by internal combustion engines as well as in certain NOVC-HEVs of category N_1 that are capable of running on petrol, diesel, liquefied petroleum gas (LPG), compressed natural gas (CNG) or E85.

(9) In view of the limited availability of E85 on the Union market as a whole, it is not considered justified to distinguish this fuel from petrol for the purpose of the testing methodology.

(10) The applicants have provided studies supporting that the usage patterns of light commercial vehicles and of passenger cars, with regard to the use of exterior vehicle lighting, are sufficiently similar to allow the methodology set out in Implementing Decision (EU) 2019/1119 to be applied also for light commercial vehicles.

(11) With regard to the cornering lamps and static bending lamps, the applicants have, however, proposed to include specific usage factors that are different from those included in the methodology set out in Implementing Decision (EU) 2019/1119. The usage factors proposed by the applicants for those lights can be considered more conservative than those set out in Implementing Decision (EU) 2019/1119 and it is therefore considered appropriate to include those new usage factors in the testing methodology in this Decision. Moreover, end-outline marker lights and side marker lights were not covered in Implementing Decision (EU) 2019/1119 and usage factors and power consumption values for those lights should therefore be added.

(12) Taking into account those additions, the testing methodology set out in Implementing Decision (EU) 2019/1119 should be considered appropriate for determining the CO_2 savings from the use of the innovative technology in light commercial vehicles.

([5]) Commission Implementing Decision 2014/128/EU of 10 March 2014 on the approval of the light emitting diodes low beam module 'E-Light' as an innovative technology for reducing CO_2 emissions from passenger cars pursuant to Regulation (EC) No 443/2009 of the European Parliament and of the Council (OJ L 70, 11.3.2014, p. 30).

([6]) Commission Implementing Decision (EU) 2015/206 of 9 February 2015 on the approval of the Daimler AG efficient exterior lighting using light emitting diodes as an innovative technology for reducing CO_2 emissions from passenger cars pursuant to Regulation (EC) No 443/2009 of the European Parliament and of the Council (OJ L 33, 10.2.2015, p. 52).

([7]) Commission Implementing Decision (EU) 2016/160 of 5 February 2016 on the approval of the Toyota Motor Europe efficient exterior lighting using light emitting diodes as an innovative technology for reducing CO_2 emissions from passenger cars pursuant to Regulation (EC) No 443/2009 of the European Parliament and of the Council (OJ L 31, 6.2.2016, p. 70).

([8]) Commission Implementing Decision (EU) 2016/587 of 14 April 2016 on the approval of the technology used in efficient vehicle exterior lighting using light emitting diodes as an innovative technology for reducing CO_2 emissions from passenger cars pursuant to Regulation (EC) No 443/2009 of the European Parliament and of the Council (OJ L 101, 16.4.2016, p. 17).

([9]) Commission Implementing Decision (EU) 2019/1119 of 28 June 2019 on the approval of efficient vehicle exterior lighting using light emitting diodes for use in internal combustion engine vehicles and non-externally chargeable hybrid electrified vehicles as an innovative technology for reducing CO_2 emissions from passenger cars pursuant to Regulation (EC) No 443/2009 of the European Parliament and of the Council (OJ L 176, 1.7.2019, p. 67).

(13) The efficient exterior LED lights should be used in internal combustion engine powered light commercial vehicles, or in NOVC-HEVs of category N_1 for which uncorrected measured fuel consumption and CO_2 emission values may be used in accordance with paragraph 1.1.4 of Appendix 2 to Sub-annex 8 to Annex XXI to Regulation (EU) 2017/1151.

(14) Manufacturers should have the possibility to apply to a type-approval authority for the certification of CO_2 savings from the use of efficient exterior LED lights where the conditions laid down in this Decision are met. Manufacturers should for that purpose ensure that the application for certification is accompanied by a verification report from an independent and certified body confirming that the innovative technology complies with the conditions laid down in this Decision and that the savings have been determined in accordance with the testing methodology set out in the Annex to this Decision.

(15) In order to facilitate a wider deployment of the innovative technology in new vehicles, a manufacturer should also have the possibility to submit a single application for the certification of the CO_2 savings from several efficient exterior LED lights. It is, however, appropriate to ensure that where this possibility is used a mechanism is applied that incentivises the deployment of only those efficient exterior LED lights that offer the highest efficiency.

(16) It is the responsibility of the type-approval authority to verify thoroughly that the conditions for certifying the CO_2 savings from the use of an innovative technology as specified in this Decision are met. Where the certification is granted, the responsible type-approval authority should ensure that all elements considered for the certification are recorded in a test report and kept together with the verification report and that this information is made available to the Commission on request.

(17) For the purpose of determining the general eco-innovation code to be used in the relevant type-approval documents in accordance with Annexes I, VIII and IX to Directive 2007/46/EC of the European Parliament and of the Council ([10]), it is necessary to attribute an individual code to the innovative technology.

(18) From 2021, manufacturers' compliance with their specific CO_2 emission targets is to be established on the basis of the CO_2 emissions determined in accordance with the WLTP. CO_2 savings from the innovative technology certified by reference to this Decision may therefore be taken into account for the calculation of manufacturers' average specific CO_2 emissions starting from that year,

HAS ADOPTED THIS DECISION:

Article 1

Innovative technology

The use of efficient light emitting diodes in vehicle exterior lighting ('efficient exterior LED light') is approved as an innovative technology within the meaning of Article 11 of Regulation (EU) 2019/631 for use in light commercial vehicles powered by an internal combustion engine that are capable of running on petrol, diesel, liquefied petroleum gas (LPG), compressed natural gas (CNG) or E85, or a combination of those fuels, as well as in not-off-vehicle charging hybrid electric vehicles (NOVC-HEVs) of category N_1 for which uncorrected measured fuel consumption and CO_2 emission values may be used in accordance with paragraph 1.1.4 of Appendix 2 to Sub-Annex 8 to Annex XXI to Regulation (EU) 2017/1151 and that are capable of running on those same fuels or a combination thereof, where the innovative technology is used in one or several of the following exterior vehicle lights:

(a) low beam headlamp (including adaptive front lighting system);

(b) high beam headlamp;

(c) front position lamp;

(d) front fog lamp;

(e) rear fog lamp;

(f) front turn signal lamp;

(g) rear turn signal lamp;

([10]) 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 (Framework Directive) (OJ L 263, 9.10.2007, p. 1).

(h) licence plate lamp;

(i) reversing lamp;

(j) cornering lamp;

(k) static bending light lamp;

(l) end-outline marker light;

(m) side marker light.

Article 2

Application for certification of CO_2 savings

1. A manufacturer may apply to a type-approval authority for certification of the CO_2 savings from the use of one or several efficient exterior LED lights by reference to this Decision.

2. The manufacturer shall ensure that the application for the certification is accompanied by a verification report from an independent and certified body confirming that the conditions set out in Article 1 have been met.

3. Where the savings have been certified in accordance with Article 3, the manufacturer shall ensure that the certified CO_2 savings and the eco-innovation code referred to in Article 4(1) are recorded in the certificate of conformity of the vehicles concerned.

Article 3

Certification of CO_2 savings

1. The type-approval authority shall ensure that the CO_2 savings achieved from the use of the innovative technology have been determined using the methodology set out in the Annex.

2. Where a manufacturer applies for the certification of the CO_2 savings from more than one efficient exterior LED light referred to in Article 1 in relation to one vehicle version, the type approval authority shall determine which of the efficient exterior LED lights tested delivers the lowest CO_2 savings, and record the lowest value in the relevant type approval documentation.

3. The type approval authority shall record the certified CO_2 savings determined in accordance with paragraphs 1 and 2 of this Article, and the eco-innovation code referred to in Article 4(1) in the relevant type-approval documentation.

4. Where the innovative technology is fitted in a bi-fuel or flex-fuel vehicle, the approval authority shall record the CO_2 savings as follows:

(a) for bi-fuel vehicles using petrol and gaseous fuels, the CO_2 savings with regard to LPG or CNG fuels;

(b) for flex-fuel vehicles using petrol and E85, the CO_2 savings with regard to petrol.

5. The type-approval authority shall record all the elements considered for the certification in a test report and keep that together with the verification report referred to in Article 2(2), and shall make that information available to the Commission on request.

6. The type-approval authority shall only certify CO_2 savings, if it finds that the innovative technology complies with the conditions set out in Article 1 of this Decision, and if the CO_2 savings achieved are 0,5 g CO_2/km or higher, as specified in Article 9(1)(b) of Implementing Regulation (EU) No 427/2014.

Article 4

Eco-innovation code

1. The innovative technology approved by this Decision is attributed with the eco-innovation code 35.

2. The certified CO_2 savings recorded by reference to the eco-innovation code referred to in paragraph 1 may be taken into account for the calculation of the average specific emissions of manufacturers starting from the calendar year 2021.

Article 5

Entry into force

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

Done at Brussels, 23 September 2020.

For the Commission
The President
Ursula VON DER LEYEN

ANNEX

Methodology to determine the CO_2 savings of Efficient Exterior LED Lights for use in certain light commercial vehicles

1. INTRODUCTION

This Annex sets out the methodology to determine the carbon dioxide (CO_2) emission savings to be attributed to the use of efficient vehicle exterior LED lights in one or several of the exterior vehicle lights listed in Article 1, for use in the light commercial vehicles referred to in that Article.

2. TESTING CONDITIONS

In the case of NOVC-HEVs, the maximum available voltage level on board shall not exceed 60 Volt.

The testing conditions shall fulfil the requirements of UN/ECE Regulations Nos 4 ([1]), 6 ([2]), 7 ([3]), 19 ([4]), 23 ([5]), 38 ([6]), 48 ([7]), 91 ([8]), 100 ([9]), 112 ([10]), 119 ([11]) and 123 ([12]). The power consumption shall be determined in accordance with point 6.1.4 of UN/ECE Regulation No 112, and points 3.2.1 and 3.2.2 of Annex 10 to that Regulation.

For the low beam adaptive front lighting system (AFS) falling within at least two of the Classes C, E, V or W as defined in Table 1 of UN/ECE Regulation No 123, the power consumption measurements shall be done at the LED intensity of each class (P_k), where k corresponds to each class specified at Table 1 as defined in UN/ECE Regulation No 123.

If it is agreed with the technical service that Class C is the representative/average LED intensity for the vehicle application, power consumption measurements shall be done in the same way as for any other exterior LED light included in the combination.

Table 1

Classes of Low beam AFS

Class	See point 1.3 and footnote 2 of UN/ECE Regulation No 123	% LED Intensity	Activation Mode (*)
C	Base Passing Beam (Country)	100	50 km/h < speed < 100 km/h Or when no mode of another passing beam class is activated (V, W, E)
V	Town	85	Speed < 50 km/h
E	Motorway	110	Speed > 100 km/h
W	Adverse Conditions	90	Windshield wiper active > 2 minutes

(*) Activation speeds shall be checked for each vehicle application in accordance with UN/ECE Regulation No 48 Section 6, Chapter 6.22, paragraphs 6.22.7.4.1 (class C), 6.22.7.4.2 (class V), 6.22.7.4.3 (class E), 6.22.7.4.4 (class W).

2.1. **Test equipment**

The following test equipment shall be used:

(a) a power supply unit (i.e. variable voltage supplier);

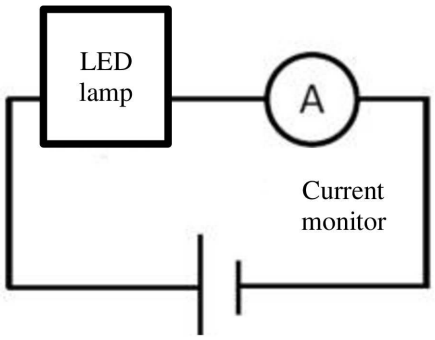
(b) two digital multimeters, one for measuring the DC-current, and the other for measuring the DC-voltage.

([1]) OJ L 4, 7.1.2012, p. 17.
([2]) OJ L 213, 18.7.2014, p. 1.
([3]) OJ L 285, 30.9.2014, p. 1.
([4]) OJ L 250, 22.8.2014, p. 1.
([5]) OJ L 237, 8.8.2014, p. 1.
([6]) OJ L 148, 12.6.2010, p. 55.
([7]) OJ L 323, 6.12.2011, p. 46.
([8]) OJ L 164, 30.6.2010, p. 69.
([9]) OJ L 302, 28.11.2018, p. 114.
([10]) OJ L 250, 22.8.2014, p. 67.
([11]) OJ L 89, 25.3.2014, p. 101.
([12]) OJ L 222, 24.8.2010, p. 1.

Figure 1 shows a possible test set-up, with the DC-voltage meter integrated in the power supply unit.

Figure 1

Illustration of test set-up



2.2. **Determination of the power savings**

2.2.1. *Measurement of the power consumption*

For each efficient exterior LED light included in a combination, the measurement of the current shall be performed at a voltage of 13,2 V. LED module(s) operated by an electronic light source control gear, shall be measured as specified by the applicant.

The manufacturer may request that additional measurements of the current shall be performed at other voltages, where the necessity to do so can be demonstrated on the basis of verified documentation.

In any case the measurements (n) shall be performed for each voltage at least five times consecutively. The applied voltage and the measured current shall be recorded in four decimals.

The power consumption shall be determined by multiplying the voltage with the measured current. The average of the power consumption for each efficient exterior LED light ($\overline{P_{EI_i}}$) [W] shall be calculated as set out in Formula 1 with four decimals to be taken into account in the calculations. When a stepper motor or electronic controller is used for the supply of the electricity to the LED lamps, then the electric load of this component is to be excluded from the measurement.

Formula 1

$$\overline{P_{EI_i}} = \frac{\sum_{j=1}^{n} \left(V_{EI_{ij}} \cdot I_{EI_{ij}} \right)}{n}$$

where:

$V_{EI_{ij}}$ is the tested voltage of each LED vehicle light i [V]

$I_{EI_{ij}}$ is the measured current of each LED vehicle light i [A]

n is the number of measurements of the sample

j refers to an individual measurement of power consumption

In case of low beam AFS, the power consumption ($P_{EI_{AFS}}$) [W] shall be calculated as the average of the LED power consumption for each class k, weighted according to the WLTP time share per speed range, in accordance with Formula 2.

Formula 2

$$P_{EI_{AFS}} = \sum_{k=1}^{K} WLTP\_share \cdot \overline{P_k}$$

where:

$\overline{P_k}$ is the power consumption at the LED intensity for each class k as the average of n consecutive measurements [W]

K is the number of classes associated with the low beam AFS.

WLTP_share is the WLTP time share per speed range in each class as defined in Table 2.

Table 2

WLTP time share per speed range

Speed range	WLTP_share
< 50 km/h	0,588
50 – 100 km/h	0,311
> 100 km/h	0,101

When the low beam AFS does not fall within all four classes specified in Table 1, the WLTP_share of the missing classes shall be attributed to class C.

2.2.2. *Calculation of the power savings*

The power savings of each efficient exterior LED light (ΔP_i) [W] shall be calculated in accordance with Formula 3.

Formula 3

$$\Delta P_i = P_{B_i} - \overline{P_{EI_i}}$$

where:

P_{B_i} is the power consumption of the baseline vehicle light i [W]

$\overline{P_{EI_i}}$ is the average power consumption of the eco-innovative vehicle light i [W].

The power consumption of the different baseline vehicle lights is defined in Table 3.

Table 3

Power consumption for different baseline vehicle lights

Vehicle light	Power consumption P_B [W]
Low beam headlamp	137
High beam headlamp	150
Front position	12
Licence plate	12
Front fog lamp	124
Rear fog lamp	26

Vehicle light	Power consumption P_B [W]
Front turn signal lamp	13
Rear turn signal lamp	13
Reversing lamp	52
Cornering lamp	44
Static Bending lamp	44
End-outline marker lamp (vehicles width > 2,1 m)	12
Side marker lamp (vehicles length > 6 m)	24

3. CALCULATION OF THE CO_2 SAVINGS

The CO_2 savings shall be calculated in accordance with Formula 4.

Formula 4

$$C_{CO_2} = \left(\sum_{i=1}^{m} \Delta P_i \cdot UF_i\right) \cdot \frac{V_{Pe}}{\eta_A} \cdot \frac{CF}{v}$$

where:

v is the mean driving speed of the WLTP, which is 46,6 km/h

η_A is the efficiency of the alternator, which is 0,67

UF_i is the usage factor of the vehicle light i as defined in Table 4

V_{Pe} is the consumption of effective power for each fuel approved, as defined in Table 5

CF is the fuel conversion factor as defined in Table 6.

Table 4

Usage factor for different vehicle lights

Vehicle light	Usage factor (UF)
Low beam headlamp	0,33
High beam headlamp	0,03
Front position	0,36
Licence plate	0,36
Front fog lamp	0,01
Rear fog lamp	0,01
Front turn signal lamp	0,15
Rear turn signal lamp	0,15
Reversing lamp	0,01
Cornering lamp	0,019
Static Bending lamp	0,039
End-outline marker lamps (width > 2,1 m)	0,36
Side marker lamps (length > 6 m)	0,36

Table 5

Consumption of effective power

Type of Engine	Consumption of effective power V_{Pe} [l/kWh]
Petrol/E85	0,264
Petrol/E85 Turbo	0,280
Diesel	0,220
LPG	0,342
LPG Turbo	0,363
	Consumption of effective power V_{Pe} [m^3/kWh]
CNG (G20)	0,259
CNG (G20) Turbo	0,275

Table 6

Fuel Conversion Factor

Type of fuel	Conversion factor (CF) [g CO_2/l]
Petrol/E85	2 330
Diesel	2 640
LPG	1 629
	Conversion factor (CF) [g CO_2/m^3]
CNG (G20)	1 795

4. CALCULATION OF THE UNCERTAINTY OF THE CO_2 SAVINGS

4.1. **General methodology**

The uncertainty of the CO_2 savings ($s_{C_{CO_2}}$) [W] shall be calculated in accordance with Formula 5 and shall not exceed 30 % of the CO_2 savings.

Formula 5

$$s_{C_{CO_2}} = \frac{V_{Pe} \cdot CF}{\eta_A \cdot v} \cdot \sqrt{\sum_{i=1}^{m} \left(UF_i \cdot s_{\overline{P_{EI_i}}} \right)^2}$$

where:

m is the number of exterior LED lights in the combination tested.

$s_{\overline{P_{EI_i}}}$ is the statistical margin of the power consumption of each i-th LED light fitted in the eco-innovative vehicle which shall be calculated in accordance with Formula 6.

Formula 6

$$s_{\overline{P_{EI_i}}} = \sqrt{\frac{\sum_{j=1}^{n}\left(P_{EI_{i_j}} - \overline{P_{EI_i}}\right)^2}{n(n-1)}}$$

In case of a low beam AFS the statistical margin of the power consumption ($s_{\overline{P_{EI_{AFS}}}}$) [W] shall instead be calculated in accordance with Formulas 7 and 8.

Formula 7

$$s_{\overline{P_k}} = \sqrt{\frac{\sum_{j=1}^{n}\left(P_{c_j} - \overline{P_k}\right)^2}{n(n-1)}}$$

Formula 8

$$s_{\overline{P_{EI_{AFS}}}} = \sqrt{\sum_{k=1}^{K}\left(WLTP\_share \cdot s_{\overline{P_k}}\right)^2}$$

where:

n is the number of power consumption measurements, which is at least 5 as indicated in Section 2.2.1

i corresponds to each vehicle light

j refers to an individual measurement of power consumption

$\overline{P_k}$ is the average of the n values of P_k

K is the number of classes associated with the low beam AFS.

5. ROUNDING

The CO_2 savings (C_{CO_2}) and the uncertainty of the CO_2 savings ($s_{C_{CO_2}}$) shall be rounded to two decimal places.

Each value used in the calculation of the CO_2 savings shall either be applied unrounded or be rounded to the minimum number of decimal places which allows the maximum total impact (i.e. combined impact of all rounded values) on the savings to be lower than 0,25 g CO_2/km.

6. CHECK AGAINST THE MINIMUM CO_2 SAVINGS THRESHOLD

The type-approval authority shall ensure for each version of a vehicle fitted with the efficient exterior LED lights that the minimum threshold criterion as specified in Article 9(1)(b) of Implementing Regulation (EU) No 427/2014 is met.

When verifying whether the minimum threshold criterion is met, the type-approval authority shall take into account, in accordance with Formula 9, the CO_2 savings determined in point 3 and the uncertainty determined in point 4.

Formula 9

$$C_{CO_2} - s_{C_{CO_2}} \geq MT$$

where:

MT	is the minimum threshold equal to 1 g CO_2/km
C_{CO_2}	is the CO_2 savings [g CO_2/km] as defined in point 3
$s_{C_{CO_2}}$	is the uncertainty of the CO_2 savings calculated in accordance with point 4 [g CO_2/km].

7. CERTIFICATION OF THE CO_2 SAVINGS

The CO_2 savings to be certified by the type-approval authority in accordance with Article 11 of Implementing Regulation (EU) No 427/2014 (CS_{CO_2}) [g CO_2/km] are those calculated in accordance with Formula 10.

The CO_2 savings shall be recorded in the type approval certificate for each vehicle version fitted with the efficient exterior LED lights.

Formula 10

$$CS_{CO_2} = \left(C_{CO_2} - s_{C_{CO_2}}\right)$$

where:

C_{CO_2}	is the CO_2 savings as determined in point 3 [g CO_2/km]
$s_{C_{CO_2}}$	is the uncertainty of the CO_2 savings calculated in accordance with point 4 [g CO_2/km].