
Changes to legislation: There are outstanding changes not yet made to Commission Implementing Regulation (EU) 2018/2066. Any changes that have already been made to the legislation appear in the content and are referenced with annotations. (See end of Document for details) [View outstanding changes](#)

Commission Implementing Regulation (EU) 2018/2066 of 19 December 2018 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council and amending Commission Regulation (EU) No 601/2012 (Text with EEA relevance)

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ANNEX VIII

Measurement-based methodologies (Article 41)

1. TIER DEFINITIONS FOR MEASUREMENT-BASED METHODOLOGIES

Measurement-based methodologies shall be approved in accordance with tiers with the following maximum permissible uncertainties for the annual average hourly emissions calculated in accordance with Equation 2 set out in section 3 of this Annex.

TABLE 1

Tiers for CEMS (maximum permissible uncertainty for each tier)

In case of CO₂, the uncertainty is to be applied to the total amount of CO₂ measured. Where the biomass fraction is determined using a measurement based methodology, the same tier definition as for CO₂ shall be applied to the biomass fraction.

	Tier 1	Tier 2	Tier 3	Tier 4
CO ₂ emission sources	± 10 %	± 7,5 %	± 5 %	± 2,5 %
N ₂ O emission sources	± 10 %	± 7,5 %	± 5 %	N.A.
CO ₂ transfer	± 10 %	± 7,5 %	± 5 %	± 2,5 %

2. MINIMUM TIER REQUIREMENTS FOR CATEGORY A INSTALLATIONS

TABLE 2

Minimum tiers to be applied by category A installations for measurement-based methodologies in accordance with point (a) of Article 41(1)

Greenhouse gas	Minimum tier level required
CO ₂	2
N ₂ O	2

3. DETERMINATION OF GHGS USING MEASUREMENT-BASED METHODOLOGIES

Equation 1: Calculation of annual emissions in accordance with Article 43(1):

$$GHG\ Em_{total} [t] = \sum_{i=1}^{HoursOp} GHG\ conc_{hourly,i} \times V_{hourly,i} \times 10^{-6} [t / g]$$

Equation 2: Determination of average hourly emissions:

$$GHG\ Em_{average} [kg / h] = \frac{GHG\ Em_{total}}{HoursOp} \times 10^3 [kg / t]$$

Equation 2a: Determination of average hourly GHG concentration for the purpose of reporting in accordance with point 9(b) of Annex X, section 1:

$$GHG\ conc_{average} [g / Nm^3] = \frac{GHG\ Em_{total}}{\sum_{i=1}^{HoursOp} V_{hourly,i}} \times 10^6 [g / t]$$

Equation 2b: Determination of average hourly flue gas flow for the purpose of reporting in accordance with point 9(b) of Annex X, section 1:

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$$Flow_{average} [Nm^3 / h] = \frac{\sum_{i=1}^{HoursOp} V_{hourly,i}}{HoursOp}$$

Equation 2c: Calculation of annual emissions for the purpose of the annual emission report in accordance with point 9(b) of Annex X, section 1:

$$GHG Em_{total} [t] = GHG conc_{average} \times Flow_{average} \times HoursOp \times 10^{-6} [t / g]$$

The following abbreviations are used in Equations 1 to 2c:

The index *i* refers to the individual operating hour. Where an operator uses shorter reference periods in accordance with Article 44(1), that reference period shall be used instead of hours for these calculations.

- GHG Em_{total}* = total annual GHG emissions in tonnes
- GHG conc_{hourly, i}* = hourly concentrations of GHG emissions in g/Nm³ in the flue gas flow measured during operation for hour *i*;
- V_{hourly, i}* = flue gas volume in Nm³ for hour *i* (i.e. integrated flow over the hour or shorter reference period);
- GHG Em_{average}* = annual average hourly emissions in kg/h from the source;
- HoursOp* = total number of hours for which the measurement-based methodology is applied, including the hours for which data has been substituted in accordance with Article 45(2) to (4);
- GHG conc_{average}* = annual average hourly concentrations of GHG emissions in g/Nm³;
- Flow_{average}* = annual average flue gas flow in Nm³/h.

4. CALCULATION OF THE CONCENTRATION USING INDIRECT CONCENTRATION MEASUREMENT

Equation 3: Calculation of the concentration

$$GHG concentration[\%] = 100\% - \sum_i Concentration\ of\ component\ i[\%]$$

5. SUBSTITUTION FOR MISSING CONCENTRATION DATA FOR MEASUREMENT-BASED METHODOLOGIES

Equation 4: Substitution for missing data for measurement-based methodologies

$$C_{i}^{subst} = \bar{C} + 2\sigma_{C_{i}}$$

Where:

- \bar{C} = the arithmetic mean of the concentration of the specific parameter over the whole reporting period or, where specific circumstances applied when data loss occurred, an appropriate period reflecting the specific circumstances;
- $\sigma_{C_{i}}$ = the best estimate of the standard deviation of the concentration of the specific parameter over the whole reporting or, where specific circumstances applied when data loss occurred, an appropriate period reflecting the specific circumstances.

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Changes and effects yet to be applied to :

- Regulation amendment to earlier affecting provision S.I. 2020/1265, Sch. 4 by [S.I. 2020/1557 art. 35\(3\)-\(8\)](#)
- Regulation amendment to earlier affecting provision S.I. 2020/1265, Sch. 4 by [S.I. 2021/1455 art. 22\(2\)-\(9\)](#)
- Regulation amendment to earlier affecting provision S.I. 2020/1265, Sch. 4 by [S.I. 2022/1173 art. 13](#)
- Regulation amendment to earlier affecting provision S.I. 2020/1265, Sch. 4 by [S.I. 2023/850 art. 8\(2\)](#)
- Regulation amendment to earlier affecting provision S.I. 2020/1265, Sch. 7 para. 13 by [S.I. 2022/1173 art. 17\(3\)](#)
- Regulation modified by [S.I. 2020/1265 art. 24Sch. 4](#)
- Regulation modified by [S.I. 2020/1265 Sch. 7 para. 13](#)
- Regulation modified by 2019 c. 1, s. 77(4) (as substituted) by [2020 c. 14 Sch. 12 para. 7\(3\)](#)
- Regulation power to amend conferred by 2019 c. 1, ss. 76, 77 (as amended) by [2020 c. 14 Sch. 12 para. 4\(4\)\(b\)\(i\)7\(2\)\(b\)](#)
- Regulation power to amend conferred by 2019 c. 1, ss. 76, 77 (as amended) by [2020 c. 14 Sch. 12 para. 5\(b\)7\(2\)\(b\)](#)
- Regulation restricted by [S.I. 2020/1265 Sch. 8 para. 5\(3\)](#)