Commission Implementing Decision of 10 September 2013 on the approval of the Daimler engine compartment encapsulation system as an innovative technology for reducing CO2 emissions from new passenger cars pursuant to Regulation (EC) No 443/2009 of the European Parliament and of the Council (Text with EEA relevance) (2013/451/EU)

COMMISSION IMPLEMENTING DECISION

of 10 September 2013

on the approval of the Daimler engine compartment encapsulation system as an innovative technology for reducing CO_2 emissions from new passenger cars pursuant to Regulation (EC) No 443/2009 of the European Parliament and of the Council

(Text with EEA relevance)

(2013/451/EU)

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 Article 12(4) thereof,

Whereas:

(1) The manufacturer Daimler AG (the 'Applicant') submitted an application for the approval of an engine compartment encapsulation system as an innovative technology on 15 February 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 necessary information on 17 April 2013. The application was found to be complete and the period granted to the Commission for its assessment started on the day following the date of official receipt, i.e. 18 April 2013.

(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 an engine compartment encapsulation system which permits the reduction of heat loss after the vehicle is turned off by sealing the engine compartment and by the closing of grille openings by a radiator shutter. The stored heat yields a delayed cool-down of the powertrain. The fuel consumption and CO_2 emissions

of the vehicle after restarting is decreased due to lower friction caused by the higher powertrain temperature.

(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 market penetration in 2009 of engine compartment encapsulation systems of the kind described in the application did not exceed the threshold specified in Article 2(2)(a) of Implementing Regulation (EU) No 725/2011. This claim is also supported by the accompanying verification report. On that basis, the Commission finds that the engine compartment encapsulation provided by the Applicant should be considered as meeting the eligibility criterion set out in Article 2(2)(a) of Implementing Regulation (EU) No 725/2011.

(6) In order to determine the CO_2 savings that the innovative technology will deliver when fitted to a vehicle, it is necessary to define the baseline vehicle against which the efficiency of the vehicle equipped with the innovative technology should be compared, as provided for in Articles 5 and 8 of Implementing Regulation (EU) No 725/2011. The Commission finds that it is appropriate to consider the eco-innovation vehicle without an engine compartment encapsulation as an appropriate baseline technology.

(7) The Applicant has provided a comprehensive methodology for testing the CO_2 reductions. That methodology consists of roller bench tests to determine the Hot Start Benefit (HSB). That benefit occurs when the engine compartment encapsulation is implemented. It includes formulae that are consistent with the formulae described in the Technical Guidelines for the simplified approach with regard to engine compartment encapsulation. 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 effects of reduced engine cooling as a result of engine compartment encapsulation are not covered by the standard test cycle referred to in Regulation (EC) No 715/2007 of the European Parliament and of the Council[(4)] and Commission Regulation (EC) No 692/2008[(5)], the Commission is satisfied that the engine compartment encapsulation is not covered by the standard test cycle.

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

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

(12) 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,

HAS ADOPTED THIS DECISION:

Article 1

1 The Daimler engine compartment encapsulation system 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 Daimler engine compartment encapsulation system referred to in paragraph 1 shall be determined using the methodology set out in the Annex.

[F1]Article 2

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Textual Amendments

F1 Art. 2 omitted (31.12.2020) by virtue of The Road Vehicle Carbon Dioxide Emission Performance Standards (Cars and Vans) (Amendment) (EU Exit) Regulations 2019 (S.I. 2019/550), regs. 1, **8(2)**; 2020 c. 1, Sch. 5 para. 1(1)

Done at Brussels, 10 September 2013.

For the Commission

The President

José Manuel BARROSO

ANNEX

Methodology for determining the reduction in CO_2 emissions due to the use of the Daimler engine compartment encapsulation system in an M_1 vehicle

1. INTRODUCTION

In order to determine the CO_2 reductions that can be attributed to the use of the Daimler engine encapsulation system in an M_1 vehicle, it is necessary to establish the following:

(a) the testing procedure to be followed for determining the cool-down curves of the eco-innovation vehicle with and without an engine compartment encapsulation;

(b) the testing procedure to be followed to determine the Hot Start Benefit (HSB) of the eco-innovation vehicle;

(c) the formulae for calculating the variation coefficients;

(d) the formulae for calculating the CO_2 savings;

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

2. DETERMINING THE COOL-DOWN CURVES

The cool-down curves shall be determined experimentally for the baseline and the eco-innovation vehicle. The curves shall be applicable for vehicle variants with the same heat capacities, engine bay packaging and engine heat insulation as those available in the baseline and EI vehicle. The experimental test shall include continuous measurements of representative coolant temperatures by means of a thermocouple at a constant ambient temperature of at least 14 °C over 24 hours. The engine shall be heated up to the maximum coolant temperature before cut-off by a sufficient number of consecutive New European Driving Cycles (NEDC) as specified in point 3.

After preconditioning, for deactivation of all pumps and fans, the ignition shall be switched off and the dash key pulled out. The car's bonnet shall be closed completely. Any artificial ventilation systems inside the test cell shall be switched off. The resulting measurement curves shall be converged by the mathematical approach described by formula 1.

Formula 1:

$$T(t) = (T_0 - T_A) \times e^{(-d \times t)} + T_A$$

with:

T(t)	:	temperature over time [°C]
T_O	:	temperature of the operating engine [°C]
T_A	:	ambient temperature [°C]
d	:	decay constant [1/h]

The least squares method shall be used for the fitting of the two curves. To do that, the temperature measurement data of the first 20 minutes after engine cut-off is not to be considered because of the untypical behaviour of the coolant temperature after switching off the coolant system.

3. DETERMINING THE HOT START BENEFIT (HSB)

The HSB of the EI vehicle shall be determined experimentally. This value describes the difference of CO_2 emissions between a cold start and a hot start NEDC test in relation to the cold start result:

Formula 2:

$$\mathbf{HSB} = 1 - \frac{\mathrm{CO_2(hot)}}{\mathrm{CO_2(14\ ^\circ C)}}$$

with:

HSB	:	Hot Start Benefit
CO_2 (*hot*)	:	CO_2 emissions of hot start NEDC test [g CO_2/km]
CO_2 (14 °C)	:	CO_2 emissions of cold start NEDC test [g CO_2/km]

The coolant temperature at the beginning of the cold start test and the ambient temperature in the test cell shall not be below 14 °C. The hot start NEDC test shall be conducted following the cold start NEDC test. It is possible to perform one or two preconditioning NEDC tests between the cold start and the hot start NEDC test. It shall be ensured and documented that the state of charge (SOC) variation (for example, using his Controller Area Network signal) of the starter battery after each test is within 5 %. The complete test procedure shall be repeated at least two times. Arithmetic means of the cold start and of the hot start CO_2 results and the respective variation coefficients of the means shall be calculated. The complete test procedure shall be repeated as long as the variation coefficients of both arithmetic means are below 1 % (see point 4).

4. CALCULATING THE VARIATION COEFFICIENTS OF THE ARITHMETIC MEANS

The variation coefficients of the arithmetic means shall be calculated using the following formulae:

Formula 3:

$$c_v = s_{\bar{x}} / \bar{x}$$

c_v	:	variation coefficient;
$s_{\bar{x}}$	:	standard deviation of arithmetic mean [g CO_2/km];
$\bar{x}$	:	arithmetic mean [g CO_2/km];

and

Formula 4:

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

$s_{\bar{x}}$	:	standard deviation of arithmetic mean [g CO_2/km];
x_i	:	measurement value [g CO_2/km];
$\bar{x}$	:	arithmetic mean [g CO_2/km];
n	:	number of measurements.

5. FORMULAE FOR CALCULATING THE CO_2 SAVINGS

The relative CO_2 reduction potential $\Delta CO_2(t)$ for different parking times shall be calculated using formula 5 with the following input data:

— decay constant of the eco-innovation vehicle without an engine compartment encapsulation (baseline vehicle): $\mathbf{d_B}$ [1/h]. This value shall be calculated with formula 1;

— decay constant of eco-innovation vehicle with an engine compartment encapsulation: $\mathbf{d_E}$ [1/h]. This value shall be calculated with formula 1;
— Hot Start Benefit: **HSB.** This value shall be calculated with formula 2;
— parking time distribution (share of vehicle stops): **SVS**. Table 2 (below) shall be used;
— CO_2 type-approval value: $\mathbf{TA_{CO_2}}$ [g CO_2/km], i.e. CO_2 mass emissions combined.

Formula 5:

$$\Delta CO_2 = 1{,}443 \times \ln\left(\frac{e^{(-d_E \times t)}+1}{e^{(-d_E \times t)}+1}\right) \times HSB$$

The calculation results shall be given in the following Table 1:

TABLE 1

Relative CO_2 reduction potential $\Delta CO_2(t)$ for different parking times

Parking time [h]	0,5	1,5	2,5	3,5	4,5	5,5	6,5	7,5	8,5	9,5	10,5	11,5
ΔCO_2(t) [%]												
Parking time [h]	12,5	13,5	14,5	15,5	16,5	17,5	18,5	19,5	20,5	21,5	22,5	23,5
ΔCO_2(t) [%]												

The total CO_2 savings, weighted by the parking times (pt) shall be calculated using formula 6[6].

Formula 6:

$$C_{CO_2} = TA_{CO_2} \times \sum_{pt=1}^{24} \Delta CO_2(t)_{pt} \times SVS_{pt}$$

Where the values for parking time [h] and SVS [%] shall be those in Table 2:

TABLE 2

Parking time distribution (share of vehicle stops)

Parking time [h]	0,5	1,5	2,5	3,5	4,5	5,5	6,5	7,5	8,5	9,5	10,5	11,5
SVS [%]	36	13	6	4	2	2	1	1	3	4	3	1
Parking time [h]	12,5	13,5	14,5	15,5	16,5	17,5	18,5	19,5	20,5	21,5	22,5	23,5
SVS [%]	1	3	3	2	1	1	1	1	1	1	1	1

The CO_2 savings shall be the type-approval value (CO_2 mass emissions combined) multiplied by a factor of x[7]. The value of x is equal to the term

$$\sum \Delta CO_2(t)_{pt} \times SVS_{pt}$$

of formula 6.

Where an existing vehicle type is equipped with the innovative technology the following formula shall be used:

Formula 7:

$$C_{CO_2} = x * TA_{CO_2 \text{baseline vehicle}}$$

with:

C_{CO_2}	:	CO_2 savings [g CO_2/km]
$TA_{CO_2 \text{ baseline vehicle}}$	:	type-approval value of the eco-innovation vehicle without an engine compartment encapsulation [g CO_2/km]

Where the innovative technology is installed on a new vehicle type and the type-approval CO_2 value has been determined with the innovative technology installed, the following formula for calculating the CO_2 savings shall be used:

Formula 8:

$$C_{CO_2} = x / (1 - x) * TA_{CO_2 \text{new vehicle type}}$$

with:

C_{CO_2}	:	CO_2 savings [g CO_2/km]
$TA_{CO_2 \text{ new vehicle type}}$	:	type-approval value of the new vehicle type equipped with the innovative technology [g CO_2/km]

6. ECO-INNOVATION CODE TO BE ENTERED INTO TYPE-APPROVAL DOCUMENTATION

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[8], the individual code to be used for the innovative technology approved through this Decision shall be ‘3’.

F2 …

Textual Amendments

F2 Words in Annex para. 6 omitted (31.12.2020) by virtue of The Road Vehicle Carbon Dioxide Emission Performance Standards (Cars and Vans) (Amendment) (EU Exit) Regulations 2019 (S.I. 2019/550), regs. 1, **8(3)**; 2020 c. 1, Sch. 5 para. 1(1)

(**1**) OJ L 140, 5.6.2009, p. 1.

(**2**) Commission Implementing Regulation (EU) No 725/2011 of 25 July 2011 establishing a procedure for the approval and certification of innovative technologies for reducing CO_2 emissions from passenger cars (OJ L 194, 26.7.2011, p. 19).

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

(**4**) 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).

(**5**) 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).

(**6**) In this formula 6, TA_{CO_2} is the type-approval value for the baseline vehicle.

(**7**) In accordance with point 8.5 of the Technical Guidelines.

(**8**) 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).

Changes to legislation:
There are currently no known outstanding effects for the Commission Implementing Decision of 10 September 2013 on the approval of the Daimler engine compartment encapsulation system as an innovative technology for reducing CO2 emissions from new passenger cars pursuant to Regulation (EC) No 443/2009 of the European Parliament and of the Council (Text with EEA relevance) (2013/451/EU).