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

(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 emissions 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 Article 12(4) thereof,

Whereas:

(1) The manufacturer Daimler AG (the 'Applicant') submitted an application for the approval of efficient exterior lighting with the use of light emitting diodes (LEDs) as an innovative technology package on 14 November 2013. The completeness of the application was assessed in accordance with Article 4 of Commission Implementing Regulation (EU) No 725/2011 ([2]). The Commission identified certain relevant information as missing in the original application and requested the Applicant to complete it. The Applicant provided the required information on 14 May 2014. The application was found to be complete and the period for the Commission's assessment of the application started on the day following the date of official receipt of the complete information, i.e. 15 May 2014.

(2) The application has been assessed in accordance with Article 12 of Regulation (EC) No 443/2009, Implementing Regulation (EU) No 725/2011 and the Technical Guidelines for the preparation of applications for the approval of innovative technologies pursuant to Regulation (EC) No 443/2009 (the Technical Guidelines) ([3]).

(3) The application refers to efficient exterior lighting with the use of light emitting diodes in the low beam headlamp, the high beam headlamp, the front position, and the licence plate. This technology package is similar to the innovative technologies approved as an eco-innovation in Commission Implementing Decisions 2013/128/EU ([4]) and 2014/128/EU ([5]). It should also be noted that the application by Daimler AG is based on the simplified approach described in the Technical Guidelines as the application previously approved by Implementing Decision 2014/128/EU, whereas the application approved by Implementing Decision 2013/128/EU was based on the comprehensive approach.

(4) The Commission finds that the information provided in the application demonstrates that the conditions and criteria referred to in Article 12 of Regulation (EC) No 443/2009 and in Articles 2 and 4 of Implementing Regulation (EU) No 725/2011 have been met.

(5) The Applicant has demonstrated that the use of the LEDs in the low beam headlamp, the high beam headlamp, the front position, and the licence plate did not exceed 3 % of the new passenger cars registered in the reference year 2009. In support of this the Applicant has referred to the Technical Guidelines, which provides for the summary of the CLEPA LIGHT Sight Safety report. The Applicant has used predefined functions and averaged data in line with the simplified approach specified in the Technical Guidelines.

([1]) OJ L 140, 5.6.2009, p. 1.

([2]) Commission Implementing Regulation (EU) No 725/2011of 25 July 2011 establishing a procedure for the approval and certification of innovative technologies 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 194, 26.7.2011, p. 19).

([3]) http://ec.europa.eu/clima/policies/transport/vehicles/cars/docs/guidelines_en.pdf

([4]) Commission Implementing Decision 2013/128/EU of 13 March 2013 on the approval of the use of light emitting diodes in certain lighting functions of an M1 vehicle 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, 14.3.2013, p. 7).

([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) The Applicant has in accordance with the simplified approach described in the Technical Guidelines used halogen lighting as baseline technology for demonstrating the CO_2 reducing capacity of the efficient exterior lighting with the use of light emitting diodes in the low beam headlamp, the high beam headlamp, the front position, and the licence plate.

(7) The Applicant has provided a methodology for testing the CO_2 reductions which includes formulae that are consistent with the formulae described in the Technical Guidelines for the simplified approach with regard to lighting functions. Considering that the Applicant has applied for an innovative technology package of efficient exterior lighting with the use of LEDs, the Commission finds it appropriate to modify the formulae for the calculation of CO_2 savings to reflect the total CO_2 savings of the lighting package. As a consequence, the methodology specified in the Annex to the decision differs in some essential elements from that approved by Implementing Decision 2014/128/EU. The Commission considers that the testing methodology will provide testing results that are verifiable, repeatable and comparable and that it is capable of demonstrating in a realistic manner the CO_2 emissions benefits of the innovative technology with strong statistical significance in accordance with Article 6 of Implementing Regulation (EU) No 725/2011.

(8) Against that background the Commission finds that the Applicant has demonstrated satisfactorily that the emission reduction achieved by the innovative technology is at least 1 g CO_2/km.

(9) Since the activation of the exterior lighting is not required for the CO_2 emissions type approval test referred to in Regulation (EC) No 715/2007 of the European Parliament and of the Council ([1]) and Commission Regulation (EC) No 692/2008 ([2]), the Commission is satisfied that the lighting functions in question are not covered by the standard test cycle.

(10) The activation of the lighting functions concerned is mandatory to ensure the safe operation of the vehicle and as a consequence not dependant on the choice of the driver. On that basis the Commission finds that the manufacturer should be considered accountable for the CO_2 emission reduction due to the use of the LEDs.

(11) The Commission finds that the verification report has been prepared by TÜV NORD Mobilität GmbH & Co. KG which is an independent and certified body and that the report supports the findings set out in the application.

(12) Against that background, the Commission finds that no objections should be raised as regards the approval of the innovative technology in question.

(13) Any manufacturer wishing to benefit from a reduction of its average specific CO_2 emissions for the purpose of meeting its specific emissions target by means of the CO_2 savings from the use of the innovative technology approved by this Decision, should in accordance with Article 11(1) of Implementing Regulation (EU) No 725/2011, refer to this Decision in its application for an EC type-approval certificate for the vehicles concerned.

(14) For the purposes 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 ([3]), the individual code to be used for the innovative technology approved through this Decision should be specified.

(15) The period for the assessment of the innovative technology referred to in Article 10(2) of Implementing Regulation (EU) No 725/2011 is due to expire. It is therefore appropriate that the Decision enters into force as soon as possible,

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([1]) Regulation (EC) No 715/2007 of the European Parliament and of the Council of 20 June 2007 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 171, 29.6.2007, p. 1).

([2]) 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).

([3]) 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).

HAS ADOPTED THIS DECISION:

Article 1

1. The efficient exterior lighting with the use of light emitting diodes (LEDs) intended for use in M1 vehicles is approved as an innovative technology within the meaning of Article 12 of Regulation (EC) No 443/2009.

2. The CO_2 emissions reduction from the use of the efficient exterior lighting with the use of light emitting diodes (LED) referred to in paragraph 1 shall be determined using the methodology set out in the Annex.

3. The individual eco-innovation code to be entered into type approval documentation to be used for the innovative technology approved through this Decision shall be '10'.

Article 2

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

Done at Brussels, 9 February 2015.

For the Commission
The President
Jean-Claude JUNCKER

ANNEX

1. **Testing methodology — Introduction**

In order to determine the CO_2 emission reductions that can be attributed to the efficient exterior lighting with the use of light emitting diodes (LED) in an M1 vehicle, it is necessary to establish the following:

(a) the testing conditions;

(b) the test procedure;

(c) the formulae for calculating the CO_2 savings;

(d) the formulae for calculating the standard deviation;

(e) the determination of the CO_2 savings for the certification by type approval authorities.

2. **Testing conditions**

The requirements of UN/ECE Regulation No 112 [1] on Uniform provisions concerning the approval of motor vehicle headlamps emitting an asymmetrical passing beam or a driving beam or both and equipped with filament lamps and/or light-emitting diode (LED) modules shall apply. For determining the power consumption, the reference is to be made to point 6.1.4 of Regulation No 112, and points 3.2.1 and 3.2.2 of Annex 10 to Regulation No 112.

3. **The testing procedure**

Measurements are to be performed as shown in figure 1. The following equipment is to be used:

— Two Digital Multi Meters, one for measuring the DC-current, and the other for measuring the DC-voltage.

— A power supply unit.

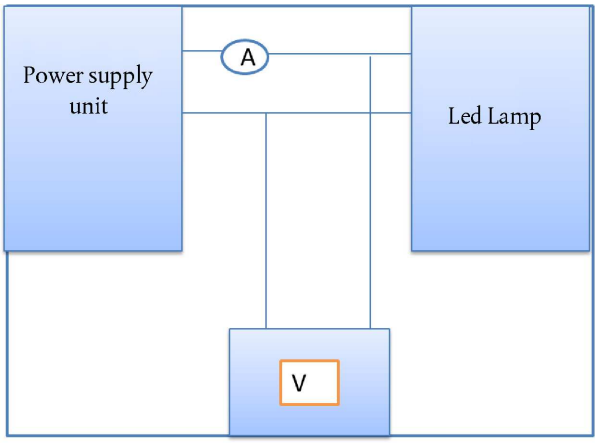

Figure 1

Test set-up

In total 5 measurements of the current should be done at the voltage of 12,8 V for the low and high beam headlamp and the front position, and 10,7 V for the licence plate.

The exact installed voltages and the measured current is to be recorded in four decimals.

4. **Formulae**

The following steps are to be taken to determine the CO_2 savings and to determine whether the threshold value of 1 g CO_2/km is met:

Step 1: Calculate the power savings;

Step 2: Calculate the CO_2 savings;

[1] E/ECE/324/Rev.2/Add.111/Rev.3 — E/ECE/TRANS/505/Rev.2/Add.111/Rev.3, 9 January 2013

Step 3: Calculate the error in the CO_2 savings;

Step 4: Verify the threshold value.

4.1. *Calculate the power savings*

For each of the 5 measurements the power which is used is to be calculated by multiplying the installed voltage with the measured current. 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 part is to be excluded from the measurement. This will result in 5 values. Each value must be expressed in 4 decimals. Then the mean value of the used power will be calculated, which is the sum of the 5 values for the power divided by 5.

The resulting power savings are to be calculated with the following formula:

Formula (1)

$$\Delta P = P_{baseline} - P_{eco\text{-}innovation}$$

Where:

ΔP: Power savings in W;

$P_{baseline}$: Power of the baseline;

$P_{eco\text{-}innovation}$: Mean value of the used power of the eco-innovation in W.

Table 1

Power requirements for different baseline type of lighting

Type of lighting	Total electric power [W]
Low beam headlamp	137
High beam headlamp	150
Front position	12
License plate	12

4.2. *Calculate the CO_2 savings*

The total CO_2 savings of the lighting package are to be calculated by Formulae (2) and (3).

For a petrol-fuelled vehicle:

Formula (2):

$$C_{CO_2} = (\sum_{j=1}^{m} \Delta P_j \cdot UF_j) \cdot V_{Pe-P}/\eta_A \cdot CF_P/v$$

For a diesel-fuelled vehicle:

Formula (3):

$$C_{CO_2} = (\sum_{j=1}^{m} \Delta P_j \cdot UF_j) \cdot V_{Pe-D}/\eta_A \cdot CF_D/v$$

These formulae present the total CO_2 savings of the lighting package in gCO_2/km.

The input data for the formulae (2) and (3) are:

ΔP_j: Saved electrical power in W of the type of lighting j, which is the result of step 1

UF_j: Usage factor of the type of lighting j, specified in table 2

m: a number of types of lightings in the innovative technology package

v: Mean driving speed of the NEDC, which is 33,58 km/h

V_{Pe-P}: Consumption of effective power for petrol-fuelled vehicles, which is 0,264 l/kWh

V_{Pe-D}: Consumption of effective power for diesel-fuelled vehicles, which is 0,22 l/kWh

η_A: Efficiency of the alternator, which is 0,67

CF_P: Conversion factor for petrol fuel, which is 2 330 gCO_2/l

CF_D: Conversion factor for diesel fuel, which is 2 640 gCO_2/l

Table 2

Usage factor for different type of lighting

Type of lighting	usage factor UF
Low beam headlamp	0,33
High beam headlamp	0,03
Front position	0,36
License plate	0,36

4.3. *Calculate the statistical error in the CO_2 savings*

The statistical error in the CO_2 savings is to be determined in two steps. In the first step the error value of the power is to be determined as a standard deviation being equivalent to a confidence interval of 68 %.

This is to be done by formula (4).

Formula (4):

$$\sigma_{\bar{x}} = \sqrt{\frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n(n-1)}}$$

Where:

$\sigma_{\bar{x}}$: Standard deviation of arithmetic mean [W];

x_i: Measurement value [W];

$\bar{x}$: Arithmetic mean [W];

n: Number of measurements, which is 5.

In order to calculate the error in the CO_2 savings for a petrol and diesel -fuelled vehicles, the propagation law, expressed in formula (5), is to be applied.

Formula (5):

$$\overline{\Delta C_{CO_2}} = \sqrt{\sum_{j=1}^{m} \left(\frac{\partial C_{CO_2}}{\partial P_j} \cdot \sigma_{P_j} \right)^2}$$

Where:

$\overline{\Delta C_{CO_2}}$: Mean total error of the CO_2 saving [gCO_2/km]

$\frac{\partial C_{CO_2}}{\partial P_j}$: Sensitivity of calculated CO_2 saving related to the type of lighting P_j

σ_{P_j}: Error of the type of lighting P_j [W]

m: a number of types of lightings in the innovative technology package

Substituting formula (2) in formula (5) results in formula (6) for calculating the error in CO_2 savings for petrol fuelled vehicles.

Formula (6):

$$\overline{\Delta C_{CO_2}} = 0{,}0273\ gCO_2/kmW \cdot \sqrt{\sum_{j=1}^{m} (UF_j \cdot \sigma_{P_j})^2}$$

Substituting formula (3) in formula (5) results in formula (7) for calculating the error in CO_2 savings for diesel fuelled vehicles.

Formula (7):

$$\overline{\Delta C_{CO_2}} = 0{,}0258\ gCO_2/kmW \cdot \sqrt{\sum_{j=1}^{m} (UF_j \cdot \sigma_{P_j})^2}$$

4.4. *Verify the threshold value*

In order to demonstrate that the 1,0 gCO_2/km threshold is exceeded with a statistic relevance, the following formula (8) should be used.

Formula (8):

$$MT = 1{,}0\ gCO_2/km \leq C_{CO_2} - \overline{\Delta C_{CO_2}}$$

Where:

MT: Minimum threshold [gCO_2/km],

C_{CO2}: Total CO_2 saving [gCO_2/km], which must be expressed in 4 decimals,

$\overline{\Delta C_{CO_2}}$: Mean total error of the CO_2 saving [gCO_2/km], which must be expressed in 4 decimals.

Where the total CO_2 emission savings of the innovative technology package, as a result of the calculation using Formula (8), are below the threshold specified in Article 9(1) of Implementing Regulation (EU) No 725/2011, the second subparagraph of Article 11(2) of that Regulation shall apply.