Regulation (EU) 2019/1242 of the European Parliament and of the Council of 20 June 2019 setting CO2 emission performance standards for new heavy-duty vehicles and amending Regulations (EC) No 595/2009 and (EU) 2018/956 of the European Parliament and of the Council and Council Directive 96/53/EC (Text with EEA relevance)

ANNEX I

Average specific CO_2 emissions, specific CO_2 emissions targets and excess CO_2 emissions

1. VEHICLE SUB-GROUPS

Each new heavy-duty vehicle shall be attributed to one of the vehicle sub-groups defined in Table 1 in accordance with the conditions set out therein.

TABLE 1

Vehicle sub-groups (sg)

Heavy-duty vehicles	Cab type	Engine power	Vehicle sub-group (sg)
Rigid lorries with axle configuration 4 × 2 and technically permissible maximum laden mass > 16 tonnes	All	< 170 kW	4-UD
	Day cab	≥ 170 kW	4-RD
	Sleeper cab	≥ 170 kW and < 265 kW	
	Sleeper cab	≥ 265 kW	4-LH
Rigid lorries with axle configuration 6 × 2	Day cab	All	9-RD
	Sleeper cab		9-LH
Tractors with axle configuration 4 × 2 and technically permissible maximum laden mass > 16 tonnes	Day cab	All	5-RD
	Sleeper cab	< 265 kW	
	Sleeper cab	≥ 265 kW	5-LH
Tractors with axle configuration 6 × 2	Day cab	All	10-RD
	Sleeper cab		10-LH

‘Sleeper cab’ means a type of cab that has a compartment behind the driver’s seat intended to be used for sleeping as reported in accordance with Regulation (EU) 2018/956.

‘Day cab’ means a type of cab that is not a sleeper cab.

If a new heavy-duty vehicle cannot be attributed to a vehicle sub-group because information on the cab type or engine power is not available, it shall be attributed to the long-haul (LH) vehicle sub-group corresponding to its chassis type (rigid lorry or tractor) and axle configuration (4 × 2 or 6 × 2).

Where a new heavy-duty vehicle is attributed to vehicle sub-group 4-UD, but data on the CO_2 emissions in g/km are not available for the UDL or UDR mission profiles as defined in Table 2 of point 2.1, the new heavy-duty vehicle shall be attributed to vehicle sub-group 4-RD.

2. AVERAGE SPECIFIC CO_2 EMISSIONS OF A MANUFACTURER

2.1. Specific CO_2 emissions of a new heavy-duty vehicle

The specific CO_2 emissions in g/km of a new heavy-duty vehicle *v* ($CO2_v$), attributed to the vehicle sub-group *sg* shall be calculated as follows:

$$CO2_v = \sum_{mp} W_{sg,mp} \times CO2_{v,mp}$$

where:

$\sum_{mp}$	is the sum over all mission profiles *mp* listed in Table 2;
sg	is the vehicle sub-group to which the new heavy-duty vehicle *v* has been attributed according to point 1 of this Annex;
$W_{sg,mp}$	is the mission profile weight specified in Table 2;
$CO2_{v,mp}$	is the CO_2 emissions in g/km of a new heavy-duty vehicle *v* determined for a mission profile *mp* and reported in accordance with Regulation (EU) 2018/956.

The specific CO_2 emissions of a zero-emission heavy-duty vehicle shall be set to 0 g CO_2/km.

The specific CO_2 emissions of a vocational vehicle shall be the average of the CO_2 emissions in g/km reported in accordance with Regulation (EU) 2018/956.

TABLE 2

Mission profile weights ($W_{sg,mp}$)

Vehicle sub-group (sg)	**Mission profile[a] (mp)**						
	RDL	**RDR**	**LHL**	**LHR**	**UDL**	**UDR**	**REL, RER, LEL, LER**
4-UD	0	0	0	0	0,5	0,5	0
4-RD	0,45	0,45	0,05	0,05	0	0	0
4-LH	0,05	0,05	0,45	0,45	0	0	0
9-RD	0,27	0,63	0,03	0,07	0	0	0
9-LH	0,03	0,07	0,27	0,63	0	0	0
5-RD	0,27	0,63	0,03	0,07	0	0	0
5-LH	0,03	0,07	0,27	0,63	0	0	0
10-RD	0,27	0,63	0,03	0,07	0	0	0
10-LH	0,03	0,07	0,27	0,63	0	0	0

a See mission profile definitions under this Table.

MISSION PROFILE DEFINITIONS

RDL	Regional delivery payload low
RDR	Regional delivery payload representative
LHL	Long haul payload low
LHR	Long haul payload representative
UDL	Urban delivery payload low
UDR	Urban delivery payload representative

REL	Regional delivery (EMS) payload low
RER	Regional delivery (EMS) payload representative
LEL	Long haul (EMS) payload low
LER	Long haul (EMS) payload representative

2.2. Average specific CO_2 emissions of all new heavy-duty vehicles in a vehicle sub-group for a manufacturer

For each manufacturer and each reporting period, the average specific CO_2 emissions in g/tkm of all new heavy-duty vehicles in the vehicle sub-group *sg* ($avgCO2_{sg}$) shall be calculated as follows:

$$avgCO2_{sg} = \frac{\sum_v CO2_v}{V_{sg} \times PL_{sg}}$$

where:

$\sum$	is the sum over all new heavy-duty vehicles of the manufacturer in the vehicle sub-group *sg*, excluding vocational vehicles, in accordance with point (a) of the first paragraph of Article 4;
v	
$CO2_v$	is the specific CO_2 emissions of a new heavy-duty vehicle *v* determined in accordance with point 2.1;
V_{sg}	is the number of new heavy-duty vehicles of the manufacturer in the vehicle sub-group *sg*, excluding vocational vehicles, in accordance with point (a) of the first paragraph of Article 4;
PL_{sg}	is the average payload of vehicles in the vehicle sub-group *sg* as determined in point 2.5.

2.3. The zero- and low-emission factor referred to in Article 5

2.3.1. Reporting periods 2019 to 2024

For each manufacturer and reporting period from 2019 to 2024, the zero- and low-emission factor (ZLEV) referred to in Article 5 shall be calculated as follows:

$$\mathbf{ZLEV} = V / (\mathrm{Vconv} + \mathrm{Vzlev})$$

with a minimum of 0,97

where:

V	is the number of new heavy-duty vehicles of the manufacturer that meet the characteristics set out in the first subparagraph of Article 2(1), excluding vocational vehicles, in accordance with point (a) of the first paragraph of Article 4;
Vconv	is the number of new heavy-duty vehicles of the manufacturer that meet the characteristics set out in the first subparagraph of Article 2(1), excluding vocational vehicles, in accordance with point (a) of the first paragraph of Article 4 and excluding zero- and low-emission heavy-duty vehicles;
Vzlev	is the sum of Vin and Vout,

where:

Vin is

$$\sum_v (1 + (1 - CO2_v / LET_{sg}))$$

with

$\sum_v$

being the sum over all new zero- and low-emission heavy-duty vehicles that meet the characteristics set out in the first subparagraph of Article 2(1);

$CO2_v$ is the specific CO_2 emissions in g/km of a zero- or low-emission heavy-duty vehicle *v* determined in accordance with point 2.1;

LET_{sg} is the low-emission threshold of the vehicle sub-group *sg* to which the vehicle *v* belongs as defined in point 2.3.3;

Vout is the total number of newly registered zero-emission heavy-duty vehicles referred to in the second subparagraph of Article 2(1), multiplied by 2, and with a maximum of 1,5 % of Vconv.

2.3.2. Reporting periods from 2025 onwards

For each manufacturer and reporting period, the zero- and low-emission factor (ZLEV) referred to in Article 5 shall be calculated as follows:

$ZLEV = 1 - (y - x)$ unless this sum is larger than 1 or lower than 0,97 in which case the ZLEV factor shall be set to 1 or 0,97, as the case may be

where:

x is 0,02

y is the sum of Vin and Vout, divided by Vtotal, where:

Vin is the total number of newly registered low- and zero-emission heavy-duty vehicles that meet the characteristics set out in the first subparagraph of Article 2(1), where each of them is counted as ZLEVspecific in accordance with the formula below:

$$ZLEVspecific = 1 - (CO2v / LET_{sg})$$

where:

$CO2_v$ is the specific CO_2 emissions in g/km of a zero- or low-emission heavy-duty vehicle *v* determined in accordance with point 2.1;

LET_{sg} is the low-emission threshold of the vehicle sub-group *sg* to which the vehicle *v* belongs as defined in point 2.3.3;

Vout is the total number of newly registered zero-emission heavy-duty vehicles referred to in the second subparagraph of Article 2(1), and with a maximum of 0,035 of Vtotal;

Vtotal is the total number of newly registered heavy-duty vehicles of the manufacturer in that reporting period.

Where Vin/Vtotal is lower than 0,0075, the ZLEV factor shall be set to 1.

2.3.3. Low-emission threshold

The low-emission threshold LET_{sg} of the vehicle sub-group *sg* is defined as follows:

$$\mathbf{LET_{sg} = (rCO2_{sg} \times PL_{sg}) / 2}$$

where:

$rCO2_{sg}$	is the reference CO_2 emissions of the vehicle sub-group *sg*, as determined in point 3;
PL_{sg}	is the average payload of vehicles in the vehicle sub-group *sg*, as determined in point 2.5.

2.4. The manufacturer's share of new heavy-duty vehicles in a vehicle sub-group

For each manufacturer and each reporting period, the share of new heavy-duty vehicles in the vehicle sub-group *sg* ($share_{sg}$) shall be calculated as follows:

$$share_{sg} = \frac{V_{sg}}{V}$$

where:

V_{sg}	is the number of new heavy-duty vehicles of the manufacturer in the vehicle sub-group *sg*, excluding vocational vehicles, in accordance with point (a) of the first paragraph of Article 4;
V	is the number of new heavy-duty vehicles of the manufacturer, excluding vocational vehicles, in accordance with point (a) of the first paragraph of Article 4.

2.5. Average payload values of all vehicles in a vehicle sub-group

The average payload value of a vehicle in the vehicle sub-group *sg* (PL_{sg}) shall be calculated as follows:

$$PL_{sg} = \sum_{mp} W_{sg,mp} \times PL_{sg,mp}$$

where:

$\sum_{mp}$	is the sum over all mission profiles *mp*;
$W_{sg,mp}$	is the mission profile weight specified in Table 2 under point 2.1;
$PL_{sg,mp}$	is the payload value attributed to the vehicles in the vehicle sub-group *sg* for the mission profile *mp*, as specified in Table 3.

TABLE 3

Payload values $PL_{sg,mp}$ (in tonnes)

Vehicle sub-group sg	Mission profile[a] mp									
	RDL	RDR	LHL	LHR	UDL	UDR	REL	RER	LEL	LER
4-UD	0,9	4,4	1,9	14	0,9	4,4	3,5	17,5	3,5	26,5
4-RD										
4-LH										

a See mission profile definitions under Table 2 of point 2.1

5-RD	2,6	12,9	2,6	19,3	2,6	12,9	3,5	17,5	3,5	26,5
5-LH										
9-RD	1,4	7,1	2,6	19,3	1,4	7,1	3,5	17,5	3,5	26,5
9-LH										
10-RD	2,6	12,9	2,6	19,3	2,6	12,9	3,5	17,5	3,5	26,5
10-LH										

a See mission profile definitions under Table 2 of point 2.1

2.6. Mileage and payload weighting factor

The mileage and payload weighting factor (MPW_{sg}) of the vehicle sub-group *sg* is defined as the product of the annual mileage specified in Table 4 and the payload value per vehicle sub-group specified in Table 3 of point 2.5, normalised to the respective value for vehicle sub-group 5-LH, and shall be calculated as follows:

$$MPW_{sg} = \frac{(AM_{sg} \times PL_{sg})}{(AM_{5-LH} \times PL_{5-LH})}$$

where:

AM_{sg} is the annual mileage specified in Table 4 for the vehicles in the respective vehicle sub-group;

$AM_{5\text{-}LH}$ is the annual mileage specified for the vehicle sub-group 5-LH in Table 4;

PL_{sg} is the average payload value as determined in point 2.5;

$PL_{5\text{-}LH}$ is the average payload value for the vehicle sub-group 5-LH as determined in point 2.5.

TABLE 4

Annual mileages

Vehicle sub-group *sg*	**Annual mileage AM_{sg} (in km)**
4-UD	60 000
4-RD	78 000
4-LH	98 000
5-RD	78 000
5-LH	116 000
9-RD	73 000
9-LH	108 000
10-RD	68 000
10-LH	107 000

2.7. Average specific CO_2 emissions in g/tkm of a manufacturer referred to in Article 4

For each manufacturer and each *reporting period*, the average specific CO_2 emissions in g/tkm (CO_2) shall be calculated as follows:

$$CO2 = ZLEV \times \sum_{sg} share_{,sg} \times MPW_{sg} \times avgCO2_{sg}$$

where:

$\sum_{sg}$	is the sum over all vehicle sub-groups;
ZLEV	is the zero- and low-emission factor as determined in point 2.3;
$share_{,sg}$	is the share of new heavy-duty vehicles in the vehicle sub-group *sg* as determined in point 2.4;
MPW_{sg}	is the mileage and payload weighting factor as determined in point 2.6;
$avgCO2_{sg}$	is the average specific CO_2 emissions in g/tkm as determined in point 2.2.

3. THE REFERENCE CO_2 EMISSIONS REFERRED TO IN THE SECOND PARAGRAPH OF ARTICLE 1

The reference CO_2 emissions ($rCO2_{sg}$) shall be calculated for each vehicle sub-group *sg* on the basis of all new heavy-duty vehicles of all manufacturers of the reference period as follows:

$$rCO2_{sg} = \frac{\sum_{v} (CO2_v / PL)_{sg}}{rV_{sg}}$$

where:

$\sum_{v}$	is the sum over all new heavy-duty vehicles registered in the reference period in the vehicle sub-group *sg*, excluding vocational vehicles, in accordance with the second paragraph of Article 1;
$CO2_v$	are the specific CO_2 emissions of the new heavy-duty vehicle *v* as determined in accordance with point 2.1, if applicable adjusted pursuant to Annex II;
rV_{sg}	is the number of all new heavy-duty vehicles registered in the reference period in the vehicle sub-group *sg*, excluding vocational vehicles, in accordance with the second paragraph of Article 1;
PL_{sg}	is the average payload of vehicles in the vehicle sub-group *sg* as determined in point 2.5.

4. THE SPECIFIC CO_2 EMISSIONS TARGET OF A MANUFACTURER REFERRED TO IN ARTICLE 6

For each manufacturer and each reporting period, from 1 July 2025 onwards, the specific CO_2 emissions target *T* shall be calculated as follows:

$$T = \sum_{sg} share_{sg} \times MPW_{sg} \times (1 - rf) \times rCO2_{sg}$$

where:

$\sum_{sg}$	is the sum over all vehicle sub-groups;
$share_{sg}$	is the share of new heavy-duty vehicles in the vehicle sub-group *sg* as determined in point 2.4;
MPW_{sg}	is the mileage and payload weighting factor as determined in point 2.6;
rf	is the CO_2 emissions reduction target (in %) applicable in that specific reporting period;
$rCO2_{sg}$	is the reference CO_2 emissions as determined in point 3.

5. EMISSION CREDITS AND EMISSION DEBTS REFERRED TO IN ARTICLE 7

5.1. CO_2 emissions reduction trajectory for emission credits

For each manufacturer and each reporting period of the years Y from 2019 to 2030, a CO_2 emissions reduction trajectory (ET_Y) is defined as follows:

$$ET_Y = \sum_{sg} share_{sg} \times MPW_{sg} \times R - ET_Y \times rCO2_{sg}$$

where:

$\sum_{sg}$	is the sum over all vehicle sub-groups;
$share_{sg}$	is the share of new heavy-duty vehicles in the vehicle sub-group *sg* as determined in point 2.4;
MPW_{sg}	is the mileage and payload weighting factor as determined in point 2.6;
$rCO2_{sg}$	is the reference CO_2 emissions as determined in point 3;
R-ET_Y	is defined as follows: for the reporting periods of the years Y from 2019 to 2025: $R - ET_Y = (1 - rf_{2025}) + rf_{2025} \times (2025 - Y) / 6$ and, for the reporting periods of the years Y from 2026 to 2030: $R - ET_Y = (1 - rf_{2030}) + (rf_{2030} - rf_{2025}) \times (2030 - Y) / 5$
$rf_{2025}$and rf_{2030}	are the CO_2 emissions reduction targets (in %) applicable for the reporting periods of the years 2025 and 2030, respectively.

5.2. Emission credits and emission debts in each reporting period

For each manufacturer and each reporting period of the years Y from 2019 to 2029, the emission credits ($cCO2_Y$) and emission debts ($dCO2_Y$) (shall be calculated as follows:

If $CO2_Y < ET_Y$:

$$cCO2_Y = (ET_Y - CO_{2Y}) \times V_y \text{ and}$$

$dCO2_Y = 0$

If $CO2_Y > T_Y$ for the years 2025 to 2029:

$$dCO2_Y = (CO2_Y - T_Y) \times V_Y \text{ and}$$

$dCO2_Y = 0$

In all other cases $dCO2_Y$ and $cCO2_Y$ are set to 0.

where:

ET_Y	is the manufacturer's CO_2 emissions reduction trajectory in the reporting period of the year Y determined in accordance with point 5.1;
$CO2_Y$	is the average specific CO_2 emissions of the manufacturer in the reporting period of the year Y determined in accordance with point 2.7;
T_Y	is the manufacturer specific CO_2 emissions target in the reporting period of the year Y determined in accordance with point 4;
V_Y	is the number of new heavy-duty vehicles of the manufacturer in the reporting period of the year Y, excluding vocational vehicles, in accordance with point (a) of the first paragraph of Article 4.

5.3. Emission debt limit

For each manufacturer the emission debt limit ($limCO_2$) is defined as follows:

$$limCO2 = T_{2025} \times 0{,}05 \times V_{2025}$$

where:

T_{2025}	is the manufacturer specific CO_2 emissions target in the reporting period of the year 2025 determined in accordance with point 4;
V_{2025}	is the number of new heavy-duty vehicles of the manufacturer in the reporting period of the year 2025, excluding vocational vehicles, in accordance with point (a) of the first paragraph of Article 4.

5.4. Emission credits acquired before the year 2025

Emission debts acquired for the reporting period of the year 2025 shall be reduced by an amount (*redCO2*) corresponding to the emission credits acquired prior to that reporting period, which is determined for each manufacturer as follows:

$$redCO2 = min\left(dCO2_{2025}; \sum_{Y=2019}^{2024} cCO_{2Y}\right)$$

where:

min	is the minimum of the two values mentioned between the brackets;
$\sum_{Y=2019}^{2024}$	is the sum over the reporting periods of the years Y from 2019 to 2024;
$dCO2_{2025}$	is the emission debts for reporting period of the year 2025 as determined in accordance with point 5.2;
$cCO2_Y$	is the emission credits for the reporting period of the year Y as determined in accordance with point 5.2.

6. A MANUFACTURER'S EXCESS CO_2 EMISSIONS REFERRED TO IN ARTICLE 8(2)

For each manufacturer and each reporting period from the year 2025 onwards, the value of the excess CO_2 emissions (*exeCO2*$_Y$) shall be calculated as follows, if the value is positive:

For the reporting period of the year 2025

$$exeCO2_{2025} = dCO2_{2025} - \sum_{Y=2019}^{2025} cCO2_Y - limCO2$$

For the reporting periods of the years Y from 2026 to 2028

$$\text{exeCO } 2_Y = \sum_{I=2025}^{Y} (dCO2_I - cCO2_I) - \sum_{J=2025}^{Y-1} exeCO2_J - redCO2 - limCO2$$

For the reporting period of the year 2029

$$exeCO2_Y = \sum_{I=2025}^{2029} (dCO2_I - cCO2_I) - \sum_{J=2025}^{2028} exeCO2_J - redCO2$$

For the reporting periods of the years Y from 2030 onwards

$$exeCO2_y = (CO2_Y - T_Y) \times V_Y$$

where:

$\sum_{Y=2019}^{2025}$	is the sum over the reporting periods of the years Y from 2019 to 2025;
$\sum_{I=2025}^{Y}$	is the sum over the reporting periods of the years I from 2025 to the year Y;
$\sum_{J=2025}^{Y-1}$	is the sum over the reporting periods of the years J from 2025 to the year (Y–1);
$\sum_{J=2025}^{2028}$	is the sum over the reporting periods of the years J from 2025 to 2028;
$\sum_{I=2025}^{2029}$	is the sum over the reporting periods of the years I from 2025 to 2029;
$dCO2_Y$	is the emission debts for the reporting period of the year Y as determined in accordance with point 5.2;
$cCO2_Y$	is the emission credits for the reporting period of the year Y as determined in accordance with point 5.2;
limCO2	is the emission debt limit as determined in accordance with point 5.3;
redCO2	is the reduction of emission debts of the reporting period of the year 2025 as determined in accordance with 5.4.

In all other cases the value of the excess CO_2 emissions $exeCO2_Y$ shall be set to 0.

Changes to legislation:
There are outstanding changes not yet made to Regulation (EU) 2019/1242 of the European Parliament and of the Council. Any changes that have already been made to the legislation appear in the content and are referenced with annotations.
View outstanding changes

Changes and effects yet to be applied to the whole legislation item and associated provisions

- Annex 2 Pt. 2 words inserted by S.I. 2022/1361 reg. 16(9)
- Art. 3(9) words inserted by S.I. 2022/1361 reg. 16(3)(a)
- Art. 3(10) substituted by S.I. 2022/1361 reg. 16(3)(b)
- Art. 3(11) words inserted by S.I. 2022/1361 reg. 16(3)(c)(i)
- Art. 3(11) words inserted by S.I. 2022/1361 reg. 16(3)(c)(ii)
- Art. 3(16)-(21) inserted by S.I. 2022/1361 reg. 16(3)(d)
- Art. 8(1)(a) sum substituted by S.I. 2020/1402 reg. 8(2)(b)
- Art. 8(1)(b) sum substituted by S.I. 2020/1402 reg. 8(2)(c)
- Art. 11(1)(a) word substituted by S.I. 2020/1402 reg. 11(2)(b)
- Art. 11(1)(b) word substituted by S.I. 2020/1402 reg. 11(2)(c)
- Art. 11(1)(d) word substituted by S.I. 2020/1402 reg. 11(2)(d)
- Art. 11(1)(f) word substituted by S.I. 2020/1402 reg. 11(2)(e)(i)
- Art. 11(1)(f) words substituted by S.I. 2020/1402 reg. 11(2)(e)(ii)
- Art. 15(2)(b) words substituted by S.I. 2022/1361 reg. 16(8)(a)
- Art. 15(2)(d) words inserted by S.I. 2022/1361 reg. 16(8)(b)
- Art. 15(2)(e) words omitted by S.I. 2020/1402 reg. 15(3)
- Art. 15(2)(g) words substituted by S.I. 2022/1361 reg. 16(8)(c)