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⁽¹⁾ Text with EEA relevance

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Acts whose titles are printed in light type are those relating to day-to-day management of agricultural matters, and are generally valid for a limited period.

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II

(Non-legislative acts)

REGULATIONS

COMMISSION REGULATION (EU) No 600/2012

of 21 June 2012

on the verification of greenhouse gas emission reports and tonne-kilometre reports and the accreditation of verifiers pursuant to Directive 2003/87/EC 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 Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC ⁽¹⁾, and in particular the fourth paragraph of Article 15 thereof,

Whereas:

(1) An overall framework of rules for the accreditation of verifiers is necessary to ensure that the verification of operator's or aircraft operator's reports in the framework of the Union's greenhouse gas emission allowance trading scheme, to be submitted in accordance with Commission Regulation (EU) No 601/2012 of 21 June 2012 on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council ⁽²⁾, is carried out by verifiers that possess the technical competence to perform the entrusted task in an independent and impartial manner and in conformity with the requirements and principles set out in this Regulation.

(2) Directive 2006/123/EC of the European Parliament and of the Council of 12 December 2006 on services in the internal market ⁽³⁾ established a general framework to

facilitate the free movement of services and service providers in the Union while maintaining a high quality of service. Union harmonisation of the rules for accreditation and verification relating to the Union's emissions trading scheme should contribute to a competitive market for verifiers while ensuring transparency and information for operators and aircraft operators.

(3) When implementing Article 15 of Directive 2003/87/EC, it is necessary to ensure a synergy between the comprehensive framework for accreditation established by Regulation (EC) No 765/2008 of the European Parliament and of the Council of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No 339/93 ⁽⁴⁾ and related provisions of Decision No 768/2008/EC of the European Parliament and of the Council of 9 July 2008 on a common framework for the marketing of products, and repealing Council Decision 93/465/EEC ⁽⁵⁾ on one hand, and the specific features of the Union's greenhouse gas emission trading scheme and requirements that are essential for the effective implementation of Directive 2003/87/EC on the other hand. Regulation (EC) No 765/2008 should continue to apply to those aspects of accreditation of verifiers which are not dealt with by this Regulation. In particular, it should be ensured that where, due to the internal practices of a Member State, an alternative procedure to accreditation, namely, the certification of verifiers that are natural persons, is carried out by a national authority appointed by that Member State in accordance with Regulation (EC) No 765/2008, the Member State concerned shall provide documentary evidence that such authority meets a level of credibility similar to national accreditation bodies that have successfully undergone peer evaluation organised by the body recognised under Article 14 of that Regulation.

⁽¹⁾ OJ L 275, 25.10.2003, p. 32.

⁽²⁾ See page 30 of this Official Journal.

⁽³⁾ OJ L 376, 27.12.2006, p. 36.

⁽⁴⁾ OJ L 218, 13.8.2008, p. 30.

⁽⁵⁾ OJ L 218, 13.8.2008, p. 82.

- (4) Regulation (EC) No 1221/2009 of the European Parliament and of the Council of 25 November 2009 on the voluntary participation by organisations in a Community eco-management and audit scheme (EMAS), repealing Regulation (EC) No 761/2001 and Commission Decisions 2001/681/EC and 2006/193/EC⁽¹⁾ provides for an independent and neutral accreditation or licensing system for environmental verifiers. For reasons of coherence and to reduce the administrative burden imposed on the Member States and economic operators, it is appropriate to take account of synergies between that and this Regulation.
- (5) The system of verification and accreditation should avoid any unnecessary duplication of procedures and organisations established pursuant to other Union legal instruments that would result in an increased burden for Member States or economic operators. Therefore, it is appropriate to draw on best practices resulting from the application of harmonised standards adopted by the European Committee for Standardisation on the basis of a remit issued by the Commission in accordance with Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society services⁽²⁾, such as the harmonised standard concerning general requirements for accreditation bodies accrediting conformity assessment bodies, and the harmonised standard concerning requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition, the references of which have been published in the *Official Journal of the European Union*, as well as Document EA-6/03 and other technical documents developed by the European co-operation for Accreditation or by other bodies.
- (6) When establishing harmonised rules for the verification of operator's or aircraft operator's reports and the accreditation of verifiers, it is necessary to ensure that the burden imposed on operators emitting a lower amount of carbon dioxide (CO₂) per year, on aircraft operators considered small emitters within the meaning of Regulation (EU) No 601/2012, as well as on the available resources of the Member States is not disproportionate to the aims pursued.
- (7) Article 27 of Directive 2003/87/EC allows Member States to exclude small installations, subject to equivalent measures, from the Union's greenhouse gas emission allowance trading scheme provided that the conditions contained in that Article are met. This Regulation should not apply directly to those installations excluded pursuant to Article 27 of Directive 2003/87/EC unless the Member State decides that this Regulation should apply.
- (8) In accordance with the principles of Annex V of Directive 2003/87/EC, the verifier should apply a risk-based approach with the aim of reaching a verification opinion providing reasonable assurance that the total emissions or tonne-kilometres are not materially misstated and the report can be verified as satisfactory. The level of assurance should relate to the depth and detail of verification activities carried out during the verification and the wording of the verification opinion statement. The verifier should be obliged, in the light of the findings and information obtained during the verification process, to adjust one or more activities in the verification process to meet the requirements for achieving reasonable assurance.
- (9) To avoid entanglement between the role of the competent authority and the verifier, the responsibilities of a verifier when carrying out verification should be clearly defined. The verifier should take the monitoring plan approved by the competent authority as a reference point and assess whether this plan and the procedures described in this plan have been implemented correctly. Where the verifier identifies non-compliance with Regulation (EU) No 601/2012, it should be the responsibility of the verifier to report this non-compliance issue in the verification report.
- (10) Full understanding of the activities of an operator or an aircraft operator is necessary for the performance of an effective verification of an operator's or aircraft operator's report. A verifier should only perform the requested verification activities after it has ascertained following a preliminary assessment that it is competent to do so. In the pursuit of a high-quality level of verification activities, harmonised rules should be developed for a preliminary assessment to determine whether a verifier is competent, independent and impartial to carry out the requested verification activities in accordance with the rules and principles set out in this Regulation.
- (11) Provision of relevant information between the operator or the aircraft operator and the verifier is essential in all facets of the verification process, in particular in the pre-contractual phase, in the performance of a strategic analysis by the verifier and throughout the verification. It is necessary to establish a set of harmonised requirements that should govern this provision of information between the operator or aircraft operator and the verifier at all times.
- (12) All verification activities in the verification process are interconnected and should be concluded with the issuance of a verification report by the verifier containing a verification statement that is commensurate with the outcome of the verification assessment. Harmonised requirements for the verification reports and the performance of the verification activities should be established to ensure that verification reports and verification activities in the Member States meet the same standards.

⁽¹⁾ OJ L 342, 22.12.2009, p. 1.

⁽²⁾ OJ L 204, 21.7.1998, p. 37.

- (13) Analysing the susceptibility of reported data to misstatements that could be material is an essential part of the verification process and determines how the verification activities should be carried out by the verifier. Every element in the verification process is therefore strongly linked to the outcome of the analysis of these risks of misstatements.
- (14) Specific provision should be made for the verification of the report of aircraft operators and that of operators of sites which are subject to Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 ⁽¹⁾.
- (15) Correct and effective reporting of greenhouse gas emissions by the operator or the aircraft operator is essential for the implementation of Directive 2003/87/EC. To ensure the proper functioning of the monitoring and reporting process, continuous improvement of the operator or aircraft operator's performance should be part of the verification activities performed by the verifier.
- (16) Verification activities and the issuance of verification reports should only be carried out by verifiers and their personnel that are competent. Verifiers should establish and continuously improve internal processes that ensure that all personnel involved in the verification activities are competent to perform the tasks entrusted to them. The criteria for determining whether a verifier is competent should be the same in all Member States and should be verifiable, objective and transparent.
- (17) The national accreditation body established pursuant to Regulation (EC) No 765/2008 should be empowered to accredit and issue an authoritative statement concerning the competence of a verifier to perform the verification activities pursuant to this Regulation, adopt administrative measures and carry out the surveillance of verifiers.
- (18) A Member State that does not consider it economically meaningful or sustainable to establish a national accreditation body or to carry out accreditation activities should have recourse to the national accreditation body of another Member State. Only national accreditation bodies that have undergone a successful peer evaluation organised by the body recognised under Article 14 of Regulation (EC) No 765/2008 should be permitted to perform the accreditation activities pursuant to this Regulation.
- (19) National accreditation bodies that demonstrate conformity with this Regulation and that have already successfully undergone peer evaluation organised by the body recognised under Article 14 of Regulation (EU) No 765/2008 should be presumed to fulfil the procedural requirements imposed on national accreditation bodies such as requirements on the structure of a national accreditation body, setting up a competence process, setting up the necessary procedures and management system and arrangements to safeguard the confidentiality of information obtained and should be exempted from undergoing a new peer evaluation following the entry into force of this Regulation. In accordance with Directive 2003/4/EC of the European Parliament and of the Council of 28 January 2003 on public access to environmental information and repealing Council Directive 90/313/EEC ⁽²⁾, environmental information contained in verified operator's or aircraft operator's reports held by the public authorities should be made public to ensure transparency, subject to certain confidentiality requirements.
- (20) Effective cooperation between national accreditation bodies, or where applicable, other national authorities, and competent authorities is essential for the proper functioning of the greenhouse gas emission allowance scheme and the supervision on the quality of verification. For reasons of transparency, it is necessary to ensure that the national accreditation bodies, or where applicable, other national authorities, and competent authorities establish effective means of information exchange. Information exchanges between competent authorities and between competent authorities and national accreditation bodies or other national authorities should be governed by the strictest guarantees of confidentiality and professional secrecy and be handled in accordance with applicable national and Union law.
- (21) The measures provided for in this Regulation are in accordance with the opinion of the Climate Change Committee,

HAS ADOPTED THIS REGULATION:

CHAPTER I

GENERAL PROVISIONS

Article 1

Subject matter

This Regulation lays down provisions for the verification of reports submitted pursuant to Directive 2003/87/EC and for the accreditation and supervision of verifiers.

This Regulation also specifies, without prejudice to Regulation (EC) No 765/2008, provisions for the mutual recognition of verifiers and peer evaluation of national accreditation bodies pursuant to Article 15 of Directive 2003/87/EC.

⁽¹⁾ OJ L 140, 5.6.2009, p. 114.

⁽²⁾ OJ L 41, 14.2.2003, p. 26.

*Article 2***Scope**

This Regulation shall apply to the verification of greenhouse gas emissions and tonne-kilometre data occurring from 1 January 2013, reported pursuant to Article 14 of Directive 2003/87/EC.

*Article 3***Definitions**

For the purposes of this Regulation, in addition to the definitions laid down in Article 3 of Directive 2003/87/EC and Article 3 of Regulation (EU) No 601/2012, the following definitions shall apply:

- (1) 'detection risk' means the risk that the verifier does not detect a material misstatement;
- (2) 'accreditation' means attestation by a national accreditation body that a verifier meets the requirements set by harmonised standards, within the meaning of point 9 of Article 2 of Regulation (EC) No 765/2008, and requirements set out in this Regulation to carry out the verification of an operator's or aircraft operator's report pursuant to this Regulation;
- (3) 'verifier' means a legal person or another legal entity carrying out verification activities pursuant to this Regulation and accredited by a national accreditation body pursuant to Regulation (EC) No 765/2008 and this Regulation or a natural person otherwise authorised, without prejudice to Article 5(2) of that Regulation, at the time a verification report is issued;
- (4) 'verification' means the activities carried out by a verifier to issue a verification report pursuant to this Regulation;
- (5) 'material misstatement' means a misstatement that, in the opinion of the verifier, individually or when aggregated with other misstatements, exceeds the materiality level or could affect the treatment of the operator's or aircraft operator's report by the competent authority;
- (6) 'operator's or aircraft operator's report' means the annual emission report to be submitted by the operator or aircraft operator pursuant to Article 14(3) of Directive 2003/87/EC or the tonne-kilometre report to be submitted by the aircraft operator for the purposes of applying for the allocation of allowances pursuant to Articles 3e and 3f of that Directive;
- (7) 'scope of accreditation' means activities referred to in Annex I for which accreditation is sought or has been granted;
- (8) 'competence' means the ability to apply knowledge and skills to carry out an activity;
- (9) 'materiality level' means the quantitative threshold or cut-off point above which misstatements, individually or when aggregated with other misstatements, are considered material by the verifier;
- (10) 'control system' means the operator's or aircraft operator's risk assessment and entire set of control activities, including the continuous management thereof, that an operator or aircraft operator has established, documented, implemented and maintained pursuant to Article 58 of Regulation (EU) No 601/2012;
- (11) 'control activities' means any acts carried out or measures implemented by the operator or aircraft operator to mitigate inherent risks;
- (12) 'non-conformity' means one of the following:
 - (a) for the purposes of verifying an operator's emission report, any act or omission of an act by the operator that is contrary to the greenhouse gas emissions permit and the requirements in the monitoring plan approved by the competent authority;
 - (b) for the purposes of verifying an aircraft operator's emission or tonne-kilometre report, any act or omission of an act by the aircraft operator that is contrary to the requirements in the monitoring plan approved by the competent authority;
 - (c) for the purposes of accreditation pursuant to Chapter IV, any act or omission of an act by the verifier that is contrary to the requirements of this Regulation;
- (13) 'site' means, for the purposes of verifying the emission or tonne-kilometre report of an aircraft operator, the locations where the monitoring process is defined and managed, including the locations where relevant data and information are controlled and stored;
- (14) 'control environment' means the environment in which the internal control system functions and the overall actions of an operator's or aircraft operator's management to ensure awareness of this internal control system;
- (15) 'inherent risk' means the susceptibility of a parameter in the operator's or aircraft operator's report to misstatements that could be material, individually or when aggregated with other misstatements, before taking into consideration the effect of any related control activities;

- (16) 'control risk' means the susceptibility of a parameter in the operator's or aircraft operator's report to misstatements that could be material, individually or when aggregated with other misstatements, and that will not be prevented or detected and corrected on a timely basis by the control system;
- (17) 'verification risk' means the risk, being a function of inherent risk, control risk and detection risk, that the verifier expresses an inappropriate verification opinion when the operator's or aircraft operator's report is not free of material misstatements;
- (18) 'reasonable assurance' means a high but not absolute level of assurance, expressed positively in the verification opinion, as to whether the operator's or aircraft operator's report subject to verification is free from material misstatement;
- (19) 'analytical procedures' means the analysis of fluctuations and trends in the data including an analysis of the relationships that are inconsistent with other relevant information or that deviate from predicted amounts;
- (20) 'internal verification documentation' means all internal documentation that a verifier has compiled to record all documentary evidence and justification of activities that are carried out for the verification of an operator's or aircraft operator's report;
- (21) 'EU ETS lead auditor' means an EU ETS auditor in charge of directing and supervising the verification team, who is responsible for performing and reporting on the verification of an operator's or aircraft operator's report;
- (22) 'EU ETS auditor' means an individual member of a verification team responsible for conducting a verification of an operator's or aircraft operator's report other than the EU ETS lead auditor;
- (23) 'technical expert' means a person who provides detailed knowledge and expertise on a specific subject matter needed for the performance of verification activities for the purposes of Chapter III and for the performance of accreditation activities for the purposes of Chapter V;
- (24) 'level of assurance' means the degree of assurance the verifier provides on the verification report based on the objective to reduce the verification risk according to the circumstances of the verification engagement;
- (25) 'assessor' means a person assigned by a national accreditation body to perform individually or as part of an assessment team an assessment of a verifier pursuant to this Regulation;

(26) 'lead assessor' means an assessor who is given the overall responsibility for the assessment of a verifier pursuant to this Regulation;

(27) 'misstatement' means an omission, misrepresentation or error in the operator's or aircraft operator's reported data, not considering the uncertainty permissible pursuant to Article 12(1)(a) of Regulation (EU) No 601/2012.

Article 4

Presumption of conformity

Where a verifier demonstrates its conformity with the criteria laid down in the relevant harmonised standards, within the meaning of point 9 of Article 2 of Regulation (EC) No 765/2008, or parts thereof, the references of which have been published in the *Official Journal of the European Union*, it shall be presumed to comply with the requirements set out in Chapters II and III of this Regulation in so far as the applicable harmonised standards cover those requirements.

Article 5

General framework for accreditation

Where no specific provisions concerning the composition of the national accreditation bodies or the activities and requirements linked to accreditation are laid down in this Regulation, the relevant provisions of Regulation (EC) No 765/2008 shall apply.

CHAPTER II

VERIFICATION

Article 6

Reliability of verification

A verified emissions report shall be reliable for users. It shall represent faithfully that which it either purports to represent or may reasonably be expected to represent.

The process of verifying emission reports shall be an effective and reliable tool in support of quality assurance and quality control procedures, providing information upon which an operator or aircraft operator can act to improve performance in monitoring and reporting emissions.

Article 7

General obligations of the verifier

1. The verifier shall carry out the verification and the activities required by this Chapter with the aim of providing a verification report that concludes with reasonable assurance that the operator's or aircraft operator's report is free from material misstatements.

2. The verifier shall plan and perform the verification with an attitude of professional scepticism recognising that circumstances may exist that cause the information in the operator's or aircraft operator's report to contain material misstatements.

3. The verifier must carry out verification in the public interest, independent of the operator or aircraft operator and the competent authorities responsible for Directive 2003/87/EC.

4. During the verification, the verifier shall assess whether:

- (a) the operator's or aircraft operator's report is complete and meets the requirements laid down in Annex X of Regulation (EU) No 601/2012;
- (b) the operator or aircraft operator has acted in compliance with the requirements of the greenhouse gas emissions permit and the monitoring plan approved by the competent authority, where the verification of an operator's emission report is concerned, and with the requirements of the monitoring plan approved by the competent authority, where the verification of an aircraft operator's emission or tonne-kilometre report is concerned;
- (c) the data in the operator's or aircraft operator's report are free from material misstatements;
- (d) information can be provided in support of the operator's or aircraft operator's data flow activities, control system and associated procedures to improve the performance of their monitoring and reporting.

For the purpose of point (c) of this paragraph, the verifier shall obtain clear and objective evidence from the operator or aircraft operator to support the reported aggregated emissions or tonne-kilometres taking into account all other information provided in the operator's or aircraft operator's report.

5. Where the verifier discovers that an operator or an aircraft operator is not complying with Regulation (EU) No 601/2012, that irregularity shall be included in the verification report even if the monitoring plan concerned is approved by the competent authority.

6. Where the monitoring plan has not been approved by the competent authority pursuant to Article 11 of Regulation (EU) No 601/2012, is incomplete or where significant modifications referred to in Article 15(3) or (4) of that Regulation have been made during the reporting period which have not been accordingly approved by the competent authority, the verifier shall advise the operator or aircraft operator to obtain the necessary approval from the competent authority.

Following the approval by the competent authority, the verifier shall continue, repeat or adapt the verification activities accordingly.

Where the approval has not been obtained before the issue of the verification report, the verifier shall report this in the verification report.

Article 8

Pre-contractual obligations

1. Before accepting a verification engagement, a verifier shall obtain a proper understanding of the operator or aircraft operator and assess whether it can undertake the verification. For this purpose the verifier shall at least:

- (a) evaluate the risks involved to undertake the verification of the operator's or aircraft operator's report in accordance with this Regulation;
- (b) undertake a review of the information supplied by the operator or aircraft operator to determine the scope of the verification;
- (c) assess whether the engagement falls within the scope of its accreditation;
- (d) assess whether it has the competence, personnel and resources required to select a verification team capable of dealing with the complexity of the installation or the aircraft operator's activities and fleet as well as whether it is capable of successfully completing the verification activities within the timeframe required;
- (e) assess whether it is capable of ensuring that the potential verification team at its disposal holds all the competence, and persons required to carry out verification activities for that specific operator or aircraft operator;
- (f) determine, for each verification engagement requested, the time allocation needed to properly carry out the verification.

2. The operator or aircraft operator shall provide the verifier with all relevant information that enables the verifier to carry out the activities referred to in paragraph 1.

Article 9

Time allocation

1. When determining the time allocation for a verification engagement referred to in Article 8(1)(f), the verifier shall at least take into account:

- (a) the complexity of the installation or the aircraft operator's activities and fleet;
- (b) the level of information and the complexity of the monitoring plan approved by the competent authority;

- (c) the required materiality level;
- (d) the complexity and completeness of the data flow activities and the control system of the operator or aircraft operator;
- (e) the location of information and data related to greenhouse gas emissions or tonne-kilometre data.

2. The verifier shall ensure that the verification contract provides for a possibility of time to be charged in addition to the time agreed in the contract, where such additional time is found to be needed for the strategic analysis, risk analysis or other verification activities. The situations where the additional time may be applied shall include at least the following:

- (a) during the verification where the data flow activities, control activities or logistics of the operator or aircraft operator seem to be more complex than initially anticipated;
- (b) where misstatements, non-conformities, insufficient data or errors in the data sets are identified by the verifier during the verification.

3. The verifier shall document the time allocated in the internal verification documentation.

Article 10

Information from an operator or aircraft operator

1. Before the strategic analysis and at other points of time during the verification, the operator or aircraft operator shall provide the verifier with all of the following:

- (a) the operator's greenhouse gas emissions permit when this concerns the verification of an operator's emission report;
- (b) the latest version of the operator's or aircraft operator's monitoring plan as well as any other relevant versions of the monitoring plan approved by the competent authority, including evidence of the approval;
- (c) a description of the operator's or aircraft operator's data flow activities;
- (d) the operator's or aircraft operator's risk assessment referred to in Article 58(2)(a) of Regulation (EU) No 601/2012, and an outline of the overall control system;
- (e) the procedures mentioned in the monitoring plan as approved by the competent authority, including procedures for data flow activities and control activities;
- (f) the operator's or aircraft operator's annual emission or tonne-kilometre report, as appropriate;

- (g) where applicable, the operator's sampling plan referred to in Article 33 of Regulation (EU) No 601/2012 as approved by the competent authority;

- (h) where the monitoring plan was modified during the reporting period, a record of all those modifications in accordance with Article 16(3) of Regulation (EU) No 601/2012;

- (i) where applicable, the report referred to in Article 69(4) of Regulation (EU) No 601/2012;

- (j) the verification report from the previous year if the verifier did not carry out the verification for that particular operator or aircraft operator the previous year;

- (k) all relevant correspondence with the competent authority, in particular information related to the notification of modifications of the monitoring plan;

- (l) information on databases and data sources used for monitoring and reporting purposes, including those from Euro-control;

- (m) where the verification concerns the emission report of an installation carrying out the geological storage of greenhouse gases in a storage site permitted under Directive 2009/31/EC, the monitoring plan required by that Directive and the reports required by Article 14 of that Directive, covering at least the reporting period of the emissions report to be verified;

- (n) where applicable, the approval of the competent authority for not carrying out site visits for installations pursuant to Article 31(1);

- (o) any other relevant information necessary for the planning and carrying out of the verification.

2. Before the verifier issues the verification report, the operator or aircraft operator shall provide it with the final authorised and internally validated operator's or aircraft operator's report.

Article 11

Strategic analysis

1. At the beginning of the verification the verifier shall assess the likely nature, scale and complexity of the verification tasks by carrying out a strategic analysis of all activities relevant to the installation or the aircraft operator.

2. For the purposes of understanding the activities carried out by the installation or the aircraft operator, the verifier shall collect and review the information needed to assess that the verification team is sufficiently competent to carry out the verification, to determine that the time allocation indicated in the contract has been set correctly and to ensure that it is able to conduct the necessary risk analysis. The information shall include at least:

- (a) the information referred to in Article 10(1);
- (b) the required materiality level;
- (c) where the verifier is carrying out the verification for the same operator or aircraft operator, the information obtained from the verification in previous years.

3. When reviewing the information referred to in paragraph 2, the verifier shall at least assess the following:

- (a) for the purposes of the verification of the operator's emission report, the category of the installation referred to in Article 19 of Regulation (EU) No 601/2012 and the activities carried out at that installation;
- (b) for the purposes of the verification of the aircraft operator's emission or tonne-kilometre report, the size and nature of the aircraft operator, the distribution of information in different locations as well as the number and type of flights;
- (c) the monitoring plan approved by the competent authority as well as the specifics of the monitoring methodology laid down in that monitoring plan;
- (d) the nature, scale and complexity of emission sources and source streams as well as the equipment and processes that have resulted in emissions or tonne-kilometre data, including the measurement equipment described in the monitoring plan, the origin and application of calculation factors and other primary data sources;
- (e) the data flow activities, the control system and the control environment.

4. When carrying out the strategic analysis, the verifier shall check the following:

- (a) whether the monitoring plan presented to it is the most recent version approved by the competent authority;
- (b) whether there have been any modifications of the monitoring plan during the reporting period;

- (c) whether those modifications have been notified to the competent authority pursuant to Article 15(1) or Article 23 of Regulation (EU) No 601/2012 or approved by the competent authority in accordance with Article 15(2) of that Regulation.

Article 12

Risk analysis

1. The verifier shall identify and analyse the following elements to design, plan and implement an effective verification:

- (a) the inherent risks;
- (b) the control activities;
- (c) where control activities referred to in point (b) have been implemented, the control risks concerning the effectiveness of these control activities.

2. When identifying and analysing the elements referred to in paragraph 1, the verifier shall at least consider:

- (a) the findings from the strategic analysis referred to in Article 11(1);
- (b) the information referred to in Article 10(1) and Article 11(2)(c);
- (c) the materiality level referred to in Article 11(2)(b).

3. Where the verifier has determined that the operator or aircraft operator has failed to identify the relevant inherent risks and control risks in its risk assessment, the verifier shall inform the operator or aircraft operator thereof.

4. Where appropriate according to the information obtained during the verification, the verifier shall revise the risk analysis and modify or repeat the verification activities to be performed.

Article 13

Verification plan

1. The verifier shall draft a verification plan commensurate with the information obtained and the risks identified during the strategic analysis and the risk analysis, and including at least:

- (a) a verification programme describing the nature and scope of the verification activities as well as the time and manner in which these activities are to be carried out;
- (b) a test plan setting out the scope and methods of testing the control activities as well as the procedures for control activities;

(c) a data sampling plan setting out the scope and methods of data sampling related to data points underlying the aggregated emissions in the operator or aircraft operator's emission report or the aggregated tonne-kilometre data in the aircraft operator's tonne-kilometre report.

2. The verifier shall set up the test plan referred to in point (b) of paragraph 1 in a manner that allows it to determine the extent to which the relevant control activities may be relied on for the purposes of assessing compliance with the requirements mentioned in Article 7(4)(b).

When determining the sampling size and sampling activities for testing the control activities, the verifier shall consider the following elements:

- (a) the inherent risks;
- (b) the control environment;
- (c) the relevant control activities;
- (d) the requirement to deliver a verification opinion with reasonable assurance.

3. When determining the sampling size and sampling activities for sampling the data referred to in point (c) of paragraph 1, the verifier shall consider the following elements:

- (a) the inherent risks and control risks;
- (b) the results of the analytical procedures;
- (c) the requirement to deliver a verification opinion with reasonable assurance;
- (d) the materiality level;
- (e) the materiality of the contribution of an individual data element to the overall data set.

4. The verifier shall set up and implement the verification plan such that the verification risk is reduced to an acceptable level to obtain reasonable assurance that the operator's or aircraft operator's report is free from material misstatements.

5. The verifier shall update the risk analysis and the verification plan, and adapt the verification activities during the verification when it finds additional risks that need to be reduced or when there is less actual risk than initially expected.

Article 14

Verification activities

The verifier shall implement the verification plan and, based on the risk analysis, the verifier shall check the implementation of the monitoring plan as approved by the competent authority.

To that end, the verifier shall at least carry out substantive testing consisting of analytical procedures, data verification and checking the monitoring methodology and check the following:

- (a) the data flow activities and the systems used in the data flow, including information technology systems;
- (b) whether the control activities of the operator or aircraft operator are appropriately documented, implemented, maintained and effective to mitigate the inherent risks;
- (c) whether the procedures listed in the monitoring plan are effective to mitigate the inherent risks and control risks and whether the procedures are implemented, sufficiently documented and properly maintained.

For the purposes of point (a) of the second paragraph, the verifier shall track the data flow following the sequence and interaction of the data flow activities from primary source data to the compilation of the operator's or aircraft operator's report.

Article 15

Analytical procedures

1. The verifier shall use analytical procedures to assess the plausibility and completeness of data where the inherent risk, the control risk and the aptness of the operator's or aircraft operator's control activities show the need for such analytical procedures.

2. In carrying out the analytical procedures referred to in paragraph 1, the verifier shall assess reported data to identify potential risk areas and to subsequently validate and tailor the planned verification activities. The verifier shall at least:

- (a) assess the plausibility of fluctuations and trends over time or between comparable items;
- (b) identify immediate outliers, unexpected data and data gaps.

3. In applying the analytical procedures referred to in paragraph 1, the verifier shall perform the following procedures:

- (a) preliminary analytical procedures on aggregated data before carrying out the activities referred to in Article 14 in order to understand the nature, complexity and relevance of the reported data;

- (b) substantive analytical procedures on the aggregated data and the data points underlying these data for the purposes of identifying potential structural errors and immediate outliers;
- (c) final analytical procedures on the aggregated data to ensure that all errors identified during the verification process have been resolved correctly.

4. Where the verifier identifies outliers, fluctuations, trends, data gaps or data that are inconsistent with other relevant information or that differ significantly from expected amounts or ratios, the verifier shall obtain explanations from the operator or aircraft operator supported by additional relevant evidence.

Based on the explanations and additional evidence provided, the verifier shall assess the impact on the verification plan and the verification activities to be performed.

Article 16

Data verification

1. The verifier shall verify the data in the operator's or aircraft operator's report by applying detailed testing of the data, including tracing the data back to the primary data source, cross-checking data with external data sources, performing reconciliations, checking thresholds regarding appropriate data and carrying out recalculations.
2. As part of the data verification referred to in paragraph 1 and taking into account the approved monitoring plan, including the procedures described in that plan, the verifier shall check:
 - (a) for the purposes of verifying an operator's emission report, the boundaries of an installation;
 - (b) for the purposes of verifying an operator's emission report, the completeness of source streams and emission sources as described in the monitoring plan approved by the competent authority;
 - (c) for the purposes of verifying an aircraft operator's emission report and tonne-kilometre report, the completeness of flights falling within an aviation activity listed in Annex I of Directive 2003/87/EC for which the aircraft operator is responsible as well as the completeness of emission data and tonne-kilometre data respectively;
 - (d) for the purposes of verifying an aircraft operator's emission report and tonne-kilometre report, the consistency between reported data and mass and balance documentation;

- (e) for the purposes of verifying an aircraft operator's emission report, the consistency between aggregated fuel consumption and data on fuel purchased or otherwise supplied to the aircraft performing the aviation activity;
- (f) the consistency of the aggregated reported data in an operator's or aircraft operator's report with primary source data;
- (g) where a measurement based methodology referred to in Article 21(1) of Regulation (EU) No 601/2012 is applied by an operator, the measured values using the results of the calculations performed by the operator in accordance with Article 46 of that Regulation;
- (h) the reliability and accuracy of the data.

3. For the purposes of checking the completeness of flights referred to in point (c) of paragraph 2, the verifier shall use an aircraft operator's air traffic data, including data collected from Eurocontrol or other relevant organisations which can process air traffic information such as that available to Eurocontrol.

Article 17

Verification of the correct application of the monitoring methodology

1. The verifier shall check the correct application and implementation of the monitoring methodology as approved by the competent authority in the monitoring plan, including specific details of that monitoring methodology.
2. For the purposes of verifying the operator's emission report, the verifier shall check the correct application and implementation of the sampling plan referred to in Article 33 of Regulation (EU) No 601/2012, as approved by the competent authority.
3. Where CO₂ is transferred in accordance with Articles 48 and 49 of Regulation (EU) No 601/2012 and the CO₂ transferred is measured by both the transferring and receiving installation, the verifier shall check whether differences between the measured values at both installations can be explained by the uncertainty of the measurement systems and whether the correct arithmetic average of the measured values has been used in the emission reports of both installations.

Where the differences between the measured values at both installations cannot be explained by the uncertainty of the measurement systems, the verifier shall check whether adjustments were made to align the differences between the measured values, whether those adjustments were conservative and whether the competent authority has granted approval for those adjustments.

4. Where operators are required, pursuant to Article 12(3) of Regulation (EU) No 601/2012, to include further elements in the monitoring plan that are relevant for meeting the requirements of Article 24(1) of Commission Decision 2011/278/EU ⁽¹⁾, the verifier shall check the correct application and implementation of the procedures referred to in Article 12(3) of that Regulation. In doing so, the verifier shall also check whether information on any planned or actual changes to the capacity, activity level and operation of an installation have been submitted by the operator to the competent authority by 31 December of the reporting period.

Article 18

Verification of methods applied for missing data

1. Where methods laid down in the monitoring plan as approved by the competent authority have been used to complete missing data pursuant to Article 65 of Regulation (EU) No 601/2012, the verifier shall check whether the methods used were appropriate for the specific situation and whether they have been applied correctly.

Where the operator or aircraft operator has obtained an approval by the competent authority to use other methods than those referred to in the first subparagraph in accordance with Article 65 of Regulation (EU) No 601/2012, the verifier shall check whether the approved approach has been applied correctly and appropriately documented.

Where an operator or an aircraft operator is not able to obtain such approval in time, the verifier shall check whether the approach used by the operator or aircraft operator to complete the missing data ensures that the emissions are not underestimated and that this approach does not lead to material misstatements.

2. The verifier shall check whether the control activities implemented by the operator or aircraft operator to prevent missing data referred to in Article 65(1) of Regulation (EU) No 601/2012 from occurring are effective.

Article 19

Uncertainty assessment

1. Where Regulation (EU) No 601/2012 requires the operator to demonstrate compliance with the uncertainty thresholds for activity data and calculation factors, the verifier shall confirm the validity of the information used to calculate the uncertainty levels as set out in the approved monitoring plan.

2. Where an operator applies a monitoring methodology not based on tiers, as referred to in Article 22 of Regulation (EU) No 601/2012, the verifier shall check all of the following:

(a) whether an assessment and quantification of the uncertainty has been carried out by the operator demonstrating that the

required overall uncertainty threshold for the annual level of greenhouse gas emissions pursuant to point (c) of Article 22 of that Regulation has been met;

(b) the validity of the information used for the assessment and quantification of the uncertainty;

(c) whether the overall approach used for the assessment and the quantification of the uncertainty is in accordance with point (b) of Article 22 of that Regulation;

(d) whether evidence is provided that the conditions for the monitoring methodology referred to in point (a) of Article 22 of that Regulation have been met.

3. Where the aircraft operator is required, pursuant to Regulation (EU) No 601/2012, to demonstrate that the required uncertainty levels are not exceeded, the verifier shall check the validity of the information used to demonstrate that the applicable uncertainty levels as set out in the monitoring plan approved by the competent authority have not been exceeded.

Article 20

Sampling

1. When checking the conformance of control activities and procedures referred to in points (b) and (c) of Article 14 or when performing the checks referred to in Articles 15 and 16, the verifier may use sampling methods specific to an installation or aircraft operator provided that, based on the risk analysis, sampling is justified.

2. Where the verifier identifies a non-conformity or a misstatement in the course of sampling, it shall request the operator or aircraft operator to explain the main causes of the non-conformity or the misstatement in order to assess the impact of the non-conformity or misstatement on the reported data. Based on the outcome of that assessment, the verifier shall determine whether additional verification activities are needed, whether the sampling size needs to be increased, and which part of the data population has to be corrected by the operator or aircraft operator.

3. The verifier shall document the outcome of the checks referred to in Articles 14, 15, 16 and 17, including the details of additional samples, in the internal verification documentation.

Article 21

Site visits

1. At one or more appropriate times during the verification process, the verifier shall conduct a site visit in order to assess the operation of measuring devices and monitoring systems, to conduct interviews, to carry out the activities required by this Chapter as well as to gather sufficient information and evidence enabling it to conclude whether the operator's or aircraft operator's report is free from material misstatements.

⁽¹⁾ OJ L 130, 17.5.2011, p. 1.

2. The operator or aircraft operator shall provide the verifier access to its sites.

3. For the purposes of verifying the operator's emission report, the verifier shall also use a site visit to assess the boundaries of the installation as well as the completeness of source streams and emission sources.

4. For the purposes of verifying the operator's emission report, the verifier shall decide, based on the risk analysis, whether visits to additional locations are needed, including where relevant parts of data flow activities and control activities are carried out in other locations such as company headquarters and other off-site offices.

Article 22

Addressing misstatements and non-conformities

1. Where the verifier has identified misstatements or non-conformities during the verification, it shall inform the operator or aircraft operator thereof on a timely basis and request relevant corrections.

The operator or aircraft operator shall correct any communicated misstatements or non-conformities.

2. The verifier shall document and mark as resolved, in the internal verification documentation, all misstatements or non-conformities that have been corrected by the operator or aircraft operator during the verification.

3. Where the operator or aircraft operator does not correct the misstatements or non-conformities communicated to them by the verifier in accordance with paragraph 1 before the verifier issues the verification report, the verifier shall request the operator or aircraft operator to explain the main causes of the non-conformity or misstatement in order to assess the impact of the non-conformities or misstatements on the reported data.

The verifier shall determine whether the uncorrected misstatements, individually or when aggregated with other misstatements, have a material effect on the total reported emissions or tonne-kilometre data. In assessing the materiality of misstatements the verifier shall consider the size and nature of the misstatement as well as the particular circumstances of their occurrence.

The verifier shall assess whether the uncorrected non-conformity, individually or when combined with other non-conformities, has an impact on the reported data and whether this leads to material misstatements.

The verifier may consider misstatements as material even if those misstatements, individually or when aggregated with other misstatements, are below the materiality level set out in Article 23, where such consideration is justified by the size and nature of the misstatements and the particular circumstances of their occurrence.

Article 23

Materiality level

1. The materiality level shall be 5 % of the total reported emissions in the reporting period which is subject to verification, for any of the following:

(a) category A installations referred to in Article 19(2)(a) of Regulation (EU) No 601/2012 and category B installations referred to in Article 19(2)(b) of that Regulation;

(b) aircraft operators with annual emissions equal to or less than 500 kilotonnes of fossil CO₂.

2. The materiality level shall be 2 % of the total reported emissions in the reporting period which is subject to verification, for any of the following:

(a) category C installations referred to in Article 19(2)(c) of Regulation (EU) No 601/2012;

(b) aircraft operators with annual emissions of more than 500 kilotonnes of fossil CO₂.

3. For the purposes of verifying tonne-kilometre reports of aircraft operators, the materiality level shall be 5 % of the total reported tonne-kilometre data in the reporting period which is subject to verification.

Article 24

Concluding on the findings of verification

When completing the verification and considering the information obtained during the verification, the verifier shall:

(a) check the final data from the operator or aircraft operator, including data that have been adjusted based upon information obtained during the verification;

(b) review the operator's or aircraft operator's reasons for any differences between the final data and data previously provided;

(c) review the outcome of the assessment to determine whether the monitoring plan approved by the competent authority, including the procedures described in that plan, has been implemented correctly;

(d) assess whether the verification risk is at an acceptably low level to obtain reasonable assurance;

- (e) ensure that sufficient evidence has been gathered to be able to give a verification opinion with reasonable assurance that the report is free from material misstatements;
- (f) ensure that the verification process is fully documented in the internal verification documentation and that a final judgment in the verification report can be given.

Article 25

Independent review

1. The verifier shall submit the internal verification documentation and the verification report to an independent reviewer prior to the issuance of the verification report.
2. The independent reviewer shall not have carried out any verification activities that are subject to his review.
3. The scope of the independent review shall encompass the complete verification process described in this Chapter and recorded in the internal verification documentation.

The independent reviewer shall perform the review so as to ensure that the verification process is conducted in accordance with this Regulation, that the procedures for verification activities referred to in Article 40 have been correctly carried out, and that due professional care and judgment has been applied.

The independent reviewer shall also assess whether the evidence gathered is sufficient to enable the verifier to issue a verification report with reasonable assurance.

4. Where circumstances occur which may cause changes in the verification report after the review, the independent reviewer shall also review those changes and the evidence thereof.
5. The verifier shall properly authorise a person to authenticate the verification report based upon the conclusions of the independent reviewer and the evidence in the internal verification documentation.

Article 26

Internal verification documentation

1. The verifier shall prepare and compile internal verification documentation containing at least:
 - (a) the results of the verification activities performed;
 - (b) the strategic analysis, risk analysis and verification plan;
 - (c) sufficient information to support the verification opinion including justifications for judgments made on whether or not the misstatements identified have material effect on the reported emissions or tonne-kilometre data.

2. The internal verification documentation referred to in paragraph 1 shall be drafted in such a manner that the independent reviewer referred to in Article 25 and the national accreditation body can assess whether the verification has been performed in accordance with this Regulation.

After authentication of the verification report pursuant to Article 25(5), the verifier shall include results of the independent review in the internal verification documentation.

3. The verifier shall, upon request, provide the competent authority access to the internal verification documentation to facilitate an evaluation of the verification by the competent authority.

Article 27

Verification report

1. Based on the information collected during the verification, the verifier shall issue a verification report to the operator or aircraft operator on each emission report or tonne kilometre report that was subject to verification. The verification report shall include at least one of the following findings:

- (a) the report is verified as satisfactory;
- (b) the operator's or aircraft operator's report contains material misstatements that were not corrected before issuing the verification report;
- (c) the scope of verification is too limited pursuant to Article 28 and the verifier could not obtain sufficient evidence to issue a verification opinion with reasonable assurance that the report is free from material misstatements;
- (d) non-conformities, individually or combined with other non-conformities, provide insufficient clarity and prevent the verifier from stating with reasonable assurance that the operator's or aircraft operator's report is free from material misstatements.

For the purposes of point (a) of the first subparagraph, the operator's or aircraft operator's report may be verified as satisfactory only where the operator's or aircraft operator's report is free from material misstatements.

2. The operator or aircraft operator shall submit the verification report to the competent authority together with the operator's or aircraft operator's report concerned.
3. The verification report shall at least contain the following elements:
 - (a) the name of the operator or aircraft operator that was subject to verification;

- (b) the objectives of the verification;
 - (c) the scope of the verification;
 - (d) a reference to the operator's or aircraft operator's report that has been verified;
 - (e) the criteria used to verify the operator's or aircraft operator's report, including the permit, where applicable, and versions of the monitoring plan approved by the competent authority as well as the period of validity for each monitoring plan;
 - (f) aggregated emissions or tonne-kilometres per activity referred to in Annex I of Directive 2003/87/EC and per installation or aircraft operator;
 - (g) the reporting period subject to verification;
 - (h) the responsibilities of the operator or aircraft operator, the competent authority and the verifier;
 - (i) the verification opinion statement;
 - (j) a description of any identified misstatements and non-conformities that were not corrected before the issuance of the verification report;
 - (k) the dates on which site visits were carried out and by whom;
 - (l) information on whether any site visits were waived as well as the reasons for waiving these site visits;
 - (m) any issues of non-compliance with Regulation (EU) No 601/2012, which have become apparent during the verification;
 - (n) where approval by the competent authority cannot be obtained in time for the method used to complete the data gap pursuant to the last subparagraph of Article 18(1), a confirmation whether the method used is conservative and whether it does or does not lead to material misstatements;
 - (o) where the verifier has observed changes to the capacity, activity level and operation of the installation, which might have an impact on the installation's allocation of emission allowances and which have not been reported to the competent authority by 31 December of the reporting period in accordance with Article 24(1) of Decision 2011/278/EU, a description of those changes and related remarks;
 - (p) where applicable, recommendations for improvements;
 - (q) the names of the EU ETS lead auditor, the independent reviewer and, where applicable, the EU ETS auditor and the technical expert that were involved in the verification of the operator's or aircraft operator's report;
 - (r) the date and signature by an authorised person on behalf of the verifier, including his name.
4. The verifier shall describe the misstatements and non-conformities in sufficient detail in the verification report to allow the operator or aircraft operator as well as the competent authority to understand the following:
- (a) the size and nature of the misstatement or non-conformity;
 - (b) why the misstatement has material effect, or not;
 - (c) to which element of the operator's or aircraft operator's report the misstatement or to what element of the monitoring plan the non-conformity refers to.
5. Where a Member State requires the verifier to submit information on the verification process in addition to the elements described in paragraph 3 and that information is not necessary to understand the verification opinion, the operator or aircraft operator may, for efficiency reasons, submit that additional information to the competent authority separately from the verification report at an alternative date, but no later than 15 May of the same year.

Article 28

Limitation of scope

The verifier may conclude that the scope of the verification referred to in Article 27(1)(c) is too limited in any of the following situations:

- (a) data are missing that prevent a verifier from obtaining the evidence required to reduce the verification risk to the level needed to obtain reasonable level of assurance;
- (b) the monitoring plan is not approved by the competent authority;
- (c) the monitoring plan does not provide sufficient scope or clarity to conclude on the verification;
- (d) the operator or aircraft operator has failed to make sufficient information available to enable the verifier to carry out the verification.

*Article 29***Addressing outstanding non-material non-conformities**

1. The verifier shall assess whether the operator or aircraft operator has corrected the non-conformities indicated in the verification report related to the previous monitoring period according to the requirements on the operator referred to in Article 69(4) of Regulation (EU) No 601/2012, where relevant.

Where the operator or aircraft operator has not corrected those non-conformities, pursuant to Article 69(4) of Regulation (EU) No 601/2012, the verifier shall consider whether the omission increases or may increase the risk of misstatements.

The verifier shall report in the verification report whether those non-conformities have been resolved by the operator or aircraft operator.

2. The verifier shall record in the internal verification documentation details of when and how identified non-conformities are resolved by the operator or aircraft operator during the verification.

*Article 30***Improvement of the monitoring and reporting process**

1. Where the verifier has identified areas for improvement in the operator's or aircraft operator's performance related to points (a) to (d) of this paragraph, it shall include in the verification report recommendations for improvement related to the operator's or aircraft operator's performance on those points:

- (a) the operator's or aircraft operator's risk assessment;
- (b) the development, documentation, implementation and maintenance of data flow activities and control activities as well as the evaluation of the control system;
- (c) the development, documentation, implementation and maintenance of procedures for data flow activities and control activities as well as other procedures that an operator or aircraft operator has to establish pursuant to Regulation (EU) No 601/2012;
- (d) the monitoring and reporting of emissions or tonne kilometres, including in relation to achieving higher tiers, reducing risks and enhancing efficiency in the monitoring and reporting.

2. During verification following a year in which recommendations for improvement were made in a verification report, the verifier shall check whether the operator or aircraft operator has implemented those recommendations for improvement and the manner in which this has been done.

Where the operator or aircraft operator has not implemented those recommendations or has not implemented them correctly, the verifier shall assess the impact this has on the risk of misstatements and non-conformities.

*Article 31***Simplified verification for installations**

1. By way of derogation from Article 21(1), the verifier may decide, subject to the approval by a competent authority in accordance with the second subparagraph of this Article, not to carry out site visits to installations based on the outcome of the risk analysis and after determining that all relevant data can be remotely accessed by the verifier and that the conditions for not carrying out site visits established by the Commission are met. The verifier shall inform the operator thereof without undue delay.

The operator shall submit an application to the competent authority requesting the competent authority to approve the verifier's decision not to carry out the site visit.

On an application submitted by the operator concerned, the competent authority shall decide on the approval of the verifier's decision not to carry out the site visit, taking into consideration all of the following elements:

- (a) the information provided by the verifier on the outcome of the risk analysis;
- (b) information that the relevant data can be remotely accessed;
- (c) evidence that the requirements laid down in paragraph 3 are not applicable to the installation;
- (d) evidence that the conditions for not carrying out the site visits established by the Commission are met.

2. The approval of the competent authority referred to in paragraph 1 shall not be required for not carrying out site visits of installations with low emissions referred to in Article 47(2) of Regulation (EU) No 601/2012.

3. The verifier shall carry out site visits in any case in the following situations:

- (a) when an operator's emission report is verified for the first time by the verifier;
- (b) where a verifier has not carried out a site visit in two reporting periods immediately preceding the current reporting period;

(c) where, during the reporting period, there have been significant modifications of the monitoring plan including those referred to in Article 15(3) or (4) of Regulation (EU) No 601/2012.

Article 32

Simplified verification for aircraft operators

1. By way of derogation from Article 21(1) of this Regulation, a verifier may decide not to carry out a site visit of a small emitter referred to in Article 54(1) of Regulation (EU) No 601/2012 where the verifier has concluded, based on its risk analysis, that all relevant data can be remotely accessed by the verifier.

2. Where an aircraft operator uses the simplified tools referred to in Article 54(2) of Regulation (EU) No 601/2012 to determine the fuel consumption and the reported data has been generated using those tools independently from any input from the aircraft operator, the verifier may, based on its risk analysis, decide not to carry out the checks referred to in Articles 14 and 16, Article 17(1) and (2) and Article 18 of this Regulation.

Article 33

Simplified verification plans

Where a verifier uses a simplified verification plan, the verifier shall keep record of justifications for using such plans in the internal verification documentation, including evidence that the conditions for using simplified verification plans have been met.

CHAPTER III

REQUIREMENTS FOR VERIFIERS

Article 34

Sectoral scopes of accreditation

The verifier shall only issue a verification report to an operator or aircraft operator that performs an activity that is covered by the scope of the activity referred to in Annex I for which the verifier has been granted an accreditation according to the provisions of Regulation (EC) No 765/2008 and this Regulation.

Article 35

Continued competence process

1. The verifier shall establish, document, implement and maintain a competence process to ensure that all personnel entrusted with verification activities are competent for the tasks that are allocated to them.

2. As part of the competence process referred to in paragraph 1, the verifier shall at least determine, document, implement and maintain the following:

(a) general competence criteria for all personnel undertaking verification activities;

(b) specific competence criteria for each function within the verifier undertaking verification activities, in particular for the EU ETS auditor, EU ETS lead auditor, independent reviewer and technical expert;

(c) a method to ensure the continued competence and regular evaluation of the performance of all personnel that undertake verification activities;

(d) a process for ensuring ongoing training of the personnel undertaking verification activities;

(e) a process for assessing whether the verification engagement falls within the scope of the verifier's accreditation, and whether the verifier has the competence, personnel and resources required to select the verification team and successfully complete the verification activities within the timeframe required.

The competence criteria referred to in point (b) of the first subparagraph shall be specific for each scope of accreditation in which these persons are carrying out verification activities.

In evaluating the competence of the personnel pursuant to point (c) of the first subparagraph, the verifier shall assess that competence against the competence criteria referred to in points (a) and (b).

The process referred to in point (e) of the first subparagraph shall also include a process for assessing whether the verification team holds all the competence and persons required to carry out verification activities for a specific operator or aircraft operator.

The verifier shall develop general and specific competence criteria which are in conformity with criteria laid down in Article 36(4) and Articles 37, 38 and 39.

3. The verifier shall, at regular intervals, monitor the performance of all personnel that undertakes verification activities for the purposes of confirming the continued competence of those personnel.

4. The verifier shall at regular intervals review the competence process referred to in paragraph 1 to ensure that:

(a) the competence criteria referred to in points (a) and (b) of the first subparagraph of paragraph 2 are developed in accordance with the competence requirements under this Regulation;

(b) all issues that may be identified related to the setting of the general and specific competence criteria pursuant to points (a) and (b) of the first subparagraph of paragraph 2 are addressed;

(c) all the requirements in the competence process are updated and maintained as appropriate.

5. The verifier shall have a system for recording the results of the activities carried out in the competence process referred to in paragraph 1.

6. A sufficiently competent evaluator shall assess the competence and performance of an EU ETS auditor and EU ETS lead auditor.

For that purpose, the competent evaluator shall monitor those auditors during the verification of the operator's or aircraft operator's report on the site of the installation or aircraft operator as appropriate, to determine whether they meet the competence criteria.

7. Where a member of personnel fails to demonstrate that the competence criteria for a specific task allocated to him or her have been fully met, the verifier shall identify and organise additional training or supervised work experience as well as monitor that individual until he or she demonstrates to the satisfaction of the verifier that he or she meets the competence criteria.

Article 36

Verification teams

1. For each particular verification engagement, the verifier shall assemble a verification team capable of performing the verification activities referred to in Chapter II.

2. The verification team shall at least consist of an EU ETS lead auditor, and, where the verifier's conclusions during the assessment referred to in Article 8(1)(e) and the strategic analysis require this, a suitable number of EU ETS auditors and technical experts.

3. For the independent review of the verification activities related to a particular verification engagement, the verifier shall appoint an independent reviewer who shall not be part of the verification team.

4. Each team member shall:

(a) have a clear understanding of his or her individual role in the verification process;

(b) be able to communicate effectively in the language necessary to perform his or her specific tasks.

5. The verification team shall include at least one person with the technical competence and understanding required to assess the specific technical monitoring and reporting aspects related to the activities referred to in Annex I that are carried out by the installation or aircraft operator, and one person who is able to communicate in the language required for the verification of an operator's or aircraft operator's report in the Member State where the verifier is carrying out that verification.

6. Where the verification team consists of one person, this person shall meet all the competence requirements for the EU ETS auditor and EU ETS lead auditor and meet the requirements laid down in paragraphs 4 and 5.

Article 37

Competence requirements for EU ETS auditors and EU ETS lead auditors

1. An EU ETS auditor shall have the competence to perform the verification. To this end, the EU ETS auditor shall have at least:

(a) knowledge of Directive 2003/87/EC, Regulation (EU) No 601/2012, this Regulation, relevant standards, and other relevant legislation, applicable guidelines, as well as relevant guidelines and legislation issued by the Member State in which the verifier is carrying out a verification;

(b) knowledge and experience of data and information auditing, including:

(i) data and information auditing methodologies, including the application of the materiality level and assessing the materiality of misstatements;

(ii) analysing inherent risks and control risks;

(iii) sampling techniques in relation to data sampling and checking the control activities;

(iv) assessing data and information systems, IT systems, data flow activities, control activities, control systems and procedures for control activities;

(c) the ability to perform the activities related to the verification of an operator's or aircraft operator's report as required by Chapter II;

(d) knowledge of and experience in the sector specific technical monitoring and reporting aspects that are relevant for the scope of activities referred to in Annex I in which the EU ETS auditor is carrying out verification.

2. An EU ETS lead auditor shall meet the competence requirements for an EU ETS auditor and shall have demonstrated competence to lead a verification team and to be responsible for carrying out the verification activities in accordance with this Regulation.

Article 38

Competence requirements for independent reviewers

1. The independent reviewer shall have the appropriate authority to review the draft verification report and internal verification documentation pursuant to Article 25.

2. The independent reviewer shall meet the competence requirements of an EU ETS lead auditor referred to in Article 37(2).

3. The independent reviewer shall have the necessary competence to analyse the information provided to confirm the completeness and integrity of the information, to challenge missing or contradictory information as well as to check data trails for the purposes of assessing whether the internal verification documentation is complete and provides sufficient information to support the draft verification report.

Article 39

Use of technical experts

1. When carrying out verification activities, a verifier may make use of technical experts to provide detailed knowledge and expertise on a specific subject matter needed to support the EU ETS auditor and EU ETS lead auditor in carrying out their verification activities.

2. Where the independent reviewer does not have the competence to assess a particular issue in the review process, the verifier shall request the support of a technical expert.

3. The technical expert shall have the competence and expertise required to support the EU ETS auditor and EU ETS lead auditor, or the independent reviewer, where necessary, effectively on the subject matter for which his or her knowledge and expertise is requested. In addition the technical expert shall have a sufficient understanding of the issues required pursuant to points (a), (b) and (c) of Article 37(1).

4. The technical expert shall undertake specified tasks under the direction and full responsibility of the EU ETS lead auditor of the verification team in which the technical expert is operating or the independent reviewer.

Article 40

Procedures for verification activities

1. A verifier shall establish, document, implement and maintain one or more procedures for verification activities as described in Chapter II, and the procedures and processes required by Annex II. When establishing and implementing these procedures and processes the verifier shall carry out the activities in accordance with the harmonised standard referred to in Annex II.

2. A verifier shall design, document, implement and maintain a quality management system to ensure consistent development, implementation, improvement and review of the procedures and processes referred to in paragraph 1 in accordance with the harmonised standard referred to in Annex II.

Article 41

Records and communication

1. A verifier shall keep records, including records on competence and impartiality of personnel, to demonstrate compliance with this Regulation.

2. A verifier shall on a regular basis make information available to the operator or aircraft operator and other relevant parties in accordance with the harmonised standard referred to in Annex II.

3. A verifier shall safeguard the confidentiality of information obtained during the verification in accordance with the harmonised standard referred to in Annex II.

Article 42

Impartiality and independence

1. A verifier shall be independent from an operator or aircraft operator and impartial in carrying out its verification activities.

For that purpose, the verifier and any part of the same legal entity shall not be an operator or aircraft operator, the owner of an operator or aircraft operator or owned by them nor shall the verifier have relations with the operator or aircraft operator that could affect its independence and impartiality. The verifier shall also be independent from bodies that are trading emission allowances under the greenhouse gas emission allowances trading scheme established pursuant to Article 19 of Directive 2003/87/EC.

2. A verifier shall be organised in such a manner as to safeguard its objectivity, independence and impartiality. For the purposes of this Regulation, the relevant requirements laid down in the harmonised standard referred to in Annex II shall apply.

3. A verifier shall not carry out verification activities for an operator or aircraft operator that poses an unacceptable risk to its impartiality or that creates a conflict of interest for it. The verifier shall not use personnel or contracted persons in the verification of an operator's or aircraft operator's report that involves an actual or potential conflict of interest. The verifier shall also ensure that the activities of personnel or organisations do not affect the confidentiality, objectivity, independence and impartiality of the verification.

An unacceptable risk to impartiality or a conflict of interest referred to in the first sentence of the first subparagraph shall be considered to have arisen in either of the following cases, amongst others:

- (a) where a verifier or any part of the same legal entity provides consulting services to develop part of the monitoring and reporting process that is described in the monitoring plan approved by the competent authority, including the development of the monitoring methodology, the drafting of the operator's or aircraft operator's report and the drafting of the monitoring plan;
- (b) where a verifier or any part of the same legal entity provides technical assistance to develop or maintain, the system implemented to monitor and report emissions or tonne-kilometre data.

4. A conflict of interest for a verifier in the relations between it and an operator or an aircraft operator shall be considered to have arisen in either of the following cases, amongst others:

- (a) where the relationship between the verifier and the operator or aircraft operator is based on common ownership, common governance, common management or personnel, shared resources, common finances and common contracts or marketing;
- (b) where the operator or aircraft operator has received consultancy referred to in point (a) of paragraph 3 or technical assistance referred to in point (b) of that paragraph by a consultancy body, technical assistance body or another organisation having relations with the verifier and threatening the impartiality of the verifier.

For the purposes of point (b) of the first subparagraph, the verifier's impartiality shall be considered compromised where the relations between the verifier and the consultancy body, technical assistance body or the other organisation is based on common ownership, common governance, common management or personnel, shared resources, common finances, common contracts or marketing and common payment of sales commission or other inducement for the referral of new clients.

5. A verifier shall not outsource the independent review or the issuance of the verification report. For the purposes of this

Regulation, when outsourcing other verification activities, the verifier shall meet the relevant requirements laid down in the harmonised standard referred to in Annex II.

However, contracting individuals to carry out verification activities shall not constitute outsourcing for the purposes of the first subparagraph where the verifier, when contracting those persons, meets the relevant requirements in the harmonised standard referred to in Annex II.

6. A verifier shall establish, document, implement and maintain a process to ensure continuous impartiality and independence of the verifier, parts of the same legal entity as the verifier, other organisations referred to in paragraph 4, and of all personnel and contracted persons involved in the verification. That process shall include a mechanism to safeguard the impartiality and independence of the verifier and shall meet the relevant requirements laid down in the harmonised standard referred to in Annex II.

CHAPTER IV

ACCREDITATION

Article 43

Accreditation

A verifier issuing a verification report to an operator or an aircraft operator shall be accredited for the scope of activities referred to in Annex I for which the verifier is carrying out the verification of an operator's or aircraft operator's report.

Article 44

Objectives of accreditation

During the accreditation process and the monitoring of accredited verifiers, each national accreditation body shall assess whether the verifier and its personnel undertaking verification activities:

- (a) have the competence to carry out the verification of operator's or aircraft operator's reports in accordance with this Regulation;
- (b) are performing the verification of operator's or aircraft operator's reports in accordance with this Regulation;
- (c) meet the requirements referred to in Chapter III.

Article 45

Request for accreditation

1. Any legal person or other legal entity may request accreditation pursuant to Article 5(1) of Regulation (EC) No 765/2008 and the provisions of this Chapter.

The request shall contain the information required on the basis of the harmonised standard referred to in Annex III.

2. In addition to the information referred to in paragraph 1 of this Article, an applicant shall also, prior to the commencement of the assessment pursuant to Article 44, make available to the national accreditation body the following:

- (a) all information requested by the national accreditation body;
- (b) procedures and information concerning processes referred to in Article 40(1) and the information on the quality management system referred to in Article 40(2);
- (c) the competence criteria referred to in Article 35(2)(a) and (b), the results of the competence process referred to in Article 35 as well as other relevant documentation on the competence of all personnel involved in verification activities;
- (d) information on the process for ensuring continuous impartiality and independence referred to in Article 42(6), including relevant records on the impartiality and independence of the applicant and its personnel;
- (e) information on the technical experts and key personnel involved in the verification of operator's or aircraft operator's reports;
- (f) the system and process for ensuring appropriate internal verification documentation;
- (g) other relevant records referred to in Article 41(1).

Article 46

Preparation for assessment

1. When preparing the assessment referred to in Article 44, each national accreditation body shall take into account the complexity of the scope for which the applicant requests accreditation as well as the complexity of the quality management system referred to in Article 40(2), the procedures and information on processes referred to in Article 40(1) and the geographical areas in which the applicant is carrying out or planning to carry out verification.

2. For the purposes of this Regulation, the national accreditation body shall meet the minimum requirements set out in the harmonised standard referred to in Annex III.

Article 47

Assessment

1. The assessment team referred to in Article 57 shall carry out at least the following activities for the purposes of making the assessment referred to in Article 44:

- (a) a review of all relevant documents and records referred to in Article 45;

- (b) a visit of the premises of the applicant to review a representative sample of the internal verification documentation and to assess the implementation of the applicant's quality management system and the procedures or processes referred to in Article 40;

- (c) witnessing of a representative part of the requested scope for accreditation and the performance and competence of a representative number of the applicant's staff involved in the verification of the operator's or aircraft operator's report to ensure that the staff are operating in accordance with this Regulation.

In carrying out those activities, the assessment team shall meet the requirements set out in the harmonised standard referred to in Annex III.

2. The assessment team shall report the findings and non-conformities to the applicant in accordance with the requirements set out in the harmonised standard referred to in Annex III and shall request the applicant to respond to the reported findings and non-conformities in accordance with those provisions.

3. An applicant shall take corrective action to address any non-conformities reported pursuant to paragraph 2 and indicate in its response to the findings and non-conformities of the assessment team what actions are taken or are planned to be taken within a time set by the national accreditation body to resolve any identified non-conformities.

4. The national accreditation body shall review the responses of the applicant to the findings and non-conformities submitted pursuant to paragraph 3.

Where the national accreditation body finds the response of the applicant to be insufficient or ineffective, it shall request further information or action from the applicant. The national accreditation body may also request evidence of the effective implementation of actions taken or carry out a follow-up assessment to assess the effective implementation of the corrective actions.

Article 48

Decision on accreditation and accreditation certificate

1. The national accreditation body shall take into account the requirements laid down in the harmonised standard referred to in Annex III when preparing and taking the decision on whether to grant, extend or renew the accreditation of an applicant.

2. Where the national accreditation body has decided to grant, extend or renew the accreditation of an applicant, it shall issue an accreditation certificate to that effect.

The accreditation certificate shall at least contain the information required on the basis of the harmonised standard referred to in Annex III.

The accreditation certificate shall be valid for a period not exceeding five years after the date on which the national accreditation body has issued that certificate.

Article 49

Surveillance

1. The national accreditation body shall carry out an annual surveillance of each verifier to which it has issued an accreditation certificate.

The surveillance shall at least comprise of:

- (a) a visit to the premises of the verifier with a view to carrying out the activities referred to Article 47(1)(b);
- (b) witnessing the performance and competence of a representative number of the verifier's staff in accordance with Article 47(1)(c).

2. The national accreditation body shall carry out the first surveillance of a verifier in accordance with paragraph 1 no later than 12 months after the date on which the accreditation certificate has been issued to that verifier.

3. The national accreditation body shall prepare its plan for the surveillance of each verifier in a manner that allows for representative samples of the scope of accreditation to be assessed, in accordance with the requirements laid down in the harmonised standard referred to in Annex III.

4. Based on the results of the surveillance referred to in paragraph 1, the national accreditation body shall decide whether to confirm the continuation of accreditation.

5. Where a verifier carries out a verification in another Member State, the national accreditation body that has accredited the verifier may request the national accreditation body of the Member State where the verification is performed to carry out surveillance activities on its behalf and under its responsibility.

Article 50

Reassessment

1. Before the expiry of the accreditation certificate, the national accreditation body shall carry out a reassessment of the verifier to which the national accreditation body has issued an accreditation certificate to determine whether the validity of that accreditation certificate may be extended.

2. The national accreditation body shall prepare its plan for the reassessment of each verifier in a manner that allows representative samples of the scope of accreditation to be assessed. In

planning and carrying out the surveillance, the national accreditation body shall meet the requirements laid down in the harmonised standard referred to in Annex III.

Article 51

Extraordinary assessment

1. The national accreditation body may conduct an extraordinary assessment of the verifier at any time to ensure that the verifier meets the requirements of this Regulation.

2. For the purposes of enabling the national accreditation body to assess the need for an extraordinary assessment, the verifier shall inform the national accreditation body forthwith of any significant changes relevant to its accreditation concerning any aspect of its status or operation. Significant changes shall include those changes mentioned in the harmonised standard referred to in Annex III.

Article 52

Extension of scope

The national accreditation body shall, in response to an application by a verifier for an extension of the scope of a granted accreditation, undertake the necessary activities to determine whether the verifier meets the requirements of Article 44 for the requested extension of the scope of its accreditation.

Article 53

Administrative measures

1. The national accreditation body may suspend, withdraw or reduce an accreditation of a verifier where the verifier does not meet the requirements of this Regulation.

The national accreditation body shall suspend, withdraw or reduce an accreditation of a verifier where the verifier requests so.

The national accreditation body shall establish, document, implement and maintain a procedure for the suspension of the accreditation, the withdrawal of the accreditation and the reduction of the scope of accreditation.

2. The national accreditation body shall suspend an accreditation, or restrict the scope of an accreditation in any of the following cases:

- (a) the verifier has committed a serious breach of the requirements of this Regulation;
- (b) the verifier has persistently and repeatedly failed to meet the requirements of this Regulation;
- (c) the verifier has breached other specific terms and conditions of the national accreditation body.

3. The national accreditation body shall withdraw the accreditation where:

- (a) the verifier has failed to remedy the grounds for a decision to suspend the accreditation certificate;
- (b) a member of the top management of the verifier has been found guilty of fraud;
- (c) the verifier has intentionally provided false information.

4. The decision of a national accreditation body to suspend, withdraw or reduce the scope of the accreditation in accordance with paragraphs 2 and 3 shall be subject to appeal.

Member States shall establish procedures for the resolution of those appeals.

5. The decision of a national accreditation body to suspend, withdraw or reduce the scope of the accreditation shall take effect upon its notification to the verifier.

The national accreditation body shall terminate the suspension of an accreditation certificate where it has received satisfactory information and is confident that the verifier meets the requirements of this Regulation.

CHAPTER V

REQUIREMENTS CONCERNING ACCREDITATION BODIES FOR THE ACCREDITATION OF ETS VERIFIERS

Article 54

National accreditation body

1. The tasks related to accreditation pursuant to this Regulation shall be carried out by the national accreditation bodies appointed pursuant to Article 4(1) of Regulation (EC) No 765/2008.

2. Where a Member State decides to allow for the certification of verifiers that are natural persons, pursuant to this Regulation, the tasks related to the certification of those verifiers shall be entrusted to a national authority other than the national accreditation body appointed pursuant to Article 4(1) of Regulation (EC) No 765/2008.

3. Where a Member State decides to use the option laid down in paragraph 2, it shall ensure that the national authority concerned meets the requirements of this Regulation, including those laid down in Article 70, and provide the required documentary evidence in accordance with Article 5(2) of Regulation (EC) No 765/2008.

4. A national accreditation body shall be a member of the body recognised under Article 14 of that Regulation.

5. A national accreditation body shall be entrusted with the operation of accreditation as a public authority activity and be granted formal recognition by the Member State, where accreditation is not operated directly by public authorities.

6. For the purposes of this Regulation, the national accreditation body shall carry out its functions in accordance with the requirements set out in the harmonised standard referred to in Annex III.

Article 55

Cross-border accreditation

Where a Member State considers that it is economically not meaningful or sustainable to appoint a national accreditation body or to provide accreditation services within the meaning of Article 15 of Directive 2003/87/EC, that Member State shall have recourse to a national accreditation body of another Member State.

The Member State concerned shall inform the Commission and other Member States.

Article 56

Independence and impartiality

1. The national accreditation body shall be organised in a manner that guarantees its full independence from verifiers it assesses and its impartiality in carrying out its accreditation activities.

2. For that purpose, the national accreditation body shall not offer or provide any activities or services provided by a verifier, nor shall it provide consultancy services, own shares in or otherwise have a financial or managerial interest in a verifier.

3. Without prejudice to Article 54(2), the structure, responsibilities and tasks of the national accreditation body shall be clearly distinguished from those of the competent authority and those of other national authorities.

4. The national accreditation body shall take all final decisions pertaining to the accreditation of verifiers.

However, the national accreditation body may sub-contract certain activities, subject to the requirements set out in the harmonised standard referred to in Annex III.

*Article 57***Assessment team**

1. The national accreditation body shall appoint an assessment team for each particular assessment.
2. An assessment team shall consist of a lead assessor and, where necessary, a suitable number of assessors or technical experts for a specific scope of accreditation.

The assessment team shall include at least one person with the knowledge of the monitoring and reporting of greenhouse gas emissions pursuant to Regulation (EU) No 601/2012 that are relevant for the scope of accreditation and the competence and understanding required to assess the verification activities within the installation or aircraft operator for that scope, and at least one person with the knowledge of relevant national legislation and guidance.

*Article 58***Competence requirements for assessors**

1. An assessor shall have the competence to carry out the activities required by Chapter IV when assessing the verifier. To that end, the assessor shall:
 - (a) meet the requirements laid down in the harmonised standard pursuant to Regulation (EC) No 765/2008 referred to in Annex III;
 - (b) have knowledge of Directive 2003/87/EC, Regulation (EU) No 601/2012, this Regulation, relevant standards and other relevant legislation as well as applicable guidelines;
 - (c) have knowledge of data and information auditing referred to in Article 37(1)(b) of this Regulation obtained through training or access to a person that has knowledge and experience of such data and information.

2. A lead assessor shall meet the competence requirements referred to in paragraph 1, have demonstrated competence to lead an assessment team and be responsible for carrying out an assessment in accordance with this Regulation.

3. Internal reviewers and persons taking the decisions on the granting, extending or renewing of an accreditation shall, in addition to the competence requirements referred to in paragraph 1, have sufficient knowledge and experience to evaluate the accreditation.

*Article 59***Technical experts**

1. The national accreditation body may include technical experts in the assessment team to provide detailed knowledge

and expertise on a specific subject matter needed to support the lead assessor or assessor in carrying out assessment activities.

2. A technical expert shall have the competence required to support the lead assessor and assessor effectively on the subject matter for which his or her knowledge and expertise is requested. In addition, the technical expert shall:

- (a) have knowledge of Directive 2003/87/EC, Regulation (EU) No 601/2012, this Regulation, relevant standards, and other relevant legislation as well as applicable guidelines;
- (b) have a sufficient understanding of verification activities.

3. A technical expert shall undertake specified tasks under the direction and full responsibility of the lead assessor of the assessment team concerned.

*Article 60***Procedures**

The national accreditation body shall comply with the requirements established pursuant to Article 8 of Regulation (EC) No 765/2008.

*Article 61***Complaints**

Where the national accreditation body has received a complaint concerning the verifier from the competent authority, the operator or aircraft operator, or other interested parties, the national accreditation body shall, within a reasonable time:

- (a) decide on the validity of the complaint;
- (b) ensure that the verifier concerned is given the opportunity to submit its observations;
- (c) take appropriate actions to address the complaint;
- (d) record the complaint and action taken; and
- (e) respond to the complainant.

*Article 62***Records and documentation**

The national accreditation body shall keep records on each person involved in the accreditation process. Those records shall include records related to relevant qualifications, training, experience, impartiality and competence necessary to demonstrate compliance with this Regulation.

*Article 63***Access to information and confidentiality**

1. The national accreditation body shall, on a regular basis, make publicly available and update information obtained in the process of its accreditation activities.
2. The national accreditation body shall make, in accordance with point 4 of Article 8 of Regulation (EC) No 765/2008, adequate arrangements to safeguard, as appropriate, the confidentiality of information obtained.

*Article 64***Peer evaluation**

1. National accreditation bodies shall subject themselves to a regular peer evaluation.

The peer evaluation shall be organised by the body recognised under Article 14 of Regulation (EC) No 765/2008.

2. The body recognised under Article 14 of Regulation (EC) No 765/2008 shall implement appropriate peer evaluation criteria and an effective and independent peer evaluation process in order to assess whether:

- (a) the national accreditation body that is subject to the peer evaluation has carried out the accreditation activities in accordance with Chapter IV;
- (b) the national accreditation body that is subject to the peer evaluation has met the requirements laid down in this Chapter.

The criteria shall include competence requirements for peer evaluators and peer evaluation teams that are specific to the scheme for greenhouse gas emission allowances trading established by Directive 2003/87/EC.

3. The body recognised under Article 14 of Regulation (EC) No 765/2008 shall publish and communicate the outcome of the peer evaluation of a national accreditation body to the Commission, the national authorities responsible for the national accreditation bodies in the Member States, and the competent authority of Member States or the focal point referred to in Article 69(2).

4. Without prejudice to paragraph 1, where a national accreditation body has successfully undergone a peer evaluation organised by the body recognised under Article 14 of Regulation (EC) No 765/2008 prior to the entry into force of this Regulation, the national accreditation body shall be exempted from undergoing a new peer evaluation following the entry into force of this Regulation if it can demonstrate conformity with this Regulation.

To that end, the national accreditation body concerned shall submit a request and the necessary documentation to the body recognised under Article 14 of Regulation (EC) No 765/2008.

The body recognised under Article 14 of Regulation (EC) No 765/2008 shall decide whether the conditions for granting an exemption have been met.

The exemption shall apply for a period not exceeding three years from the date of notification of the decision to the national accreditation body.

5. The national authority entrusted, pursuant to Article 54(2), with the tasks related to the certification of verifiers that are natural persons, pursuant to this Regulation shall meet a level of credibility equivalent to national accreditation bodies that have successfully undergone peer evaluation.

To that end, the Member State concerned shall, immediately following its decisions authorising the national authority to perform certification, provide the Commission and the other Member States with all relevant documentary evidence. No national authority shall certify verifiers for the purposes of this Regulation before the Member State concerned provides that documentary evidence.

The Member State concerned shall periodically review the functioning of the national authority with a view to ensure that it continues to meet the aforementioned level of credibility and inform the Commission thereof.

*Article 65***Corrective action**

1. Member States shall monitor their national accreditation bodies at regular intervals in order to ensure that they fulfil the requirements of this Regulation on a continuing basis, taking into account the results of the peer evaluation carried out in accordance with Article 64.

2. Where a national accreditation body does not meet the requirements or fails to fulfil its obligations, as laid down in this Regulation, the Member State concerned shall take appropriate corrective action or shall ensure that such corrective action is taken, and inform the Commission thereof.

*Article 66***Mutual recognition of verifiers**

1. Member States shall recognise the equivalence of the services delivered by those national accreditation bodies that have successfully undergone a peer evaluation. Member States shall accept the accreditation certificates of verifiers accredited by those national accreditation bodies and respect the right of the verifiers to carry out verification for their scope of accreditation.

2. Where a national accreditation body has not undergone the complete peer evaluation process before 31 December 2014, Member States shall accept the accreditation certificates of verifiers accredited by that national accreditation body provided the body recognised under Article 14 of Regulation (EC) No 765/2008 has started a peer evaluation for that national accreditation body and it has not identified any non-compliance of the national accreditation body with this Regulation.

3. Where the certification of verifiers is carried out by a national authority referred to in Article 54(2), Member States shall accept the certificate issued by such authority and respect the right of certified verifiers to carry out verification for their scope of certification.

Article 67

Monitoring of services delivered

Where a Member State has established, in the course of an inspection carried out in accordance with Article 31(4) of Directive 2006/123/EC, that a verifier is not complying with this Regulation, the competent authority or national accreditation body of that Member State shall inform the national accreditation body that has accredited the verifier.

The national accreditation body that has accredited the verifier shall consider the communication of that information as a complaint within the meaning of Article 61 of this Regulation and shall take appropriate action and respond to the competent authority or the national accreditation body in accordance with the second subparagraph of Article 72(2) of this Regulation.

Article 68

Electronic data exchange and use of automated systems

1. Member States may require verifiers to use electronic templates or specific file formats for verification reports in accordance with Article 74(1) of Regulation (EU) No 601/2012.

2. Standardised electronic templates or file format specifications may be made available for the purpose of submitting a verification report and for further types of communication between the operator, aircraft operator, verifier, competent authority and national accreditation body in accordance with Article 74(2) of Regulation (EU) No 601/2012.

CHAPTER VI

INFORMATION EXCHANGE

Article 69

Information exchange and focal points

1. The Member State shall establish an effective exchange of appropriate information and effective cooperation between their national accreditation body or, where applicable, the national authority entrusted with the certification of verifiers, and the competent authority.

2. Where more than one competent authority is designated pursuant to Article 18 of Directive 2003/87/EC in a Member State, the Member State shall authorise one of those competent authorities as the focal point for the exchange of information, for coordinating the cooperation referred to in paragraph 1, and for the activities referred to in this Chapter.

Article 70

Accreditation work programme and management report

1. By 31 December of each year, the national accreditation body shall make available an accreditation work programme to the competent authority of each Member State containing the list of verifiers accredited by that national accreditation body and which have notified it pursuant to Article 76 that they intend to carry out verifications in those Member States. The accreditation work programme shall at least contain the following information in relation to each verifier:

- (a) the anticipated time and place of the verification;
- (b) information on activities that the national accreditation body has planned for that verifier, in particular surveillance and reassessment activities;
- (c) dates of anticipated witnessing audits to be performed by the national accreditation body to assess the verifier including the address and contact details of operators or aircraft operators that will be visited during the witness audit;
- (d) information on whether the national accreditation body has requested the national accreditation body from the Member State in which the verifier is performing the verification, to carry out surveillance activities.

2. Following the submission of the accreditation work programme in accordance with paragraph 1, the competent authority shall provide the national accreditation body with any relevant information, including any relevant national legislation or guidelines.

3. By 1 June of each year, the national accreditation body shall make available a management report to the competent authority. The management report shall at least contain the following information in relation to each verifier that has been accredited by that national accreditation body:

- (a) accreditation details of verifiers that were newly accredited by that national accreditation body, including the scope of accreditation for these verifiers;
- (b) any changes to the scope of accreditation for these verifiers;
- (c) summarised results of surveillance and reassessment activities carried out by the national accreditation body;

- (d) summarised results of extraordinary assessments that have taken place, including reasons for initiating such extraordinary assessments;
- (e) any complaints filed against the verifier since the last management report and the actions taken by the national accreditation body.

Article 71

Information exchange on administrative measures

Where the national accreditation body has imposed administrative measures on the verifier pursuant to Article 53 or where a suspension of the accreditation has been terminated or a decision on appeal has reversed the decision of a national accreditation body to impose administrative measures referred to in Article 53, the national accreditation body shall inform the following parties:

- (a) the competent authority of the Member State where the verifier is accredited;
- (b) the competent authority and the national accreditation body of each Member State where the verifier is carrying out verifications.

Article 72

Information exchange by the competent authority

1. The competent authority of the Member State where the verifier is carrying out the verification shall annually communicate to the national accreditation body which has accredited that verifier at least the following:

- (a) relevant results from checking the operator's and aircraft operator's report and the verification reports, in particular of any identified non-compliance of that verifier with this Regulation;
- (b) the results from the inspection of the operator or aircraft operator where those results are relevant for the national accreditation body concerning the verifier's accreditation and surveillance or where those results include any identified non-compliance of that verifier with this Regulation;
- (c) results from the evaluation of the internal verification documentation of that verifier where the competent authority has evaluated the internal verification documentation pursuant to Article 26(3);
- (d) complaints received by the competent authority concerning that verifier.

2. Where the information referred to in paragraph 1 provides evidence that the competent authority has identified

non-compliance of the verifier with this Regulation, the national accreditation body shall consider the communication of that information as a complaint by the competent authority concerning that verifier within the meaning of Article 61.

The national accreditation body shall take appropriate action to address such information and respond to the competent authority within three months from the date of its receipt. The national accreditation body shall inform the competent authority in its response of the action taken by it and, where relevant, the administrative measures imposed on the verifier.

Article 73

Information exchange on surveillance

1. Where the national accreditation body of the Member State in which a verifier is performing a verification has been requested, pursuant to Article 49(5), to carry out surveillance activities, that national accreditation body shall report its findings to the national accreditation body that has accredited the verifier, unless otherwise agreed between both national accreditation bodies.

2. The national accreditation body that has accredited the verifier shall take the findings referred to in paragraph 1 into account when assessing whether the verifier meets the requirements of this Regulation.

3. Where the findings referred to in paragraph 1 show evidence that the verifier is not complying with this Regulation, the national accreditation body that has accredited the verifier shall take appropriate action pursuant to this Regulation and shall inform the national accreditation body that has carried out surveillance activities on:

- (a) what action has been taken by the national accreditation body that has accredited the verifier;
- (b) where appropriate, how the findings were resolved by the verifier;
- (c) where relevant, what administrative measures have been imposed on the verifier.

Article 74

Information exchange with a Member State where the verifier is established

Where a verifier has been granted accreditation by a national accreditation body in a Member State other than the Member State in which the verifier is established, the accreditation work programme and the management report referred to in Article 70, as well as the information referred to in Article 71, shall also be provided to the competent authority of the Member State in which the verifier is established.

*Article 75***Databases of accredited verifiers**

1. National accreditation bodies, or where applicable, national authorities referred to in Article 54(2), shall set up and manage a database and allow access to that database to other national accreditation bodies, national authorities, verifiers, operators, aircraft operators and competent authorities.

The body recognised under Article 14 of Regulation (EC) No 765/2008 shall facilitate and harmonise access to the databases with a view to enable efficient and cost-effective communication between national accreditation bodies, national authorities, verifiers, operators, aircraft operators and competent authorities, and may reconcile those databases into a single and centralised database.

2. The database referred to in paragraph 1 shall contain at least the following information:

- (a) name and address of each verifier accredited by that national accreditation body;
- (b) the Member States in which the verifier is carrying out verification;
- (c) each verifier's scope of accreditation;
- (d) the date on which the accreditation was granted and the due expiry date of the accreditation;
- (e) any information on administrative measures that have been imposed on the verifier.

The information shall be publicly available.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 21 June 2012.

*Article 76***Notification by verifiers**

1. For the purposes of enabling the national accreditation body to draft the accreditation work programme and the management report referred to in Article 70, a verifier shall, by 15 November of each year, send the following information to the national accreditation body that has accredited that verifier:

- (a) the planned time and place of the verifications that the verifier is scheduled to perform;
- (b) the address and contact details of the operators or aircraft operators whose emissions or tonne-kilometre reports are subject to its verification.

2. Where changes occur in the information referred to in paragraph 1, the verifier shall notify those changes to the accreditation body within a timeframe agreed with that national accreditation body.

CHAPTER VII

FINAL PROVISIONS*Article 77***Transitional provisions**

Emissions and, where applicable, activity data occurring prior to 1 January 2013 shall be verified pursuant to the requirements set out in Decision 2007/589/EC ⁽¹⁾.

*Article 78***Entry into force**

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

It shall apply from 1 January 2013.

For the Commission

The President

José Manuel BARROSO

⁽¹⁾ OJ L 229, 31.8.2007, p. 1.

ANNEX I

Scope of accreditation for verifiers

The scope of accreditation of verifiers shall be indicated in the accreditation certificate using the following groups of activities pursuant to Annex I to Directive 2003/87/EC and other activities pursuant to Articles 10a and 24 of Directive 2003/87/EC. Those provisions shall equally apply to verifiers certified by a national authority in accordance with Article 54(2) of this Regulation.

Activity group No	Scopes of accreditation
1a	Combustion of fuels in installations, where only commercial standard fuels as defined in Regulation (EU) No 601/2012 are used, or where natural gas is used in category A or B installations.
1b	Combustion of fuels in installations, without restrictions
2	Refining of mineral oil
3	<ul style="list-style-type: none"> — Production of coke — Metal ore (including sulphide ore) roasting or sintering, including pelletisation — Production of pig iron or steel (primary or secondary fusion) including continuous casting
4	<ul style="list-style-type: none"> — Production or processing of ferrous metals (including ferro-alloys) — Production of secondary aluminium — Production or processing of non-ferrous metals, including production of alloys
5	Production of primary aluminium (CO ₂ and PFC emissions)
6	<ul style="list-style-type: none"> — Production of cement clinker — Production of lime or calcination of dolomite or magnesite — Manufacture of glass including glass fibre — Manufacture of ceramic products by firing — Manufacture of mineral wool insulation material — Drying or calcination of gypsum or production of plaster boards and other gypsum products
7	<ul style="list-style-type: none"> — Production of pulp from timber or other fibrous materials — Production of paper or cardboard
8	<ul style="list-style-type: none"> — Production of carbon black — Production of ammonia — Production of bulk organic chemicals by cracking, reforming, partial or full oxidation or by similar processes — Production of hydrogen (H₂) and synthesis gas by reforming or partial oxidation — Production of soda ash (Na₂CO₃) and sodium bicarbonate (NaHCO₃)
9	<ul style="list-style-type: none"> — Production of nitric acid (CO₂ and N₂O emissions) — Production of adipic acid (CO₂ and N₂O emissions) — Production of glyoxal and glyoxylic acid (CO₂ and N₂O emissions) — Production of caprolactam
10	<ul style="list-style-type: none"> — Capture of greenhouse gases from installations covered by Directive 2003/87/EC for the purpose of transport and geological storage in a storage site permitted under Directive 2009/31/EC — Transport of greenhouse gases by pipelines for geological storage in a storage site permitted under Directive 2009/31/EC
11	Geological storage of greenhouse gases in a storage site permitted under Directive 2009/31/EC
12	Aviation activities (emissions and tonne-kilometre data)

Activity group No	Scopes of accreditation
98	Other activities pursuant to Article 10a of Directive 2003/87/EC
99	Other activities, included by a Member State pursuant to Article 24 of Directive 2003/87/EC, to be specified in detail in the accreditation certificate

*ANNEX II***Requirements on verifiers**

With respect to the requirements on verifiers, the harmonised standard pursuant to Regulation (EC) No 765/2008 concerning requirements for greenhouse gas validation and verification bodies for use in accreditation or other forms of recognition, shall apply. In addition, the following procedures, processes and arrangements referred to in Article 40(1), shall apply:

- (a) a process and policy for communication with the operator or aircraft operator and other relevant parties;
- (b) adequate arrangements to safeguard the confidentiality of information obtained;
- (c) a process for dealing with appeals;
- (d) a process for dealing with complaints (including indicative timescale);
- (e) a process for issuing a revised verification report where an error in the verification report or operator's or aircraft operator's report has been identified after the verifier has submitted the verification report to the operator or aircraft operator for onwards submission to the competent authority;
- (f) a procedure or process for outsourcing verification activities to other organisations.

*ANNEX III***Minimum requirements of the accreditation process and requirements on accreditation bodies**

With respect to the minimum requirements for accreditation, and the requirements for accreditation bodies, the harmonised standard pursuant to Regulation (EC) No 765/2008 concerning general requirements for accreditation bodies accrediting conformity assessment bodies shall apply.

COMMISSION REGULATION (EU) No 601/2012**of 21 June 2012****on the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council****(Text with EEA relevance)**

THE EUROPEAN COMMISSION,

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

Having regard to Directive 2003/87/EC of the European Parliament and of the Council of 13 October 2003 establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC ⁽¹⁾ and in particular Article 14(1) thereof,

Whereas:

‘support scheme’ within the meaning of Article 2(k) and consequently financial support within the meaning of Article 17(1)(c) of Directive 2009/28/EC.

(3) For reasons of consistency, definitions laid down in Commission Decision 2009/450/EC of 8 June 2009 on the detailed interpretation of the aviation activities listed in Annex I to Directive 2003/87/EC of the European Parliament and of the Council ⁽⁴⁾ and Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006 ⁽⁵⁾ should apply to this Regulation.

(1) The complete, consistent, transparent and accurate monitoring and reporting of greenhouse gas emissions, in accordance with the harmonised requirements laid down in this Regulation, are fundamental for the effective operation of the greenhouse gas emission allowance trading scheme established pursuant to Directive 2003/87/EC. During the second compliance cycle of the greenhouse gas emissions trading scheme, covering the years 2008 to 2012, industrial operators, aviation operators, verifiers and competent authorities have gained experience with monitoring and reporting pursuant to Commission Decision 2007/589/EC of 18 July 2007 establishing guidelines for the monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC of the European Parliament and of the Council ⁽²⁾. The rules for the third trading period of the Union’s greenhouse gas emission allowance trading scheme which begins on 1 January 2013 and for the following trading periods should build on that experience.

(2) The definition of biomass in this Regulation should be consistent with the definition of the terms ‘biomass’, ‘bio-liquids’ and ‘biofuels’ set out in Article 2 of Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC ⁽³⁾, in particular since preferential treatment with regard to allowance surrender obligations under the Union’s greenhouse gas emission allowance trading scheme pursuant to Directive 2003/87/EC constitutes a

(4) To make the operation of the monitoring and reporting system optimal, the Member States which designate more than one competent authority should ensure that those competent authorities coordinate their work in line with the principles set out in this Regulation.

(5) The monitoring plan, setting out detailed, complete and transparent documentation concerning the methodology of a specific installation or aircraft operator should be a core element of the system established by this Regulation. Regular updates of the plan should be required, both to respond to the verifier’s findings and on the basis of the operator’s or aircraft operator’s own initiative. The main responsibility for the implementation of the monitoring methodology, parts of which are specified by procedures required by this Regulation, should remain with the operator or the aircraft operator.

(6) It is necessary to establish basic monitoring methodologies to minimise the burden on operators and aircraft operators and facilitate the effective monitoring and reporting of greenhouse gas emissions pursuant to Directive 2003/87/EC. Those methodologies should include basic calculation and measurement methodologies. The calculation methodologies should be further differentiated into a standard methodology and a mass balance methodology. Flexibility should be provided to allow a combination of measurement methodologies, standard calculation methodology and mass balance within the same installation, provided the operator ensures that omissions or double counting do not occur.

⁽¹⁾ OJ L 275, 25.10.2003, p. 32.

⁽²⁾ OJ L 229, 31.8.2007, p. 1.

⁽³⁾ OJ L 140, 5.6.2009, p. 16.

⁽⁴⁾ OJ L 149, 12.6.2009, p. 69.

⁽⁵⁾ OJ L 140, 5.6.2009, p. 114.

- (7) To further minimise the burden on operators and aircraft operators, simplification with regard to the uncertainty assessment requirement, without reducing accuracy, should be introduced. Considerably reduced requirements with regard to uncertainty assessment should be applied where measuring instruments are used under type-conform conditions, in particular where measuring instruments are under national legal metrological control.
- (8) It is necessary to define calculation factors which can be either default factors or determined by analysis. Requirements for analysis should retain the preference for use of laboratories accredited in accordance with the harmonised standard General requirements for the competence of testing and calibration laboratories (EN ISO/IEC 17025) for the relevant analytical methods, and introduce more pragmatic requirements for demonstrating robust equivalence in the case of non-accredited laboratories, including in conformity with the harmonised standard Quality management systems – Requirements (EN ISO/IEC 9001) or other relevant certified quality management systems.
- (9) A more transparent and consistent manner of determining unreasonable costs should be laid down.
- (10) The measurement-based methodology should be set on a more equal footing with the calculation-based methodology in order to recognise the increased confidence in continuous emissions monitoring systems and underpinning quality assurance. That requires more proportional requirements concerning cross-checks with calculations as well as the clarification of data handling and other quality assurance requirements.
- (11) Imposing a disproportionate monitoring effort on installations with lower, less consequential annual emissions should be avoided, while ensuring that an acceptable level of accuracy is maintained. In that regard, special conditions for installations considered having low emissions and for aircraft operators considered small emitters should be set out.
- (12) Article 27 of Directive 2003/87/EC allows Member States to exclude small installations, subject to equivalent measures, from the Union's greenhouse gas emission allowance trading scheme provided that the conditions contained in that Article are met. This Regulation should not apply directly to those installations excluded pursuant to Article 27 of Directive 2003/87/EC unless the Member State decides that this Regulation should apply.
- (13) To close potential loopholes connected to the transfer of inherent or pure CO₂, such transfers should only be allowed subject to very specific conditions. Those conditions are that the transfer of inherent CO₂ should only be to other EU-ETS installations and the transfer of pure CO₂ should only occur for the purposes of storage in a geological storage site pursuant to the Union's greenhouse gas emission allowance trading scheme, which is at present the only form of permanent storage of CO₂ accepted under the Union's greenhouse gas emission trading scheme. Those conditions should not, nevertheless, exclude the possibility of future innovations.
- (14) Specific aviation-related provisions on monitoring plans and monitoring of greenhouse gas emissions should be laid down. One provision should be the determination of density by onboard measurement and by fuel invoices as equivalent options. Another provision should be the raising of the threshold for consideration of an aircraft operator as a small emitter from 10 000 tonnes of CO₂ emissions per year to 25 000 tonnes of CO₂ per year.
- (15) The estimation of missing data should be made more consistent, by requiring the use of conservative estimation procedures recognised in the monitoring plan or, where this is not possible, through the approval by the competent authority and the inclusion of an appropriate procedure in the monitoring plan.
- (16) The implementation of the improvement principle requiring operators to regularly review their monitoring methodology for improvement and to consider recommendations made by verifiers as part of the verification process should be strengthened. Where a methodology is used, which is not based on tiers, or where the highest tier methodologies are not met, operators should regularly report on the steps being taken to meet a monitoring methodology based on the tier system and to reach the highest tier required.
- (17) Aircraft operators may, pursuant to Article 3e(1) of Directive 2003/87/EC, apply for an allocation of emission allowances free of charge, in respect of activities listed in Annex I to that Directive, based on verified tonne-kilometre data. However, in the light of the principle of proportionality, where an aircraft operator is objectively unable to provide verified tonne-kilometre data by the relevant deadline because of serious and unforeseeable circumstances outside of its control, that aircraft operator should be able to submit the best tonne-kilometre data available, provided the necessary safeguards are in place.
- (18) The use of information technology, including requirements for data exchange formats and the use of automated systems, should be promoted and the Member States should be therefore allowed to require the economic operators to use such systems. The Member States should be also allowed to elaborate electronic templates and file format specifications which should, however, conform to minimum standards published by the Commission.

- (19) Decision 2007/589/EC should be repealed. However, the effects of its provisions should be maintained for the monitoring, reporting and verification of the emissions and activity data occurring during the first and second trading periods of the Union's greenhouse gas emission allowance trading scheme.
- (20) Member States should be provided sufficient time to adopt the necessary measures and establish the appropriate national institutional framework to ensure the effective application of this Regulation. This Regulation should therefore apply from the date of the beginning of the third trading period.
- (21) The measures provided for in this Regulation are in accordance with the opinion of the Climate Change Committee,

HAS ADOPTED THIS REGULATION:

CHAPTER I

GENERAL PROVISIONS

SECTION 1

Subject matter and definitions

Article 1

Subject matter

This Regulation lays down rules for the monitoring and reporting of greenhouse gas emissions and activity data pursuant to Directive 2003/87/EC in the trading period of the Union emissions trading scheme commencing on 1 January 2013 and subsequent trading periods.

Article 2

Scope

This Regulation shall apply to the monitoring and reporting of greenhouse gas emissions specified in relation to the activities listed in Annex I to Directive 2003/87/EC and activity data from stationary installations, from aviation activities and to the monitoring and reporting of tonne-kilometre data from aviation activities.

It shall apply to emissions and activity data occurring from 1 January 2013.

Article 3

Definitions

For the purposes of this Regulation, the following definitions apply:

- (1) 'activity data' means the data on the amount of fuels or materials consumed or produced by a process as relevant for the calculation-based monitoring methodology, expressed in terajoules, mass in tonnes, or for gases as volume in normal cubic metres, as appropriate;

- (2) 'trading period' means an eight-year period referred to in Article 13(1) of Directive 2003/87/EC;

- (3) 'tonne-kilometre' means a tonne of payload carried a distance of one kilometre;

- (4) 'source stream' means any of the following:

- (a) a specific fuel type, raw material or product giving rise to emissions of relevant greenhouse gases at one or more emission sources as a result of its consumption or production;
- (b) a specific fuel type, raw material or product containing carbon and included in the calculation of greenhouse gas emissions using a mass balance methodology;

- (5) 'emission source' means a separately identifiable part of an installation or a process within an installation, from which relevant greenhouse gases are emitted or, for aviation activities, an individual aircraft;

- (6) 'uncertainty' means a parameter, associated with the result of the determination of a quantity, that characterises the dispersion of the values that could reasonably be attributed to the particular quantity, including the effects of systematic as well as of random factors, expressed in per cent, and describes a confidence interval around the mean value comprising 95 % of inferred values taking into account any asymmetry of the distribution of values;

- (7) 'calculation factors' means net calorific value, emission factor, preliminary emission factor, oxidation factor, conversion factor, carbon content or biomass fraction;

- (8) 'tier' means a set requirement used for determining activity data, calculation factors, annual emission and annual average hourly emission, as well as for payload;

- (9) 'inherent risk' means the susceptibility of a parameter in the annual emissions report or tonne-kilometre data report to misstatements that could be material, individually or when aggregated with other misstatements, before taking into consideration the effect of any related control activities;

- (10) 'control risk' means the susceptibility of a parameter in the annual emissions report or tonne-kilometre report to misstatements that could be material, individually or when aggregated with other misstatements, and not prevented or detected and corrected on a timely basis by the control system;

- (11) 'combustion emissions' means greenhouse gas emissions occurring during the exothermic reaction of a fuel with oxygen;
- (12) 'reporting period' means one calendar year during which emissions have to be monitored and reported, or the monitoring year as referred to in Articles 3e and 3f of Directive 2003/87/EC for tonne-kilometre data;
- (13) 'emission factor' means the average emission rate of a greenhouse gas relative to the activity data of a source stream assuming complete oxidation for combustion and complete conversion for all other chemical reactions;
- (14) 'oxidation factor' means the ratio of carbon oxidised to CO₂ as a consequence of combustion to the total carbon contained in the fuel, expressed as a fraction, considering CO emitted to the atmosphere as the molar equivalent amount of CO₂;
- (15) 'conversion factor' means the ratio of carbon emitted as CO₂ to the total carbon contained in the source stream before the emitting process takes place, expressed as a fraction, considering carbon monoxide (CO) emitted to the atmosphere as the molar equivalent amount of CO₂;
- (16) 'accuracy' means the closeness of the agreement between the result of a measurement and the true value of the particular quantity or a reference value determined empirically using internationally accepted and traceable calibration materials and standard methods, taking into account both random and systematic factors;
- (17) 'calibration' means the set of operations, which establishes, under specified conditions, the relations between values indicated by a measuring instrument or measuring system, or values represented by a material measure or a reference material and the corresponding values of a quantity realised by a reference standard;
- (18) 'passengers' means the persons onboard the aircraft during a flight excluding its on duty crew members;
- (19) 'conservative' means that a set of assumptions is defined in order to ensure that no under-estimation of annual emissions or over-estimation of tonne-kilometres occurs;
- (20) 'biomass' means the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste; it includes bioliquids and biofuels;
- (21) 'bioliquids' means liquid fuel for energy purposes other than for transport, including electricity and heating and cooling, produced from biomass;
- (22) 'biofuels' means liquid or gaseous fuel for transport produced from biomass;
- (23) 'legal metrological control' means the control of the measurement tasks intended for the field of application of a measuring instrument, for reasons of public interest, public health, public safety, public order, protection of the environment, levying of taxes and duties, protection of the consumers and fair trading;
- (24) 'maximum permissible error' means the error of measurement allowed as specified in Annex I and instrument-specific Annexes to Directive 2004/22/EC of the European Parliament and of the Council⁽¹⁾, or national rules on legal metrological control, as appropriate;
- (25) 'data flow activities' mean activities related to the acquisition, processing and handling of data that are needed to draft an emissions report from primary source data;
- (26) 'tonnes of CO_{2(e)}' means metric tonnes of CO₂ or CO_{2(e)};
- (27) 'CO_{2(e)}' means any greenhouse gas, other than CO₂ listed in Annex II to Directive 2003/87/EC with an equivalent global-warming potential as CO₂;
- (28) 'measurement system' means a complete set of measuring instruments and other equipment, such as sampling and data processing equipment, used for the determination of variables like the activity data, the carbon content, the calorific value or the emission factor of the CO₂ emissions;
- (29) 'net calorific value' (NCV) means the specific amount of energy released as heat when a fuel or material undergoes complete combustion with oxygen under standard conditions less the heat of vaporisation of any water formed;
- (30) 'process emissions' means greenhouse gas emissions other than combustion emissions occurring as a result of intentional and unintentional reactions between substances or their transformation, including the chemical or electrolytic reduction of metal ores, the thermal decomposition of substances, and the formation of substances for use as product or feedstock;
- (31) 'commercial standard fuel' means the internationally standardised commercial fuels which exhibit a 95 % confidence interval of not more than 1 % for their specified calorific value, including gas oil, light fuel oil, gasoline, lamp oil, kerosene, ethane, propane, butane, jet kerosene (jet A1 or jet A), jet gasoline (Jet B) and aviation gasoline (AvGas);

⁽¹⁾ OJ L 135, 30.4.2004, p. 1.

- (32) 'batch' means an amount of fuel or material representatively sampled and characterised and transferred as one shipment or continuously over a specific period of time;
- (33) 'mixed fuel' means a fuel which contains both biomass and fossil carbon;
- (34) 'mixed material' means a material which contains both biomass and fossil carbon;
- (35) 'preliminary emission factor' means the assumed total emission factor of a mixed fuel or material based on the total carbon content composed of biomass fraction and fossil fraction before multiplying it with the fossil fraction to result in the emission factor;
- (36) 'fossil fraction' means the ratio of fossil carbon to the total carbon content of a fuel or material, expressed as a fraction;
- (37) 'biomass fraction' means the ratio of carbon stemming from biomass to the total carbon content of a fuel or material, expressed as a fraction;
- (38) 'energy balance method' means a method to estimate the amount of energy used as fuel in a boiler, calculated as sum of utilisable heat and all relevant losses of energy by radiation, transmission and via the flue gas;
- (39) 'continuous emission measurement' means a set of operations having the objective of determining the value of a quantity by means of periodic measurements, applying either measurements in the stack or extractive procedures with a measuring instrument located close to the stack, whilst excluding measurement methodologies based on the collection of individual samples from the stack;
- (40) 'inherent CO₂' means CO₂ which is part of a fuel;
- (41) 'fossil carbon' means inorganic and organic carbon that is not biomass;
- (42) 'measurement point' means the emission source for which continuous emission measurement systems (CEMS) are used for emission measurement, or the cross-section of a pipeline system for which the CO₂ flow is determined using continuous measurement systems;
- (43) 'mass and balance documentation' means the documentation as specified in international or national implementation of the Standards and Recommended Practices (SARPs), as laid down in Annex 6 to the Convention on International Civil Aviation, signed in Chicago on 7 December 1944, and as specified in Subpart J Annex III to Council Regulation (EEC) No 3922/91 ⁽¹⁾, or equivalent applicable international rules;
- (44) 'distance' means the Great Circle Distance between the aerodrome of departure and the aerodrome of arrival, in addition to a fixed factor of 95 km;
- (45) 'aerodrome of departure' means the aerodrome at which a flight constituting an aviation activity listed in Annex I to Directive 2003/87/EC begins;
- (46) 'aerodrome of arrival' means the aerodrome at which a flight constituting an aviation activity listed in Annex I to Directive 2003/87/EC ends;
- (47) 'payload' means the total mass of freight, mail, passengers and baggage carried onboard the aircraft during a flight;
- (48) 'fugitive emissions' means irregular or unintended emissions from sources which are not localised, or too diverse or too small to be monitored individually;
- (49) 'aerodrome pair' means a pair constituted by the aerodrome of departure and the aerodrome of arrival;
- (50) 'standard conditions' means temperature of 273,15 K and pressure conditions of 101 325 Pa defining normal cubic metres (Nm³);
- (51) 'CO₂ capture' means the activity of capturing from gas streams carbon dioxide (CO₂), which would otherwise be emitted, for the purposes of transport and geological storage in a storage site permitted under Directive 2009/31/EC;
- (52) 'CO₂ transport' means the transport of CO₂ by pipelines for geological storage in a storage site permitted under Directive 2009/31/EC;
- (53) 'vented emissions' means emissions deliberately released from the installation by provision of a defined point of emission;
- (54) 'enhanced hydrocarbon recovery' means the recovery of hydrocarbons in addition to those extracted by water injection or other means;
- (55) 'proxy data' means annual values which are empirically substantiated or derived from accepted sources and which an operator uses to substitute the activity data or the calculation factors for the purpose of ensuring complete reporting when it is not possible to generate all the required activity data or calculation factors in the applicable monitoring methodology.

⁽¹⁾ OJ L 373, 31.12.1991, p. 4.

In addition, the definitions of 'flight' and 'aerodrome' laid down in the Annex to Decision 2009/450/EC and the definitions laid down in points (1), (2), (3), (5), (6) and (22) of Article 3 of Directive 2009/31/EC shall apply to this Regulation.

SECTION 2

General principles

Article 4

General obligation

Operators and aircraft operators shall carry out their obligations related to monitoring and reporting of greenhouse gas emissions under Directive 2003/87/EC in accordance with the principles laid down in Articles 5 to 9.

Article 5

Completeness

Monitoring and reporting shall be complete and cover all process and combustion emissions from all emission sources and source streams belonging to activities listed in Annex I to Directive 2003/87/EC and other relevant activities included pursuant to Article 24 of that Directive, and of all greenhouse gases specified in relation to those activities while avoiding double-counting.

Operators and aircraft operators shall apply appropriate measures to prevent any data gaps within the reporting period.

Article 6

Consistency, comparability and transparency

1. Monitoring and reporting shall be consistent and comparable over time. To that end, operators and aircraft operators shall use the same monitoring methodologies and data sets subject to changes and derogations approved by the competent authority.

2. Operators and aircraft operators shall obtain, record, compile, analyse and document monitoring data, including assumptions, references, activity data, emission factors, oxidation factors and conversion factors, in a transparent manner that enables the reproduction of the determination of emissions by the verifier and the competent authority.

Article 7

Accuracy

Operators and aircraft operators shall ensure that emission determination is neither systematically nor knowingly inaccurate.

They shall identify and reduce any source of inaccuracies as far as possible.

They shall exercise due diligence to ensure that the calculation and measurement of emissions exhibit the highest achievable accuracy.

Article 8

Integrity of methodology

The operator or aircraft operator shall enable reasonable assurance of the integrity of emission data to be reported. They shall determine emissions using the appropriate monitoring methodologies set out in this Regulation.

Reported emission data and related disclosures shall be free from material misstatement, avoid bias in the selection and presentation of information, and provide a credible and balanced account of an installation's or aircraft operator's emissions.

In selecting a monitoring methodology, the improvements from greater accuracy shall be balanced against the additional costs. Monitoring and reporting of emissions shall aim for the highest achievable accuracy, unless this is technically not feasible or incurs unreasonable costs.

Article 9

Continuous improvement

Operators and aircraft operators shall take account of the recommendations included in the verification reports issued pursuant to Article 15 of Directive 2003/87/EC in their consequent monitoring and reporting.

Article 10

Coordination

Where a Member State designates more than one competent authority pursuant to Article 18 of Directive 2003/87/EC, it shall coordinate the work of those authorities undertaken pursuant to this Regulation.

CHAPTER II

MONITORING PLAN

SECTION 1

General rules

Article 11

General obligation

1. Each operator or aircraft operator shall monitor greenhouse gas emissions, based on a monitoring plan approved by the competent authority in accordance with Article 12, taking into account the nature and functioning of the installation or aviation activity to which it applies.

The monitoring plan shall be supplemented by written procedures which the operator or aircraft operator establishes, documents, implements and maintains for activities under the monitoring plan, as appropriate.

2. The monitoring plan referred to in paragraph 1 shall describe the instructions to the operator or aircraft operator in a logical and simple manner, avoiding duplication of effort and taking into account the existing systems in place at the installation or used by the operator or aircraft operator.

Article 12

Content and submission of the monitoring plan

1. An operator or an aircraft operator shall submit a monitoring plan to the competent authority for approval.

The monitoring plan shall consist of a detailed, complete and transparent documentation of the monitoring methodology of a specific installation or aircraft operator and shall contain at least the elements laid down in Annex I.

Together with the monitoring plan, the operator or aircraft operator shall submit all of the following supporting documents:

- (a) evidence for each source stream and emission source demonstrating compliance with the uncertainty thresholds for activity data and calculation factors, where applicable, for the applied tiers as defined in Annex II and Annex III;
- (b) the results of a risk assessment providing evidence that the proposed control activities and procedures for control activities are commensurate with the inherent risks and control risks identified.

2. Where Annex I makes a reference to a procedure, an operator or an aircraft operator shall establish, document, implement and maintain such a procedure separately from the monitoring plan.

The operator or the aircraft operator shall summarise the procedures in the monitoring plan providing the following information:

- (a) the title of the procedure;
- (b) a traceable and verifiable reference for identification of the procedure;
- (c) identification of the post or department responsible for implementing the procedure and for the data generated from or managed by the procedure;
- (d) a brief description of the procedure allowing the operator or aircraft operator, the competent authority and the verifier to understand the essential parameters and operations performed;

(e) the location of relevant records and information;

(f) the name of the computerised system used, where applicable;

(g) a list of EN standards or other standards applied, where relevant.

The operator or aircraft operator shall make any written documentation of the procedures available to the competent authority upon request. They shall also make them available for the purposes of verification pursuant to Commission Regulation (EU) No 600/2012 ⁽¹⁾.

3. In addition to the elements referred to in paragraphs 1 and 2 of this Article, Member States may require further elements to be included in the monitoring plan of installations to meet the requirements of Article 24(1) of Commission Decision 2011/278/EU of 27 April 2011 determining transitional Union-wide rules for harmonised free allocation of emission allowances pursuant to Article 10a of Directive 2003/87/EC of the European Parliament and of the Council ⁽²⁾, including a summary of a procedure ensuring the following:

- (a) the operator regularly checks if information regarding any planned or effective changes to the capacity, activity level and operation of an installation is relevant under that Decision;
- (b) the information referred to in point (a) is submitted by the operator to the competent authority by 31 December of each year.

Article 13

Standardised and simplified monitoring plans

1. Member States may allow operators and aircraft operators to use standardised or simplified monitoring plans, without prejudice to Article 12(3).

For that purpose, Member States may publish templates for those monitoring plans, including the description of data flow and control procedures referred to in Article 57 and Article 58, based on the templates and guidelines published by the Commission.

2. Before the approval of any simplified monitoring plan referred to in paragraph 1, the competent authority shall carry out a simplified risk assessment as to whether the proposed control activities and procedures for control activities are commensurate with the inherent risks and control risks identified, and justify the use of such a simplified monitoring plan.

⁽¹⁾ See page 1 of this Official Journal.

⁽²⁾ OJ L 130, 17.5.2011, p. 1.

Member States may require the operator or aircraft operator to carry out the risk assessment pursuant to the previous subparagraph itself, where appropriate.

Article 14

Modifications of the monitoring plan

1. Each operator or aircraft operator shall regularly check if the monitoring plan reflects the nature and functioning of the installation or aviation activity in accordance with Article 7 of Directive 2003/87/EC, and whether the monitoring methodology can be improved.

2. The operator or aircraft operator shall modify the monitoring plan in any of the following situations:

- (a) new emissions occur due to new activities carried out or due to the use of new fuels or materials not yet contained in the monitoring plan;
- (b) the change of availability of data, due to the use of new measuring instrument types, sampling methods or analysis methods, or for other reasons, leads to higher accuracy in the determination of emissions;
- (c) data resulting from the previously applied monitoring methodology has been found incorrect;
- (d) changing the monitoring plan improves the accuracy of the reported data, unless this is technically not feasible or incurs unreasonable costs;
- (e) the monitoring plan is not in conformity with the requirements of this Regulation and the competent authority requests the operator or aircraft operator to modify it;
- (f) it is necessary to respond to the suggestions for improvement of the monitoring plan contained in a verification report.

Article 15

Approval of modifications of the monitoring plan

1. The operator or aircraft operator shall notify any proposals for modification of the monitoring plan to the competent authority without undue delay.

However, the competent authority may allow the operator or aircraft operator to notify, by 31 December of the same year, modifications of the monitoring plan that are not significant within the meaning of paragraph 3.

2. Any significant modification of the monitoring plan within the meaning of paragraphs 3 and 4 shall be subject to approval by the competent authority.

Where the competent authority considers a modification not significant, it shall inform the operator or aircraft operator thereof without undue delay.

3. Significant modifications to the monitoring plan of an installation shall include the following:

- (a) changes of the category of the installation;
- (b) notwithstanding Article 47(8), changes regarding whether the installation is considered an installation with low emissions;
- (c) changes to emission sources;
- (d) a change from calculation-based to measurement-based methodologies, or vice versa, used to determine emissions;
- (e) a change in the tier level applied;
- (f) the introduction of new source streams;
- (g) a change in the categorisation of source streams — between major, minor or *de-minimis* source streams;
- (h) a change of the default value for a calculation factor, where the value is to be laid down in the monitoring plan;
- (i) the introduction of new procedures related to sampling, analysis or calibration, where the changes of those procedures have a direct impact on the accuracy of emissions data;
- (j) the implementation or adaption of a quantification methodology for emissions from leakage at storage sites.

4. Significant changes to the monitoring plans of an aircraft operator shall include:

- (a) with regard to the emission monitoring plan:
 - (i) a change of tiers related to fuel consumption;
 - (ii) a change of emission factor values laid down in the monitoring plan;

- (iii) a change between calculation methods as laid down in Annex III;
 - (iv) the introduction of new source streams;
 - (v) a change in the categorisation of source streams where a minor source stream changes to a major source stream;
 - (vi) changes in the status of the aircraft operator as a small emitter within the meaning of Article 54(1);
- (b) with regard to the tonne-kilometre data monitoring plan:
- (i) a change between a non-commercial and commercial status of the air transport service provided;
 - (ii) a change in the object of the air-transport service, the object being passengers, freight or mail.

Article 16

Implementation and recordkeeping of modifications

1. Prior to receiving the approval or information in accordance with Article 15(2), the operator or aircraft operator may carry out monitoring and reporting using the modified monitoring plan where they can reasonably assume that the proposed modifications are not significant, or where monitoring in accordance with the original monitoring plan would lead to incomplete emission data.

In case of doubt, the operator or aircraft operator shall carry out all monitoring and reporting, and in the interim documentation, in parallel, using both the modified and the original monitoring plan.

2. Upon the receipt of the approval or information in accordance with Article 15(2), the operator or aircraft operator shall only use the data relating to the modified monitoring plan and carry out all monitoring and reporting using only the modified monitoring plan.

3. The operator or aircraft operator shall keep records of all modifications of the monitoring plan. In each record, the following shall be specified:

- (a) transparent description of the modification;
- (b) a justification for the modification;
- (c) the date of notification of the modification to the competent authority;

(d) the date of acknowledgement, by the competent authority, of the receipt of the notification referred to in Article 15(1), where available, and the date of the approval or information referred to in Article 15(2);

(e) the starting date of implementation of the modified monitoring plan in accordance with paragraph 2 of this Article.

SECTION 2

Technical feasibility and unreasonable costs

Article 17

Technical feasibility

Where an operator or aircraft operator claims that applying a specific monitoring methodology is technically not feasible, the competent authority shall assess the technical feasibility taking the operator's or aircraft operator's justification into account. That justification shall be based on the operator or aircraft operator having technical resources capable of meeting the needs of a proposed system or requirement that can be implemented in the required time for the purposes of this Regulation. Those technical resources shall include availability of required techniques and technology.

Article 18

Unreasonable costs

1. Where an operator or aircraft operator claims that applying a specific monitoring methodology incurs unreasonable costs, the competent authority shall assess the unreasonable nature of the costs, taking into account the operator's justification.

The competent authority shall consider costs unreasonable where the cost estimation exceeds the benefit. To that end, the benefit shall be calculated by multiplying an improvement factor with a reference price of EUR 20 per allowance and costs shall include an appropriate depreciation period based on the economic lifetime of the equipment.

2. When assessing the unreasonable nature of the costs with regard to the choice of tier levels for activity data, the competent authority shall use as the improvement factor referred to in paragraph 1 the difference between the uncertainty currently achieved and the uncertainty threshold of the tier which would be achieved by the improvement multiplied by the average annual emissions caused by that source stream over the three most recent years.

In the absence of the average annual emissions caused by that source stream over the three most recent years, the operator or aircraft operator shall provide a conservative estimate of the annual average emissions, with the exclusion of CO₂ stemming from biomass and before subtraction of transferred CO₂. For measuring instruments under national legal metrological control, the uncertainty currently achieved may be substituted by the maximum permissible error in service allowed by the relevant national legislation.

3. When assessing the unreasonable nature of the costs with regard to measures increasing the quality of reported emissions but without direct impact on the accuracy of activity data, the competent authority shall use an improvement factor of 1 % of the average annual emissions of the respective source streams of the three most recent reporting periods. Those measures may include:

- (a) a switch from default values to analyses for the determination of calculation factors;
- (b) an increase of the number of analyses per source stream;
- (c) where the specific measuring task does not fall under national legal metrological control, the substitution of measuring instruments with instruments complying with relevant requirements of legal metrological control of the Member State in similar applications, or to measuring instruments meeting national rules adopted pursuant to Directive 2004/22/EC or Directive 2009/23/EC of the European Parliament and of the Council ⁽¹⁾;
- (d) shortening of calibration and maintenance intervals of measuring instruments;
- (e) improvements of data flow activities and control activities reducing the inherent or control risk significantly.

4. Measures relating to the improvement of an installation's monitoring methodology in accordance with Article 69 shall not be deemed to incur unreasonable costs up to an accumulated amount of EUR 2 000 per reporting period. For installations with low emissions that threshold shall be EUR 500 per reporting period.

CHAPTER III

MONITORING OF EMISSIONS OF STATIONARY INSTALLATIONS

SECTION 1

General provisions

Article 19

Categorisation of installations and source streams

1. Each operator shall determine the category of its installation pursuant to paragraph 2, and, where relevant, of each source stream pursuant to paragraph 3 for the purpose of monitoring emissions and determining the minimum requirements for tiers.

2. The operator shall classify each installation in one of the following categories:

- (a) a category A installation, where average verified annual emissions of the trading period immediately preceding the current trading period, with the exclusion of CO₂ stemming from biomass and before subtraction of transferred CO₂, are equal to or less than 50 000 tonnes of CO_{2(e)};
- (b) a category B installation, where the average verified annual emissions of the trading period immediately preceding the current trading period, with the exclusion of CO₂ stemming from biomass and before subtraction of transferred CO₂, are more than 50 000 tonnes of CO_{2(e)} and equal to or less than 500 000 tonnes of CO_{2(e)};
- (c) a category C installation, where the average verified annual emissions of the trading period immediately preceding the current trading period, with the exclusion of CO₂ stemming from biomass and before subtraction of transferred CO₂, are more than 500 000 tonnes of CO_{2(e)}.

3. The operator shall classify each source stream, comparing the source stream against the sum of all absolute values of fossil CO₂ and CO_{2(e)} corresponding to all source streams included in calculation-based methodologies and of all emissions of emission sources monitored using measurement-based methodologies, before subtraction of transferred CO₂, in one of the following categories:

- (a) minor source streams, where the source streams selected by the operator jointly correspond to less than 5 000 tonnes of fossil CO₂ per year or to less than 10 %, up to a total maximum contribution of 100 000 tonnes of fossil CO₂ per year, whichever is the highest in terms of absolute value;
- (b) *de-minimis* source streams, where the source streams selected by the operator jointly correspond to less than 1 000 tonnes of fossil CO₂ per year or to less than 2 %, up to a total maximum contribution of 20 000 tonnes of fossil CO₂ per year, whichever is the highest in terms of absolute value;
- (c) major source streams, where the source streams do not classify in any category referred to in points (a) and (b).

4. Where the average annual verified emissions of the trading period immediately preceding the current trading period for the installation are not available or inaccurate, the operator shall use a conservative estimate of annual average emissions, with the exclusion of CO₂ stemming from biomass and before subtraction of transferred CO₂, to determine the category of the installation.

⁽¹⁾ OJ L 122, 16.5.2009, p. 6.

*Article 20***Monitoring boundaries**

1. An operator shall define the monitoring boundaries for each installation.

Within those boundaries, the operator shall include all relevant greenhouse gas emissions from all emission sources and source streams belonging to activities carried out at the installation and listed in Annex I to Directive 2003/87/EC, as well as from activities and greenhouse gases included by a Member State pursuant to Article 24 of Directive 2003/87/EC.

The operator shall also include emissions from regular operations and abnormal events including start-up and shut-down and emergency situations over the reporting period, with the exception of emissions from mobile machinery for transportation purposes.

2. When defining the monitoring and reporting process, the operator shall include the sector specific requirements laid down in Annex IV.

3. Where leakages from a storage complex pursuant to Directive 2009/31/EC are identified and lead to emissions, or release of CO₂ to the water column, they shall be considered as emission sources for the respective installation and shall be monitored in accordance with section 23 of Annex IV to this Regulation.

The competent authority may allow the exclusion of a leakage emission source from the monitoring and reporting process, once corrective measures pursuant to Article 16 of Directive 2009/31/EC have been taken and emissions or release into the water column from that leakage can no longer be detected.

*Article 21***Choice of the monitoring methodology**

1. For the monitoring of the emissions of an installation, the operator shall choose to apply either a calculation-based methodology or a measurement-based methodology, subject to specific provisions of this Regulation.

A calculation-based methodology shall consist in determining emissions from source streams based on activity data obtained by means of measurement systems and additional parameters from laboratory analyses or default values. The calculation-based methodology may be implemented through the standard methodology set out in Article 24 or the mass balance methodology set out in Article 25.

A measurement-based methodology shall consist in determining emissions from emission sources by means of continuous measurement of the concentration of the relevant greenhouse gas in the flue gas and of the flue gas flow, including the

monitoring of CO₂ transfers between installations where the CO₂ concentration and the flow of the transferred gas are measured.

Where the calculation-based methodology is applied, the operator shall for each source stream define, in the monitoring plan, whether the standard methodology or the mass balance methodology is used, including the relevant tiers in accordance with Annex II.

2. An operator may combine, subject to approval by the competent authority, standard methodology, mass balance and measurement-based methodologies for different emission sources and source streams belonging to one installation, provided that neither gaps nor double counting concerning emissions occur.

3. Where the operator does not choose a measurement-based methodology, the operator shall choose the methodology required by the relevant section of Annex IV, unless he provides evidence to the competent authorities that the use of such methodology is technically not feasible or incurs unreasonable costs, or that another methodology leads to a higher overall accuracy of emissions data.

*Article 22***Monitoring methodology not based on tiers**

By way of derogation from Article 21(1), the operator may use a monitoring methodology that is not based on tiers (hereinafter 'the fall-back methodology') for selected source streams or emission sources, provided that all of the following conditions are met:

- (a) applying at least tier 1 under the calculation-based methodology for one or more major source streams or minor source streams and a measurement-based methodology for at least one emission source related to the same source streams is technically not feasible or would incur unreasonable costs;
- (b) the operator assesses and quantifies each year the uncertainties of all parameters used for the determination of the annual emissions in accordance with the ISO Guide to the Expression of Uncertainty in Measurement (JCGM 100:2008), or another equivalent internationally accepted standard, and includes the results in the annual emissions report;
- (c) the operator demonstrates to the satisfaction of the competent authority that by applying such a fall-back monitoring methodology, the overall uncertainty thresholds for the annual level of greenhouse gas emissions for the whole installation do not exceed 7,5 % for category A installations, 5,0 % for category B installations and 2,5 % for category C installations.

*Article 23***Temporary changes to the monitoring methodology**

1. Where it is for technical reasons temporarily not feasible to apply the tier in the monitoring plan for the activity data or each calculation factor of a fuel or material stream as approved by the competent authority, the operator concerned shall apply the highest achievable tier until the conditions for application of the tier approved in the monitoring plan have been restored.

The operator shall take all necessary measures to allow the prompt restoration of the tier in the monitoring plan as approved by the competent authority.

2. The operator concerned shall notify the temporary change referred to in paragraph 1 to the monitoring methodology without undue delay to the competent authority, specifying:

- (a) the reasons for the deviation from the tier;
- (b) in detail the interim monitoring methodology that the operator uses to determine the emissions until the conditions for the application of the tier in the monitoring plan have been restored;
- (c) the measures the operator is taking to restore the conditions for the application of the tier in the monitoring plan approved by the competent authority;
- (d) the anticipated point in time when application of the tier as approved by the competent authority will be resumed.

*SECTION 2***Calculation-based methodology***Subsection 1***General***Article 24***Calculation of emissions under the standard methodology**

1. Under the standard methodology, the operator shall calculate combustion emissions per source stream by multiplying the activity data related to the amount of fuel combusted, expressed as terajoules based on net calorific value (NCV), with the corresponding emission factor, expressed as tonnes CO₂ per terajoule (t CO₂/TJ) consistent with the use of NCV, and with the corresponding oxidation factor.

The competent authority may allow the use of emission factors for fuels, expressed as t CO₂/t or t CO₂/Nm³. In that case, the operator shall determine combustion emissions by multiplying the activity data related to the amount of fuel combusted,

expressed as tonnes or normal cubic metres, with the corresponding emission factor and the corresponding oxidation factor.

2. The operator shall determine process emissions per source stream by multiplying the activity data related to the material consumption, throughput or production output, expressed in tonnes or normal cubic metres with the corresponding emission factor, expressed in t CO₂/t or t CO₂/Nm³, and the corresponding conversion factor.

3. Where a tier 1 or tier 2 emission factor already includes the effect of incomplete chemical reactions, the oxidation factor or conversion factor shall be set to 1.

*Article 25***Calculation of emissions under the mass balance methodology**

1. Under the mass balance methodology, the operator shall calculate the CO₂ quantity corresponding to each source stream included in the mass balance by multiplying the activity data related to the amount of material entering or leaving the boundaries of the mass balance, with the material's carbon content multiplied by 3 664 t CO₂/t C, applying section 3 of Annex II.

2. Notwithstanding Article 49, the emissions of the total process covered by the mass balance shall be the sum of the CO₂ quantities corresponding to all source streams covered by the mass balance. CO emitted to the atmosphere shall be calculated in the mass balance as emission of the molar equivalent amount of CO₂.

*Article 26***Applicable tiers**

1. When defining the relevant tiers in accordance with Article 21(1), to determine the activity data and each calculation factor, each operator shall apply the following:

- (a) at least the tiers listed in Annex V, in the case of an installation that is a category A installation, or where a calculation factor is required for a source stream that is a commercial standard fuel;
- (b) in other cases than those referred to in point (a), the highest tier as defined in Annex II.

However, the operator may apply a tier one level lower than required in accordance with the first subparagraph for category C installations and up to two levels lower for category A and B installations, with a minimum of tier 1, where it shows to the satisfaction of the competent authority that the tier required in accordance with the first subparagraph is technically not feasible or incurs unreasonable costs.

The competent authority may, for a transitional period of up to three years, allow an operator to apply lower tiers than those referred to in the second subparagraph, with a minimum of tier 1, provided that both of the following conditions are met:

- (a) the operator shows to the satisfaction of the competent authority that the tier required pursuant to the second subparagraph is technically not feasible or incurs unreasonable costs;
- (b) the operator provides an improvement plan indicating how and by when at least the tier required pursuant to the second subparagraph will be reached.

2. For activity data and each calculation factor for minor source streams, the operator shall apply the highest tier which is technically feasible and does not incur unreasonable costs, with a minimum of tier 1.

3. For activity data and each calculation factor for *de-minimis* source streams, the operator may determine activity data and each calculation factor by using conservative estimations instead of using tiers, unless a defined tier is achievable without additional effort.

4. For the oxidation factor and conversion factor, the operator shall, as a minimum, apply the lowest tiers listed in Annex II.

5. Where the competent authority has allowed the use of emission factors expressed as t CO₂/t or t CO₂/Nm³ for fuels, and for fuels used as process input or in mass balances in accordance with Article 25, the net calorific value may be monitored using lower tiers than the highest tier as defined in Annex II.

Subsection 2

Activity data

Article 27

Determination of activity data

1. The operator shall determine the activity data of a source stream in one of the following ways:

- (a) based on continual metering at the process which causes the emissions;
- (b) based on aggregation of metering of quantities separately delivered taking into account relevant stock changes.

2. For the purposes of point (b) of paragraph 1, the quantity of fuel or material processed during the reporting period shall be calculated as the quantity of fuel or material purchased during the reporting period, minus the quantity of fuel or

material exported from the installation, plus the quantity of fuel or material in stock at the beginning of the reporting period, minus the quantity of fuel or material in stock at the end of the reporting period.

Where it is technically not feasible or would incur unreasonable costs to determine quantities in stock by direct measurement, the operator may estimate those quantities based on one of the following:

- (a) data from previous years and correlated with output for the reporting period;
- (b) documented procedures and respective data in audited financial statements for the reporting period.

Where the determination of activity data for the entire calendar year is technically not feasible or would incur unreasonable costs, the operator may choose the next most appropriate day to separate a reporting year from the following one, and reconcile accordingly to the calendar year required. The deviations involved for one or more source streams shall be clearly recorded, form the basis of a value representative for the calendar year, and be considered consistently in relation to the next year.

Article 28

Measurement systems under the operator's control

1. For determining the activity data in accordance with Article 27, the operator shall use metering results based on measurement systems under its own control at the installation, provided that all of the following conditions are complied with:

- (a) the operator must carry out an uncertainty assessment and ensures that the uncertainty threshold of the relevant tier level is met;
- (b) the operator must ensure at least once per year, and after each calibration of measuring instruments, that the calibration results multiplied by a conservative adjustment factor based on an appropriate time series of previous calibrations of that or similar measuring instruments for taking into account the effect of uncertainty in service, are compared with the relevant uncertainty thresholds.

Where tier thresholds approved in accordance with Article 12 are exceeded or equipment found not to conform to other requirements, the operator shall take corrective action without undue delay and notify the competent authority thereof.

2. The operator shall provide the uncertainty assessment referred to in point (a) of paragraph 1 to the competent authority when notifying a new monitoring plan or when it is relevant for a change to the approved monitoring plan.

The assessment shall comprise the specified uncertainty of the applied measuring instruments, uncertainty associated with the calibration, and any additional uncertainty connected to how the measuring instruments are used in practice. Uncertainty related to stock changes shall be included in the uncertainty assessment where the storage facilities are capable of containing at least 5 % of the annual used quantity of the fuel or material considered. When carrying out the assessment, the operator shall take into account the fact that the stated values used to define tier uncertainty thresholds in Annex II refer to the uncertainty over the full reporting period.

The operator may simplify the uncertainty assessment by assuming that the maximum permissible errors specified for the measuring instrument in service, or where lower, the uncertainty obtained by calibration, multiplied by a conservative adjustment factor for taking into account the effect of uncertainty in service, is to be regarded as the uncertainty over the whole reporting period as required by the tier definitions in Annex II, provided that measuring instruments are installed in an environment appropriate for their use specifications.

3. Notwithstanding paragraph 2, the competent authority may allow the operator to use metering results based on measurement systems under its own control at the installation, where the operator provides evidence that the measuring instruments applied are subject to relevant national legal metrological control.

For that purpose, the maximum permissible error in service allowed by the relevant national legislation on legal metrological control for the relevant measuring task may be used as the uncertainty value without providing further evidence.

Article 29

Measurement systems outside the operator's own control

1. Where, based on a simplified uncertainty assessment, the use of measurement systems outside the operator's own control, compared to the use of those within the operator's own control pursuant to Article 28, allows the operator to comply with at least as high a tier, gives more reliable results and is less prone to control risks, the operator shall determine the activity data from measurement systems outside its own control.

To that end, the operator may revert to one of the following data sources:

(a) amounts from invoices issued by a trade partner, provided that a commercial transaction between two independent trade partners takes place;

(b) direct readings from the measurement systems.

2. The operator shall ensure compliance with the applicable tier pursuant to Article 26.

To that end, the maximum permissible error in service allowed by relevant legislation for national legal metrological control for the relevant commercial transaction may be used as uncertainty without providing further evidence.

Where the applicable requirements under national legal metrological control are less stringent than the applicable tier pursuant to Article 26, the operator shall obtain evidence on the applicable uncertainty from the trade partner responsible for the measurement system.

Subsection 3

Calculation factors

Article 30

Determination of calculation factors

1. The operator shall determine calculation factors either as default values or values based on analysis depending on the applicable tier.

2. The operator shall determine and report calculation factors consistently with the state used for related activity data, referring to the fuel's or material's state in which the fuel or material is purchased or used in the emission causing process, before it is dried or otherwise treated for laboratory analysis.

Where such an approach incurs unreasonable costs, or where higher accuracy can be achieved, the operator may consistently report activity data and calculation factors referring to the state in which laboratory analyses are carried out.

Article 31

Default values for calculation factors

1. Where the operator determines calculation factors as default values, it shall, in accordance with the requirement of the applicable tier, as set out in Annexes II and VI, use one of the following values:

(a) standard factors and stoichiometric factors listed in Annex VI;

(b) standard factors used by the Member State for its national inventory submission to the Secretariat of the United Nations Framework Convention on Climate Change;

(c) literature values agreed with the competent authority, including standard factors published by the competent authority, which are compatible with factors referred to in point (b), but they are representative of more disaggregated sources of fuel streams;

- (d) values specified and guaranteed by the supplier of a material where the operator can demonstrate to the satisfaction of the competent authority that the carbon content exhibits a 95 % confidence interval of not more than 1 %;
- (e) values based on analyses carried out in the past, where the operator can demonstrate to the satisfaction of the competent authority that those values are representative for future batches of the same material.

2. The operator shall specify all default values used in the monitoring plan.

Where the default values change on an annual basis, the operator shall specify the authoritative applicable source of that value in the monitoring plan.

3. The competent authority may only approve a change of default values for a calculation factor in the monitoring plan pursuant to Article 15(2), where the operator provides evidence that the new default value leads to a more accurate determination of emissions.

4. Upon application by the operator, the competent authority may allow that the net calorific value and emission factors of fuels are determined using the same tiers as required for commercial standard fuels provided that the operator submits, at least every three years, evidence that the 1 % interval for the specified calorific value has been met during the last three years.

Article 32

Calculation factors based on analyses

1. The operator shall ensure that any analyses, sampling, calibrations and validations for the determination of calculation factors are carried out by applying methods based on corresponding EN standards.

Where such standards are not available, the methods shall be based on suitable ISO standards or national standards. Where no applicable published standards exist, suitable draft standards, industry best practice guidelines or other scientifically proven methodologies shall be used, limiting sampling and measurement bias.

2. Where online gas chromatographs or extractive or non-extractive gas analysers are used for emission determination, the operator shall obtain approval from the competent authority for the use of such equipment. The equipment shall be used only with regard to composition data of gaseous fuels and materials. As minimum quality assurance measures, the operator shall ensure that an initial validation and annually repeated validations of the instrument are performed.

3. The result of any analysis shall be used only for the delivery period or batch of fuel or material for which the samples have been taken, and for which the samples were intended to be representative.

For the determination of a specific parameter the operator shall use the results of all analyses made with regards to that parameter.

Article 33

Sampling plan

1. Where calculation factors are determined by analyses, the operator shall submit to the competent authority for approval for each fuel or material a sampling plan in the form of a written procedure, which contains information on methodologies for the preparation of samples, including information on responsibilities, locations, frequencies and quantities, and methodologies for the storage and transport of samples.

The operator shall ensure that the derived samples are representative for the relevant batch or delivery period and free of bias. Relevant elements of the sampling plan shall be agreed with the laboratory carrying out the analysis for the respective fuel or material, and evidence of that agreement shall be included in the plan. The operator shall make the plan available for the purposes of verification pursuant to Regulation (EU) No 600/2012.

2. The operator shall, in agreement with the laboratory carrying out the analysis for the respective fuel or material and subject to the approval of the competent authority, adapt the elements of the sampling plan where analytical results indicate that the heterogeneity of the fuel or material significantly differs from the information on heterogeneity on which the original sampling plan for that specific fuel or material was based.

Article 34

Use of laboratories

1. The operator shall ensure that laboratories used to carry out analyses for the determination of calculation factors are accredited in accordance with EN ISO/IEC 17025, for the relevant analytical methods.

2. Laboratories not accredited in accordance with EN ISO/IEC 17025 may only be used for the determination of calculation factors where the operator can demonstrate to the satisfaction of the competent authority that access to laboratories referred to in paragraph 1 is technically not feasible or would incur unreasonable costs and that the non-accredited laboratory meets requirements equivalent to EN ISO/IEC 17025.

3. The competent authority shall deem a laboratory to meet the requirements equivalent to EN ISO/IEC 17025 within the meaning of paragraph 2 where the operator provides, to the extent feasible, in the form of and to a similar level of detail required for procedures pursuant to Article 12(2), evidence in accordance with the second and the third subparagraph of this paragraph.

With respect to quality management, the operator shall produce an accredited certification of the laboratory in conformity with EN ISO/IEC 9001, or other certified quality management systems that cover the laboratory. In the absence of such certified quality management systems, the operator shall provide other appropriate evidence that the laboratory is capable of managing its personnel, procedures, documents and tasks in a reliable manner.

With respect to technical competence, the operator shall provide evidence that the laboratory is competent and able to generate technically valid results using the relevant analytical procedures. Such evidence shall cover at least the following elements:

- (a) management of the personnel's competence for the specific tasks assigned;
- (b) suitability of accommodation and environmental conditions;
- (c) selection of analytical methods and relevant standards;
- (d) where applicable, management of sampling and sample preparation, including control of sample integrity;
- (e) where applicable, development and validation of new analytical methods or application of methods not covered by international or national standards;
- (f) uncertainty estimation;
- (g) management of equipment, including procedures for calibration, adjustment, maintenance and repair of equipment, and record keeping thereof;
- (h) management and control of data, documents and software;
- (i) management of calibration items and reference materials;
- (j) quality assurance for calibration and test results, including regular participation in proficiency testing schemes, applying analytical methods to certified reference materials, or inter-comparison with an accredited laboratory;

(k) management of outsourced processes;

(l) management of assignments, customer complaints, and ensuring timely corrective action.

Article 35

Frequencies for analyses

1. The operator shall apply the minimum frequencies for analyses for relevant fuels and materials listed in Annex VII. Annex VII will be reviewed on a regular basis and in the first instance not more than two years from this Regulation entering into force.

2. The competent authority may allow the operator to use a different frequency than those referred to in paragraph 1, where minimum frequencies are not available or where the operator demonstrates one of the following:

- (a) based on historical data, including analytical values for the respective fuels or materials in the reporting period immediately preceding the current reporting period, any variation in the analytical values for the respective fuel or material does not exceed 1/3 of the uncertainty value to which the operator has to adhere with regard to the activity data determination of the relevant fuel or material;
- (b) using the required frequency would incur unreasonable costs.

Subsection 4

Specific calculation factors

Article 36

Emission factors for CO₂

1. The operator shall determine activity-specific emission factors for CO₂ emissions.

2. Emission factors of fuels, including when used as process input, shall be expressed as t CO₂/TJ.

The competent authority may allow the operator to use an emission factor for a fuel expressed as t CO₂/t or t CO₂/Nm³ for combustion emissions, where the use of an emission factor expressed as t CO₂/TJ incurs unreasonable costs or where at least equivalent accuracy of the calculated emissions can be achieved by using such an emission factor.

3. For the conversion of the carbon content into the respective value of a CO₂ related emission factor or vice versa, the operator shall use the factor 3 664 t CO₂/t C.

Article 37

Oxidation and conversion factors

1. The operator shall use as a minimum tier 1 to determine oxidation or conversion factors. The operator shall use a value of 1 for oxidation or for a conversion factor where the emission factor includes the effect of incomplete oxidation or conversion.

However, the competent authority may require operators to always use tier 1.

2. Where several fuels are used within an installation and tier 3 is to be used for the specific oxidation factor, the operator may ask for the approval of the competent authority for one or both of the following:

- (a) the determination of one aggregate oxidation factor for the whole combustion process and to apply it to all fuels;
- (b) the attribution of the incomplete oxidation to one major source stream and use of a value of 1 for the oxidation factor of the other source streams.

Where biomass or mixed fuels are used, the operator shall provide evidence that application of points (a) or (b) of the first subparagraph does not lead to an underestimation of emissions.

Subsection 5

Treatment of biomass

Article 38

Biomass source streams

1. The operator may determine the activity data of biomass source streams without using tiers and providing analytical evidence regarding the biomass content, where that source stream consists exclusively of biomass and the operator can ensure that it is not contaminated with other materials or fuels.

2. The emission factor of biomass shall be zero.

The emission factor of a mixed fuel or material shall be calculated and reported as the preliminary emission factor determined in accordance with Article 30 multiplied by the fossil fraction of the fuel or material.

3. Peat, xylite and fossil fractions of mixed fuels or materials shall not be considered biomass.

4. Where the biomass fraction of mixed fuels or materials is equal or higher than 97 %, or where due to the amount of the emissions associated with the fossil fraction of the fuel or material it qualifies as a *de-minimis* source stream, the

competent authority may allow the operator to apply no-tier methodologies, including the energy balance method, for determining activity data and relevant calculation factors, unless the respective value is to be used for the subtraction of biomass derived CO₂ from emissions determined by means of continuous emission measurement.

Article 39

Determination of biomass and fossil fraction

1. Where subject to the tier level required and to the availability of appropriate default values as referred to in Article 31(1), the biomass fraction of a specific fuel or material are determined using analyses, the operator shall determine that biomass fraction on the basis of a relevant standard and the analytical methods therein, and apply that standard only if approved by the competent authority.

2. Where the determination of the biomass fraction of a mixed fuel or material by analysis in accordance with paragraph 1 is technically not feasible or would incur unreasonable costs, the operator shall base its calculation on standard emission factors and biomass fraction values for mixed fuels and materials and estimation methods published by the Commission.

In the absence of such standard factors and values, the operator shall either assume the absence of a biomass share or submit an estimation method to determine the biomass fraction to the competent authority for approval. For fuels or materials originating from a production process with defined and traceable input streams, the operator may base such estimation on a mass balance of fossil and biomass carbon entering and leaving the process.

3. By way of derogation from paragraphs 1 and 2 and Article 30, where the guarantee of origin has been established in accordance with Articles 2(j) and 15 of Directive 2009/28/EC for biogas injected into and subsequently removed from a gas network, the operator shall not use analyses for the determination of the biomass fraction.

SECTION 3

Measurement-based methodology

Article 40

Use of the measurement-based monitoring methodology

The operator shall use measurement-based methodologies for all emissions of nitrous oxide (N₂O) as laid down in Annex IV, and for quantifying CO₂ transferred pursuant to Article 49.

In addition, the operator may use measurement-based methodologies for CO₂ emission sources where it can provide evidence that for each emission source the tiers required in accordance with Article 41 are complied with.

Article 41

Tier requirements

1. For each emission source which emits more than 5 000 tonnes of CO_{2(e)} per year, or which contributes more than 10 % of the total annual emissions of the installation, whichever is higher in terms of absolute emissions, the operator shall apply the highest tier listed in section 1 of Annex VIII. For all other emission sources, the operator shall apply at least one tier lower than the highest tier.

2. Only where the operator can demonstrate to the satisfaction of the competent authority that application of the tier required under paragraph 1 is technically not feasible or incurs unreasonable costs and application of a calculation methodology using the tier levels required by Article 26 is technically not feasible or incurs unreasonable costs, may a next lower tier be used for the relevant emission source, with a minimum of tier 1.

Article 42

Measurement standards and laboratories

1. All measurements shall be carried out applying methods based on EN 14181 Stationary source emissions — Quality assurance of automated measuring systems, EN 15259 Air quality — Measurement of stationary source emissions — Requirements for measurement sections and sites and for the measurement objective, plan and report, and other corresponding EN standards.

Where such standards are not available, the methods shall be based on suitable ISO standards, standards published by the Commission or national standards. Where no applicable published standards exist, suitable draft standards, industry best practice guidelines or other scientifically proven methodologies shall be used, limiting sampling and measurement bias.

The operator shall consider all relevant aspects of the continuous measurement system, including the location of the equipment, calibration, measurement, quality assurance and quality control.

2. The operator shall ensure that laboratories carrying out measurements, calibrations and relevant equipment assessments for continuous emission measurement systems (CEMS) shall be accredited in accordance with EN ISO/IEC 17025 for the relevant analytical methods or calibration activities.

Where the laboratory does not have such accreditation, the operator shall ensure that equivalent requirements of Article 34(2) and (3) are met.

Article 43

Determination of emissions

1. The operator shall determine the annual emissions from an emission source over the reporting period by summing up

over the reporting period all hourly values of the measured greenhouse gas concentration multiplied by the hourly values of the flue gas flow, where the hourly values shall be averages over all individual measurement results of the respective operating hour.

In the case of CO₂ emissions, the operator shall determine annual emission on the basis of equation 1 in Annex VIII. CO emitted to the atmosphere shall be treated as the molar equivalent amount of CO₂.

In the case of nitrous oxide (N₂O), the operator shall determine annual emissions on the basis of the equation in subsection B.1 of section 16 of Annex IV.

2. Where several emission sources exist in one installation and cannot be measured as one emission source, the operator shall measure emissions from those sources separately and add the results to obtain the total emissions of the specific gas over the reporting period.

3. The operator shall determine the greenhouse gas concentration in the flue gas by continuous measurement at a representative point through one of the following:

(a) direct measurement;

(b) in the case of a high concentration in the flue gas, calculation of the concentration using an indirect concentration measurement applying Equation 3 of Annex VIII and taking into account the measured concentration values of all other components of the gas stream as laid down in the operator's monitoring plan.

4. Where relevant, the operator shall determine separately any CO₂ amount stemming from biomass using calculation-based monitoring methodologies and subtract it from the total measured CO₂ emissions.

5. The operator shall determine the flue gas flow for the calculation in accordance with paragraph 1 by one of the following methods:

(a) calculation by means of a suitable mass balance, taking into account all significant parameters on the input side, including for CO₂ emissions at least input material loads, input airflow and process efficiency, as well as on the output side including at least the product output, the O₂, SO₂ and NO_x concentration;

(b) determination by continuous flow measurement at a representative point.

*Article 44***Data aggregation**

1. The operator shall calculate hourly averages for each parameter, including concentrations and flue gas flow, relevant for determining emissions using a measurement-based methodology by using all data points available for that specific hour.

Where an operator can generate data for shorter reference periods without additional cost, he shall use those periods for the determination of the annual emissions in accordance with Article 43(1).

2. Where the continuous measurement equipment for a parameter is out of control, out of range or out of operation for part of the hour or reference period referred to in paragraph 1, the operator shall calculate the related hourly average pro rata to the remaining data points for that specific hour or shorter reference period provided that at least 80 % of the maximum number of data points for a parameter are available. Article 45(2) to (4) shall apply where less than 80 % of the maximum number of data points for a parameter are available.

*Article 45***Missing data**

1. Where a piece of measurement equipment within the continuous emissions monitoring system is out of operation for more than five consecutive days in any calendar year, the operator shall inform the competent authority without undue delay and propose adequate measures to improve the quality of the continuous emissions monitoring system affected.

2. Where a valid hour or shorter reference period in accordance with Article 44(1) of data cannot be provided for one or more parameters of the measurement-based methodology due to the equipment being out of control, out of range or out of operation, the operator shall determine values for substitution of each missing hour of data.

3. Where a valid hour or shorter reference period of data cannot be provided for a parameter directly measured as concentration, the operator shall calculate a substitution value as the sum of an average concentration and twice the standard deviation associated with that average, using Equation 4 in Annex VIII.

Where the reporting period is not applicable for determining such substitution values due to significant technical changes at the installation, the operator shall agree with the competent authority a representative timeframe for determining the average and standard deviation, where possible with the duration of one year.

4. Where a valid hour of data cannot be provided for a parameter other than concentration, the operator shall obtain substitute values of that parameter through a suitable mass balance model or an energy balance of the process. The operator shall validate the results by using the remaining measured parameters of the measurement-based methodology and data at regular working conditions considering a time period of the same duration as the data gap.

*Article 46***Corroborating with calculation of emissions**

The operator shall corroborate emissions determined by a measurement-based methodology, with the exception of nitrous oxide (N₂O) emissions from nitric acid production and greenhouse gases transferred to a transport network or a storage site, by calculating the annual emissions of each considered greenhouse gas for the same emission sources and source streams.

The use of tier methodologies shall not be required.

*SECTION 4***Special provisions***Article 47***Installations with low emissions**

1. The competent authority may allow the operator to submit a simplified monitoring plan in accordance with Article 13, provided that it operates an installation with low emissions.

The first subparagraph shall not apply to installations carrying out activities for which N₂O is included pursuant to Annex I to Directive 2003/87/EC.

2. For the purposes of the first subparagraph of paragraph 1, an installation shall be considered an installation with low emissions where at least one of the following conditions is met:

- (a) the average annual emissions of that installation reported in the verified emission reports during the trading period immediately preceding the current trading period, with the exclusion of CO₂ stemming from biomass and before subtraction of transferred CO₂, were less than 25 000 tonnes of CO_{2(e)} per year;
- (b) the average annual emissions referred to in point (a) are not available or are no longer applicable because of changes in the installation's boundaries or changes to the operating conditions of the installation, but the annual emissions of that installation for the next five years, with the exclusion of CO₂ stemming from biomass and before subtraction of transferred CO₂, will be, based on a conservative estimation method, less than 25 000 tonnes of CO_{2(e)} per year.

3. The operator of an installation with low emissions shall not be required to submit the supporting documents referred to in the third subparagraph of Article 12(1), and shall be exempt from the requirement of reporting on improvement referred to in Article 69(4).

4. By way of derogation from Article 27, the operator of an installation with low emissions may determine the amount of fuel or material by using available and documented purchasing records and estimated stock changes. The operator shall also be exempt from the requirement to provide the uncertainty assessment referred to in Article 28(2) to the competent authority.

5. The operator of an installation with low emissions shall be exempt from the requirement of Article 28(2) to determine stock data at the beginning and the end of the reporting period, where the storage facilities are capable of containing at least 5 % of the annual consumption of fuel or material during the reporting period, in order to include related uncertainty in an uncertainty assessment.

6. By way of derogation from Article 26(1) the operator of an installation with low emissions may apply as a minimum tier 1 for the purposes of determining activity data and calculation factors for all source streams, unless higher accuracy is achievable without additional effort for the operator, without providing evidence that applying higher tiers is technically not feasible or would incur unreasonable costs.

7. For the purpose of determining calculation factors on the basis of analyses in accordance with Article 32, the operator of an installation with low emissions may use any laboratory that is technically competent and able to generate technically valid results using the relevant analytical procedures, and provides evidence for quality assurance measures as referred to in Article 34(3).

8. Where an installation with low emissions subject to simplified monitoring exceeds the threshold referred to in paragraph 2 in any calendar year, its operator shall notify the competent authority thereof without undue delay.

The operator shall, without undue delay, submit a significant modification of the monitoring plan within the meaning of point (b) of Article 15(3), to the competent authority for approval.

However, the competent authority shall allow that the operator continues simplified monitoring provided that that operator demonstrates to the satisfaction of the competent authority that the threshold referred to in paragraph 2 has not already been exceeded within the past five reporting periods and will not be exceeded again from the following reporting period onwards.

Article 48

Inherent CO₂

1. Inherent CO₂ which is transferred into an installation, including that contained in natural gas or a waste gas including blast furnace gas or coke oven gas, shall be included in the emission factor for that fuel.

2. Where inherent CO₂ originates from activities covered by Annex I to Directive 2003/87/EC or included pursuant to Article 24 of that Directive and is subsequently transferred out of the installation as part of a fuel to another installation and activity covered by that Directive, it shall not be counted as emissions of the installation where it originates.

However, where inherent CO₂ is emitted, or transferred out of the installation to entities not covered by that Directive, it shall be counted as emissions of the installation where it originates.

3. The operators may determine quantities of inherent CO₂ transferred out of the installation both at the transferring and at the receiving installation. In that case, the quantities of respectively transferred and received inherent CO₂ shall be identical.

Where the quantities of transferred and received inherent CO₂ are not identical, the arithmetic average of both measured values shall be used in both the transferring and receiving installations' emission reports, where the deviation between the values can be explained by the uncertainty of the measurement systems. In such case, the emission report shall refer to the alignment of that value.

Where the deviation between the values cannot be explained by the approved uncertainty range of the measurement systems, the operators of the transferring and receiving installations shall align the values by applying conservative adjustments approved by the competent authority.

Article 49

Transferred CO₂

1. The operator shall subtract from the emissions of the installation any amount of CO₂ originating from fossil carbon in activities covered by Annex I to Directive 2003/87/EC, which is not emitted from the installation, but transferred out of the installation to any of the following:

- (a) a capture installation for the purpose of transport and long-term geological storage in a storage site permitted under Directive 2009/31/EC;
- (b) a transport network with the purpose of long-term geological storage in a storage site permitted under Directive 2009/31/EC;

- (c) a storage site permitted under Directive 2009/31/EC for the purpose of long-term geological storage.

For any other transfer of CO₂ out of the installation, no subtraction of CO₂ from the installation's emissions shall be allowed.

2. The operator of the installation out of which the CO₂ transferred shall provide in its annual emission report the receiving installation's installation identification code recognised in accordance with Commission Regulation (EU) No 1193/2011 of 18 November 2011 establishing a Union Registry for the trading period commencing on 1 January 2013, and subsequent trading periods, of the Union emissions trading scheme pursuant to Directive 2003/87/EC of the European Parliament and of the Council and Decision No 280/2004/EC of the European Parliament and of the Council and amending Regulations (EC) No 2216/2004 and (EU) No 920/2010 ⁽¹⁾.

The first subparagraph shall also apply to the receiving installation with respect to the transferring installation's installation identification code.

3. For the determination of the quantity of CO₂ transferred from one installation to another, the operator shall apply a measurement-based methodology including in accordance with Articles 43, 44 and 45. The emission source shall correspond to the measurement point and the emissions shall be expressed as the quantity of CO₂ transferred.

4. For determining the quantity of CO₂ transferred from one installation to another, the operator shall apply tier 4 as defined in section 1 of Annex VIII.

However, the operator may apply the next lower tier provided that it establishes that applying tier 4 as defined in section 1 of Annex VIII is technically not feasible or incurs unreasonable costs.

5. The operators may determine quantities of CO₂ transferred out of the installation both at the transferring and at the receiving installation. In that case, Article 48(3) shall apply.

CHAPTER IV

MONITORING OF EMISSIONS AND TONNE-KILOMETRE DATA FROM AVIATION

Article 50

General provisions

1. Each aircraft operator shall monitor and report emissions from aviation activities for all flights included in Annex I to

Directive 2003/87/EC that are performed by that aircraft operator during the reporting period and for which the aircraft operator is responsible.

To that end, the aircraft operator shall attribute all flights to the calendar year according to the time of departure measured in Coordinated Universal Time.

2. The aircraft operator intending to apply for an allocation of allowances free of charge pursuant to Articles 3e or 3f of Directive 2003/87/EC shall also monitor tonne-kilometre data for the same flights during the respective monitoring years.

3. For the purpose of identifying the unique aircraft operator referred to in point (o) of Article 3 of Directive 2003/87/EC that is responsible for a flight, the call sign used for air traffic control purposes, shall be used. The call sign shall be one of the following:

(a) the ICAO designator laid down in box 7 of the flight plan;

(b) where the ICAO designator of the aircraft operator is not available, the registration markings of the aircraft.

4. Where the identity of the aircraft operator is not known, the competent authority shall consider the owner of the aircraft as aircraft operator unless it proves the identity the aircraft operator responsible.

Article 51

Submission of monitoring plans

1. At the latest four months before an aircraft operator commences aviation activities covered by Annex I to Directive 2003/87/EC, it shall submit to the competent authority a monitoring plan for the monitoring and reporting of emissions in accordance with Article 12.

By way of derogation from the first subparagraph, an aircraft operator that performs an aviation activity covered by Annex I to Directive 2003/87/EC for the first time that could not be foreseen four months in advance of the activity, shall submit a monitoring plan to the competent authority without undue delay, but no later than six weeks after performance of that activity. The aircraft operator shall provide adequate justification to the competent authority why a monitoring plan could not be submitted four months in advance of the activity.

Where the administering Member State referred to in Article 18a of Directive 2003/87/EC is not known in advance, the aircraft operator shall without undue delay submit the monitoring plan when information on the competent authority of the administering Member State becomes available.

⁽¹⁾ OJ L 315, 29.11.2011, p. 1.

2. Where the aircraft operator is intending to apply for an allocation of allowances free of charge pursuant to Articles 3e or 3f of Directive 2003/87/EC, it shall also submit a monitoring plan for the monitoring and reporting of tonne-kilometre data. That monitoring plan shall be submitted at the latest four months prior to the start of one of the following:

- (a) the monitoring year mentioned in Article 3e(1) of Directive 2003/87/EC for applications pursuant to that Article;
- (b) the second calendar year of the period referred to in Article 3c(2) of Directive 2003/87/EC for applications pursuant to Article 3f of that Directive.

Article 52

Monitoring methodology for emissions from aviation activities

1. Each aircraft operator shall determine the annual CO₂ emissions from aviation activities by multiplying the annual consumption of each fuel expressed in tonnes by the respective emission factor.

2. Each aircraft operator shall determine the fuel consumption for each flight and for each fuel, including fuel consumed by the auxiliary power unit. For that purpose, the aircraft operator shall use one of the methods laid down in section 1 of Annex III. The aircraft operator shall choose the method which provides for the most complete and timely data combined with the lowest uncertainty without incurring unreasonable costs.

3. Each aircraft operator shall determine the fuel uplift referred to in section 1 of Annex III based on one of the following:

- (a) the measurement by the fuel supplier, as documented in the fuel delivery notes or invoices for each flight;
- (b) data from aircraft onboard measurement systems recorded in the mass and balance documentation, in the aircraft technical log or transmitted electronically from the aircraft to the aircraft operator.

4. The aircraft operator shall determine fuel contained in the tank using data from aircraft onboard measurement systems and recorded in the mass and balance documentation, in the aircraft technical log or transmit it electronically from the aircraft to the aircraft operator.

5. Aircraft operators shall apply tier 2 as set out in section 2 of Annex III.

However, aircraft operators having reported average annual emissions over the trading period immediately preceding the current trading period, which were equal to or less than 50 000 tonnes of fossil CO₂ may apply as a minimum tier 1 as defined in section 2 of Annex III. All aircraft operators may apply as a minimum tier 1 as defined in section 2 of Annex III for source streams jointly corresponding to less than 5 000 tonnes of fossil CO₂ per year or less than 10 %, up to a maximum contribution of 100 000 tonnes of fossil CO₂ per year, whichever is highest in terms of absolute value. Where, for the purposes of this subparagraph reported emissions are not available or no longer applicable, the aircraft operator may use a conservative estimate or projection to determine the average annual emissions.

6. Where the amount of fuel uplift or the amount of fuel remaining in the tanks is determined in units of volume, expressed in litres, the aircraft operator shall convert that amount from volume to mass by using actual density values. The aircraft operator shall determine the actual density by using one of the following:

- (a) on-board measurement systems;
- (b) the density measured by the fuel supplier at fuel uplift and recorded on the fuel invoice or delivery note.

The actual density shall be expressed in kg/litre and determined for the applicable temperature for a specific measurement.

In cases for which actual density values are not available, a standard density factor of 0,8 kg/litre shall be applied upon approval by the competent authority.

7. For the purposes of the calculation referred to in paragraph 1, the aircraft operator shall use the default emission factors set out in Table 2 in Annex III.

For reporting purposes, that approach shall be considered as tier 1. For fuels not listed in that table, the aircraft operator shall determine the emission factor in accordance with Article 32, considered as tier 2. For such fuels, the net calorific value shall be determined and reported as a memo-item.

8. By way of derogation from paragraph 7, the aircraft operator may, upon approval by the competent authority, derive the emission factor or the carbon content, on which it is based, or the net calorific value for commercially traded fuels from the purchasing records for the respective fuel provided by the fuel supplier, provided that those have been derived based on internationally accepted standards and the emission factors listed in Table 2 in Annex III cannot be applied.

*Article 53***Specific provisions for biomass**

Article 39 shall apply accordingly to the determination of the biomass fraction of a mixed fuel.

Notwithstanding Article 39(2), the competent authority shall allow the use of a methodology uniformly applicable in all Member States for the determination of the biomass fraction, as appropriate.

Under that methodology, the biomass fraction, net calorific value and emission factor or carbon content of the fuel used in an EU ETS aviation activity listed in Annex I to Directive 2003/87/EC shall be determined using fuel purchase records.

The methodology shall be based on the guidelines provided by the Commission to facilitate its consistent application in all Member States.

The use of biofuels for aviation shall be assessed in accordance with Article 18 of Directive 2009/28/EC.

*Article 54***Small emitters**

1. Aircraft operators operating fewer than 243 flights per period for three consecutive four-month periods and aircraft operators operating flights with total annual emissions lower than 25 000 tonnes CO₂ per year shall be considered small emitters.

2. By way of derogation from Article 52, small emitters may estimate the fuel consumption using tools implemented by Eurocontrol or another relevant organisation, which can process all relevant air traffic information corresponding to that available to Eurocontrol and avoid any underestimations of emissions.

The applicable tools may only be used if they are approved by the Commission including the application of correction factors to compensate for any inaccuracies in the modelling methods.

3. By way of derogation from Article 12, a small emitter who intends to make use of any of the tools referred to in paragraph 2 of this Article may submit only the following information in the monitoring plan for emissions:

(a) information required pursuant to point 1 of section 2 of Annex I;

(b) evidence that the thresholds for small emitters set out in paragraph 1 of this Article are met;

(c) the name of or reference to the tool as referred to in paragraph 2 of this Article that will be used for estimating the fuel consumption.

A small emitter shall be exempted from the requirement to submit the supporting documents referred to in the third subparagraph of Article 12(1).

4. Where an aircraft operator uses any of the tools referred to in paragraph 2 and exceeds the thresholds referred to in paragraph 1 during a reporting year, the aircraft operator shall notify the competent authority thereof without undue delay.

The aircraft operator shall, without undue delay, submit a significant modification of the monitoring plan within the meaning of point (vi) of Article 15(4)(a) to the competent authority for approval.

However, the competent authority shall allow that the aircraft operator continues to use a tool referred to in paragraph 2 provided that that aircraft operator demonstrates to the satisfaction of the competent authority that the thresholds referred to in paragraph 1 have not already been exceeded within the past five reporting periods and will not be exceeded again from the following reporting period onwards.

*Article 55***Sources of uncertainty**

1. The aircraft operator shall identify sources of uncertainty and their associated levels of uncertainty. The aircraft operator shall consider that information when selecting the monitoring methodology pursuant to Article 52(2).

2. Where the aircraft operator determines fuel uplifts in accordance with point (a) of Article 52(3), it shall not be required to provide further proof of the associated uncertainty level.

3. Where on-board systems are used for measuring fuel uplift or fuel contained in tanks in accordance with point (b) of Article 52(3), the level of uncertainty associated with fuel measurements shall be supported by all of the following:

(a) the aircraft manufacturer's specifications determining uncertainty levels of on-board fuel measurement systems;

(b) evidence of carrying out routine checks of the satisfactory operation of the fuel measurement systems.

4. Notwithstanding paragraphs 2 and 3, the aircraft operator may base uncertainties for all other components of the monitoring methodology on conservative expert judgement taking into account the estimated number of flights within the reporting period.

5. The aircraft operator shall regularly perform suitable control activities, including cross-checks between the fuel uplift quantity as provided by invoices and the fuel uplift quantity indicated by on-board measurement, and take corrective action if notable deviations are observed.

Article 56

Determination of tonne-kilometre data

1. The aircraft operator intending to apply for an allocation of allowances free of charge pursuant to Articles 3e or 3f of Directive 2003/87/EC shall monitor tonne-kilometre data for all flights covered by Annex I to Directive 2003/87/EC in the monitoring years relevant for such applications.

2. The aircraft operator shall calculate tonne-kilometre data by multiplying the distance, calculated in accordance with section 4 of Annex III and expressed in kilometres (km), with the payload, calculated as the sum of the mass of freight, mail, passengers and checked baggage expressed in tonnes (t).

3. The aircraft operator shall determine the mass of freight and mail on the basis of the actual or standard mass contained in the mass and balance documentation for the relevant flights.

Aircraft operators not required to have a mass and balance documentation shall propose in the monitoring plan a suitable methodology for determining the mass of freight and mail, while excluding the tare weight of all pallets and containers that are not payload and the service weight.

4. The aircraft operator shall determine the mass of passengers using one of the following tiers:

- (a) Tier 1: consisting in a default value of 100 kg for each passenger including their checked baggage;
- (b) Tier 2: consisting in the mass for passengers and checked baggage contained in the mass and balance documentation for each flight.

However, the tier selected shall apply to all flights in the monitoring years relevant for applications pursuant to Articles 3e or 3f of Directive 2003/87/EC.

CHAPTER V

DATA MANAGEMENT AND CONTROL

Article 57

Data flow activities

1. The operator or aircraft operator shall establish, document, implement and maintain written procedures for data flow activities for the monitoring and reporting of greenhouse gas emissions and ensure that the annual emission report resulting from data flow activities, does not contain misstatements and is in conformance with the monitoring plan, those written procedures and this Regulation.

Where the aircraft operator intends to apply for an allocation of allowances free of charge pursuant to Articles 3e or 3f of Directive 2003/87/EC, the first subparagraph shall also apply to the monitoring and reporting of tonne-kilometre data.

2. Descriptions of written procedures for data flow activities in the monitoring plan shall at least cover the following elements:

- (a) the items of information listed in Article 12(2);
- (b) identification of the primary data sources;
- (c) each step in the data flow from primary data to annual emissions or tonne-kilometre data which shall reflect the sequence and interaction between the data flow activities;
- (d) the relevant processing steps related to each specific data flow activity including the formulas and data used to determine the emissions or tonne-kilometre data;
- (e) relevant electronic data processing and storage systems used as well as the interaction between such systems and other inputs including manual input;
- (f) the way outputs of data flow activities are recorded.

Article 58

Control system

1. The operator or aircraft operator shall establish, document, implement and maintain an effective control system to ensure that the annual emission report and, where applicable, the tonne-kilometre report resulting from data flow activities does not contain misstatements and is in conformity with the monitoring plan and this Regulation.

2. The control system referred to in paragraph 1 shall consist of the following:

- (a) an operator's or aircraft operator's assessment of inherent risks and control risks;
- (b) written procedures related to control activities that are to mitigate the risks identified.

3. Written procedures related to control activities as referred to in point (b) of paragraph 2 shall at least include:

- (a) quality assurance of the measurement equipment;
- (b) quality assurance of the information technology system used for data flow activities, including process control computer technology;
- (c) segregation of duties in the data flow activities and control activities as well as management of necessary competencies;
- (d) internal reviews and validation of data;
- (e) corrections and corrective action;
- (f) control of out-sourced processes;
- (g) keeping records and documentation including the management of document versions.

4. The operator or aircraft operator shall monitor the effectiveness of the control system, including by carrying out internal reviews and taking into account the findings of the verifier during the verification of annual emission reports and, where applicable, tonne-kilometre data reports, carried out pursuant to Regulation (EU) No 600/2012.

Whenever the control system is found to be ineffective or not commensurate with the risks identified, the operator or aircraft operator shall seek to improve the control system and update the monitoring plan or the underlying written procedures for data flow activities, risk assessments and control activities as appropriate.

Article 59

Quality assurance

1. For the purposes of point (a) of Article 58(3), the operator or aircraft operator shall ensure that all relevant measuring equipment is calibrated, adjusted and checked at regular intervals including prior to use, and checked against

measurement standards traceable to international measurement standards, where available, in accordance with the requirements of this Regulation and proportionate to the risks identified.

Where components of the measuring systems cannot be calibrated, the operator or aircraft operator shall identify those in the monitoring plan and propose alternative control activities.

When the equipment is found not to comply with required performance, the operator or aircraft operator shall promptly take necessary corrective action.

2. With regard to continuous emission measurement systems, the operator shall apply quality assurance based on the standard Quality assurance of automated measuring systems (EN 14181), including parallel measurements with standard reference methods at least once per year, performed by competent staff.

Where such quality assurance requires emission limit values (ELVs) as necessary parameters for the basis of calibration and performance checks, the annual average hourly concentration of the greenhouse gas shall be used as a substitute for such ELVs. Where the operator finds a non-compliance with the quality assurance requirements, including that recalibration has to be performed, it shall report that circumstance to the competent authority and take corrective action without undue delay.

Article 60

Quality assurance of information technology

For the purposes of point (b) of Article 58(3), the operator or aircraft operator shall ensure that the information technology system is designed, documented, tested, implemented, controlled and maintained in a way to process reliable, accurate and timely data in accordance with the risks identified in accordance with point (a) of Article 58(2).

The control of the information technology system shall include access control, control of back up, recovery, continuity planning and security.

Article 61

Segregation of duties

For the purposes of point (c) of Article 58(3), the operator or aircraft operator shall assign responsible persons for all data flow activities and for all control activities in a way to segregate conflicting duties. In the absence of other control activities, it shall ensure for all data flow activities commensurate with the identified inherent risks that all relevant information and data shall be confirmed by at least one person who has not been involved in the determination and recording of that information or data.

The operator or aircraft operator shall manage the necessary competencies for the responsibilities involved, including the appropriate assignment of responsibilities, training, and performance reviews.

Article 62

Internal reviews and validation of data

1. For the purposes of point (d) of Article 58(3) and based on the inherent risks and control risks identified in the risk assessment referred to in point (a) of Article 58(2), the operator or aircraft operator shall review and validate data resulting from the data flow activities referred to in Article 57.

Such review and validation of the data shall at least include:

- (a) a check as to whether the data are complete;
- (b) a comparison of the data that the operator or aircraft operator has obtained, monitored and reported over several years;
- (c) a comparison of data and values resulting from different operational data collection systems, including the following comparisons, where applicable:
 - (i) a comparison of fuel or material purchasing data with data on stock changes and data on consumption for the applicable source streams;
 - (ii) a comparison of calculation factors that have been determined by analysis, calculated or obtained from the supplier of the fuel or material, with national or international reference factors of comparable fuels or materials;
 - (iii) a comparison of emissions obtained from measurement-based methodologies and the results of the corroborating calculation pursuant to Article 46;
 - (iv) a comparison of aggregated data and raw data.

2. The operator or aircraft operator shall, to the extent possible, ensure the criteria for rejecting data as part of the review and validation are known in advance. For that purpose the criteria for rejecting data shall be laid down in the documentation of the relevant written procedures.

Article 63

Corrections and corrective action

1. Where any part of the data flow activities referred to in Article 57 or control activities referred to in Article 58 is found not to function effectively, or to function outside boundaries that are set in documentation of procedures for those data flow

activities and control activities, the operator or aircraft operator shall make appropriate corrections and correct rejected data whilst avoiding underestimation of emissions.

2. For the purpose of paragraph 1, the operator or aircraft operator shall at least proceed to all of the following:

- (a) assessment of the validity of the outputs of the applicable steps in the data flow activities referred to in Article 57 or control activities referred to in Article 58;
- (b) determination of the cause of the malfunctioning or error concerned;
- (c) implementation of appropriate corrective action, including correcting any affected data in the emission report or tonne-kilometre report, as appropriate.

3. The operator or aircraft operator shall carry out the corrections and corrective actions pursuant to paragraph 1 of this Article such that they are responsive to the inherent risks and control risks identified in the risk assessment referred to in Article 58.

Article 64

Out-sourced processes

Where the operator or aircraft operator outsources one or more data flow activities referred to in Article 57 or control activities referred to in Article 58, the operator or aircraft operator shall proceed to all of the following:

- (a) check the quality of the outsourced data flow activities and control activities in accordance with this Regulation;
- (b) define appropriate requirements for the outputs of the outsourced processes as well as the methods used in those processes;
- (c) check the quality of the outputs and methods referred to in point (b) of this Article;
- (d) ensure that outsourced activities are carried out such that those are responsive to the inherent risks and control risks identified in the risk assessment referred to in Article 58.

Article 65

Treatment of data gaps

1. Where data relevant for the determination of the emissions of an installation are missing, the operator shall use an appropriate estimation method for determining conservative surrogate data for the respective time period and missing parameter.

Where the operator has not laid down the estimation method in a written procedure, it shall establish such written procedure and submit to the competent authority an appropriate modification of the monitoring plan in accordance with Article 15 for approval.

2. Where data relevant for the determination of an aircraft operator's emissions for one flight or more flights are missing, the aircraft operator shall use surrogate data for the respective time period calculated in accordance with the alternative method defined in the monitoring plan.

Where surrogate data cannot be determined in accordance with the first subparagraph of this paragraph, the emissions for that flight or those flights may be estimated by the aircraft operator from the fuel consumption determined by using a tool referred to in Article 54(2).

Article 66

Records and documentation

1. The operator or aircraft operator shall keep records of all relevant data and information, including information as listed in Annex IX, for at least 10 years.

The documented and archived monitoring data shall allow for the verification of the annual emissions report or tonne-kilometre data in accordance with Regulation (EU) No 600/2012. Data reported by the operator or aircraft operator contained in an electronic reporting and data management system set up by the competent authority may be considered to be retained by the operator or aircraft operator, if they can access those data.

2. The operator or aircraft operator shall ensure that relevant documents are available when and where they are needed to perform the data flow activities as well as control activities.

The operator or aircraft operator shall, upon request, make those documents available to the competent authority as well as to the verifier verifying the emissions report or tonne-kilometre data report in accordance with Regulation (EU) No 600/2012.

CHAPTER VI

REPORTING REQUIREMENTS

Article 67

Timing and obligations for reporting

1. The operator or aircraft operator shall submit to the competent authority by 31 March of each year an emission report that covers the annual emissions of the reporting period and that is verified in accordance with Regulation (EU) No 600/2012.

However, competent authorities may require operators or aircraft operators to submit the verified annual emission report earlier than by 31 March, but by 28 February at the earliest.

2. Where the aircraft operator chooses to apply for the allocation of emission allowances free of charge pursuant to Article 3e or 3f of Directive 2003/87/EC, the aircraft operator shall submit to the competent authority by 31 March of the year following the monitoring year referred to in Article 3e or 3f of that Directive a tonne-kilometre data report that covers the tonne-kilometre data of the monitoring year and that is verified in accordance with Regulation (EU) No 600/2012.

3. The annual emission reports and tonne-kilometre data reports shall at least contain the information listed in Annex X.

Article 68

Force majeure

1. Where an aircraft operator cannot provide verified tonne-kilometre data to the competent authority by the relevant deadline pursuant to Article 3e(1) of Directive 2003/87/EC because of serious and unforeseeable circumstances outside of its control, that aircraft operator shall submit to the competent authority, for the purposes of that provision, the best tonne-kilometre data that can be made available given the circumstances, including data based, where necessary, on credible estimates.

2. Where the conditions set out in paragraph 1 are met, the Member State shall, for the purposes of the application referred to in Article 3e(1) of Directive 2003/87/EC and in accordance with paragraph 2 of that Article, submit the data received in respect of the aircraft operator concerned, together with an explanation of the circumstances that led to the absence of a report verified in accordance with Regulation (EU) No 600/2012, to the Commission.

The Commission and the Member States shall use those data for the purposes of Article 3e(3) and (4) of Directive 2003/87/EC.

3. Where the Member State submits data received in respect of an aircraft operator to the Commission pursuant to paragraph 2 of this Article, the aircraft operator concerned shall ensure a verification of the submitted tonne-kilometre data in accordance with Regulation (EU) No 600/2012 as soon as possible and, in any case, upon termination of the circumstances referred to in paragraph 1 of this Article.

The aircraft operator shall, without undue delay, submit the verified data to the competent authority.

The competent authority concerned shall reduce and publish the revised allocation of free allowances for the aircraft operator pursuant to Article 3e(4) of Directive 2003/87/EC as appropriate. The relevant allocation shall not be increased. Where applicable, the aircraft operator shall return any excess allowances received pursuant to Article 3e(5) of that Directive.

4. The competent authority shall put into place effective measures to ensure that the aircraft operator concerned complies with its obligations pursuant to paragraph 3.

Article 69

Reporting on improvements to the monitoring methodology

1. Each operator or aircraft operator shall regularly check whether the monitoring methodology applied can be improved.

An operator of an installation shall submit to the competent authority for approval a report containing the information referred to in paragraph 2 or 3, where appropriate, by the following deadlines:

- (a) for a category A installation, by 30 June every four years;
- (b) for a category B installation, by 30 June every two years;
- (c) for a category C installation, by 30 June every year.

However, the competent authority may set an alternative date for submission of the report, but no later date than 30 September of the same year.

2. Where the operator does not apply at least the tiers required pursuant to the first subparagraph of Article 26(1) and to Article 41(1), the operator shall provide a justification as to why it is technically not feasible or would incur unreasonable costs to apply the required tiers.

However, where evidence is found that measures needed for reaching those tiers have become technically feasible and do not any more incur unreasonable costs, the operator shall notify the competent authority of appropriate modifications of the monitoring plan in accordance with Article 15, and submit proposals for implementing the related measures and its timing.

3. Where the operator applies a fall-back monitoring methodology referred to in Article 22, the operator shall provide: a justification as to why it is technically not feasible or would incur unreasonable costs to apply at least tier 1 for one or more major or minor source streams.

However, where evidence is found that measures needed for reaching at least tier 1 for those source streams have become technically feasible and do not any more incur unreasonable costs, the operator shall notify the competent authority of appropriate modifications of the monitoring plan in accordance with Article 15 and submit proposals for implementing the related measures and its timing.

4. Where the verification report established in accordance with Regulation (EU) No 600/2012 states outstanding non-conformities or recommendations for improvements, in accordance with Articles 27, 29 and 30 of that Regulation, the operator or aircraft operator shall submit to the competent authority for approval a report by 30 June of the year in which that verification report is issued by the verifier. That report shall describe how and when the operator or aircraft operator has rectified or plans to rectify the non-conformities identified by the verifier and to implement recommended improvements.

Where applicable, such report may be combined with the report referred to in paragraph 1 of this Article.

Where recommended improvements would not lead to an improvement of the monitoring methodology, the operator or aircraft operator shall provide a justification of why that is the case. Where the recommended improvements would incur unreasonable costs, the operator or aircraft operator shall provide evidence of the unreasonable nature of the costs.

Article 70

Determination of emissions by the competent authority

1. The competent authority shall make a conservative estimate of the emissions of an installation or aircraft operator in any of the following situations:

- (a) no verified annual emission report has been submitted by the operator or aircraft operator by the deadline required pursuant to Article 67(1);
- (b) the verified annual emission report referred to in Article 67(1) is not in compliance with this Regulation;
- (c) the emission report of an operator or aircraft operator has not been verified in accordance with Regulation (EU) No 600/2012.

2. Where a verifier has stated, in the verification report pursuant to Regulation (EU) No 600/2012, the existence of non-material misstatements which have not been corrected by the operator or aircraft operator before issuing the verification statement, the competent authority shall assess those misstatements, and make a conservative estimate of the emissions of the installation or aircraft operator where appropriate. The competent authority shall inform the operator or aircraft operator whether and which corrections are required to the emissions report. The operator or aircraft operator shall make that information available to the verifier.

3. Member States shall establish an efficient exchange of information between competent authorities responsible for approval of monitoring plans and competent authorities responsible for acceptance of annual emission reports.

*Article 71***Access to information**

Emission reports held by the competent authority shall be made available to the public by that authority subject to national rules adopted pursuant to Directive 2003/4/EC. With regard to the application of the exception, as specified in Article 4(2)(d) of that Directive, operators or aircraft operators may indicate in their report which information they consider commercially sensitive.

*Article 72***Rounding of data**

1. Total annual emissions shall be reported as rounded tonnes of CO₂ or CO_{2(e)}.

Tonne-kilometres shall be reported as rounded values of tonne-kilometres.

2. All variables used to calculate the emissions shall be rounded to include all significant digits for the purpose of calculating and reporting emissions.

3. All data per flights shall be rounded to include all significant digits for the purpose of calculating the distance and payload pursuant to Article 56 as well as reporting the tonne-kilometre data.

*Article 73***Ensuring consistency with other reporting**

Each activity listed in Annex I to Directive 2003/87/EC that is carried out by an operator or aircraft operator shall be labelled using the codes, where applicable, from the following reporting schemes:

- (a) the Common Reporting Format for national greenhouse gas inventory systems as approved by the respective bodies of the United Nations Framework Convention on Climate Change;
- (b) the installation's identification number in the European Pollutant Release and Transfer Register in accordance with Regulation (EC) No 166/2006 of the European Parliament and of the Council ⁽¹⁾;
- (c) the IPPC activity of Annex I to Regulation (EC) No 166/2006;
- (d) the NACE code in accordance with Regulation (EC) No 1893/2006 of the European Parliament and of the Council ⁽²⁾.

⁽¹⁾ OJ L 33, 4.2.2006, p. 1.

⁽²⁾ OJ L 393, 30.12.2006, p. 1.

CHAPTER VII

INFORMATION TECHNOLOGY REQUIREMENTS*Article 74***Electronic data exchange formats**

1. Member States may require the operator and aircraft operator to use electronic templates or specific file formats for submission of monitoring plans and changes to the monitoring plan, as well as for submission of annual emissions reports, tonne-kilometre data reports, verification reports and improvement reports.

Those templates or file format specifications established by the Member States shall, at least, contain the information contained in electronic templates or file format specifications published by the Commission.

2. When establishing the templates or file format specifications referred to in paragraph 1, the Member States may choose one or both of the following options:

- (a) file format specifications using a standardised electronic reporting language (hereinafter the 'EU ETS reporting language') based on XML for the use in connection with advanced automated systems;
- (b) templates published in a form usable by standard office software, including spreadsheets and word processor files.

*Article 75***Use of automated systems**

1. Where a Member State chooses to use automated systems for electronic data exchange based on the EU ETS reporting language in accordance with point (a) of Article 74(2), those systems shall ensure in a cost efficient way, through the implementation of technological measures in accordance with the current state of technology:

- (a) integrity of data, preventing modification of electronic messages during transmission;
- (b) confidentiality of data, through the use of security techniques, including encryption techniques, such that the data is only accessible to the party for which it was intended and that no data can be intercepted by unauthorised parties;
- (c) authenticity of data, such that the identity of both the sender and receiver of data is known and verified;
- (d) non-repudiation of data, such that one party of a transaction cannot deny having received a transaction nor can the other party deny having sent a transaction, by applying methods such as signing techniques, or independent auditing of system safeguards.

2. Any automated systems used by Member States based on the EU ETS reporting language for communication between the competent authority, operator and aircraft operator, as well as verifier and accreditation body within the meaning of Regulation (EU) No 600/2012, shall meet the following non-functional requirements, through implementation of technological measures in accordance with the current state of technology:

- (a) access control, such that the system is only accessible to authorised parties and no data can be read, written or updated by unauthorised parties, through implementation of technological measures in order to achieve the following:
 - (i) restriction of physical access to the hardware on which automated systems run through physical barriers;
 - (ii) restriction of logical access to the automated systems through the use of technology for identification, authentication and authorisation;
- (b) availability, such that data accessibility is ensured, even after significant time and the introduction of possible new software;

- (c) audit trail, such that it is ensured that changes to data can always be found and analysed in retrospect.

CHAPTER VIII

FINAL PROVISIONS

Article 76

Repeal of Decision 2007/589/EC and transitional provisions

1. Decision 2007/589/EC is repealed.
2. The provisions of Decision 2007/589/EC shall continue to apply to the monitoring, reporting and verification of emissions and, where applicable, activity data occurring prior to 1 January 2013.

Article 77

Entry into force

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

It shall apply from 1 January 2013.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, 21 June 2012.

For the Commission

The President

José Manuel BARROSO

ANNEX I

Minimum content of the monitoring plan (Article 12(1))**1. Minimum content of the monitoring plan for installations**

The monitoring plan for an installation shall contain at least the following information:

(1) general information on the installation:

- (a) a description of the installation and activities carried out by the installation to be monitored, containing a list of emissions sources and source streams to be monitored for each activity carried out within the installation and meeting the following criteria:
 - (i) the description must be sufficient for demonstrating that neither data gaps nor double counting of emissions occur;
 - (ii) a simple diagram of the emission sources, source streams, sampling points and metering equipment must be added where requested by the competent authority or where such diagram simplifies describing the installation or referencing emission sources, source streams, measuring instruments and any other parts of the installation relevant for the monitoring methodology including data flow activities and control activities;
- (b) a description of the procedure for managing the assignment of responsibilities for monitoring and reporting within the installation, and for managing the competences of responsible personnel;
- (c) a description of the procedure for regular evaluation of the monitoring plan's appropriateness, covering at least the following:
 - (i) checking the list of emissions sources and source streams, ensuring completeness of the emission sources and source streams and that all relevant changes in the nature and functioning of the installation will be included in the monitoring plan;
 - (ii) assessing compliance with the uncertainty thresholds for activity data and other parameters, where applicable, for the applied tiers for each source stream and emission source;
 - (iii) assessing potential measures for improvement of the monitoring methodology applied;
- (d) a description of the written procedures of the data flow activities pursuant to Article 57, including a diagram where appropriate for clarification;
- (e) a description of the written procedures for the control activities established pursuant to Article 58;
- (f) where applicable, information on relevant links with activities undertaken in the framework of the Community eco-management and audit scheme (EMAS) established pursuant to Regulation (EC) No 1221/2009 of the European Parliament and of the Council ⁽¹⁾, systems covered by harmonised standard ISO 14001:2004 and other environmental management systems including information on procedures and controls with relevance to greenhouse gas emissions monitoring and reporting;
- (g) the version number of the monitoring plan;

(2) a detailed description of the calculation-based methodologies where applied, consisting of the following:

- (a) a detailed description of the calculation-based methodology applied, including a list of input data and calculation formulae used, a list of the tiers applied for activity data and all relevant calculation factors for each of the source streams to be monitored;
- (b) where applicable and where the operator intends to make use of simplification for minor and *de-minimis* source streams, a categorisation of the source streams into major, minor and *de-minimis* source streams;
- (c) a description of the measurement systems used, and their measurement range, specified uncertainty and exact location of the measuring instruments to be used for each of the source streams to be monitored;

⁽¹⁾ OJ L 342, 22.12.2009, p. 1.

- (d) where applicable, the default values used for calculation factors indicating the source of the factor, or the relevant source, from which the default factor will be retrieved periodically, for each of the source streams;
 - (e) where applicable, a list of the analysis methods to be used for the determination of all relevant calculation factors for each of the source streams, and a description of the written procedures for those analyses;
 - (f) where applicable, a description of the procedure underpinning the sampling plan for the sampling of fuel and materials to be analysed, and the procedure used to revise the appropriateness of the sampling plan;
 - (g) where applicable, a list of laboratories engaged in carrying out relevant analytical procedures and, where the laboratory is not accredited as referred to in Article 34(1) a description of the procedure used for demonstrating the compliance with equivalent requirements in accordance with Article 34(2) and (3);
- (3) where a fall-back monitoring methodology is applied in accordance with Article 22, a detailed description of the monitoring methodology applied for all source streams or emission sources, for which no tier methodology is used, and a description of the written procedure used for the associated uncertainty analysis to be carried out;
- (4) a detailed description of the measurement-based methodologies, where applied, including the following:
- (a) a description of the measurement method including descriptions of all written procedures relevant for the measurement and the following:
 - (i) any calculation formulae used for data aggregation and used to determine the annual emissions of each emission source;
 - (ii) the method for determining whether valid hours or shorter reference periods for each parameter can be calculated, and for substitution of missing data in accordance with Article 45;
 - (b) a list of all relevant emission points during typical operation, and during restrictive and transition phases, including breakdown periods or commissioning phases, supplemented by a process diagram where requested by the competent authority;
 - (c) where flue gas flow is derived by calculation, a description of the written procedure for that calculation for each emission source monitored using a measurement-based methodology;
 - (d) a list of all relevant equipment, indicating its measurement frequency, operating range and uncertainty;
 - (e) a list of applied standards and of any deviations from those standards;
 - (f) a description of the written procedure for carrying out the corroborating calculations in accordance with Article 46, where applicable;
 - (g) a description of the method, how CO₂ stemming from biomass is to be determined and subtracted from the measured CO₂ emissions, and of the written procedure used for that purpose, where applicable;
- (5) in addition to elements listed in point 4, a detailed description of the monitoring methodology where N₂O emissions are monitored, where appropriate in the form of description of the written procedures applied, including a description of the following:
- (a) the method and parameters used to determine the quantity of materials used in the production process and the maximum quantity of material used at full capacity;
 - (b) the method and parameters used to determine the quantity of product produced as an hourly output, expressed as nitric acid (100 %), adipic acid (100 %), caprolactam, glyoxal and glyoxylic acid per hour respectively;
 - (c) the method and parameters used to determine the N₂O concentration in the flue gas from each emission source, its operating range, and its uncertainty, and details of any alternative methods to be applied where concentrations fall outside the operating range and the situations when this may occur;
 - (d) the calculation method used to determine N₂O emissions from periodic, unabated sources in nitric acid, adipic acid, caprolactam, glyoxal and glyoxylic acid production;
 - (e) the way in which or the extent to which the installation operates with variable loads, and the manner in which the operational management is carried out;

- (f) the method and any calculation formulae used to determine the annual N_2O emissions and the corresponding $\text{CO}_{2(e)}$ values of each emission source;
 - (g) information on process conditions that deviate from normal operations, an indication of the potential frequency and the duration of such conditions, as well as an indication of the volume of the N_2O emissions during the deviating process conditions such as abatement equipment malfunction;
- (6) a detailed description of the monitoring methodology as far as perfluorocarbons from primary aluminium production are monitored, where appropriate in the form of a description of the written procedures applied, including the following:
- (a) where applicable, the dates of measurement for the determination of the installation-specific emission factors SEF_{CF_4} or OVC , and $\text{F}_{\text{C}_2\text{F}_6}$, and a schedule for future repetitions of that determination;
 - (b) where applicable, the protocol describing the procedure used to determine the installation-specific emission factors for CF_4 and C_2F_6 , showing also that the measurements have been and will be carried out for a sufficiently long time for measured values to converge, but at least for 72 hours;
 - (c) where applicable, the methodology for determining the collection efficiency for fugitive emissions at installations for primary aluminium production;
 - (d) a description of cell type and type of anode;
- (7) a detailed description of the monitoring methodology where transfer of inherent CO_2 as part of a fuel in accordance with Article 48 or transfer of CO_2 in accordance with Article 49 are carried out, where appropriate in the form of a description of the written procedures applied, including the following:
- (a) where applicable, the location of equipment for temperature and pressure measurement in a transport network;
 - (b) where applicable, procedures for preventing, detecting and quantification of leakage events from transport networks;
 - (c) in the case of transport networks, procedures effectively ensuring that CO_2 is transferred only to installations which have a valid greenhouse gas emission permit, or where any emitted CO_2 is effectively monitored and accounted for in accordance with Article 49;
 - (d) identification of the receiving and transferring installations according to the installation identification code recognised in accordance with Regulation (EU) No 1193/2011;
 - (e) where applicable, a description of continuous measurement systems used at the points of transfer of CO_2 between installations transferring CO_2 in accordance with Articles 48 or 49;
 - (f) where applicable, a description of the conservative estimation method used for determining the biomass fraction of transferred CO_2 in accordance with Article 48 or 49;
 - (g) where applicable, quantification methodologies for emissions or CO_2 released to the water column from potential leakages as well as the applied and possibly adapted quantification methodologies for actual emissions or CO_2 released to the water column from leakages, as specified in section 23 of Annex IV.

2. Minimum content of monitoring plans for aviation emissions

1. The monitoring plan shall contain the following information for all aircraft operators:
- (a) the identification of the aircraft operator, call sign or other unique designator used for air traffic control purposes, contact details of the aircraft operator and of a responsible person at the aircraft operator, contact address, the administering Member State, the administering competent authority;
 - (b) an initial list of aircraft types in its fleet operated at the time of the submission of the monitoring plan and the number of aircraft per type, and an indicative list of additional aircraft types expected to be used including, where available, an estimated number of aircraft per type as well as the source streams (fuel types) associated with each aircraft type;
 - (c) a description of procedures, systems and responsibilities used to update the completeness of the list of emission sources over the monitoring year for the purpose of ensuring the completeness of monitoring and reporting of the emissions of owned aircraft as well as leased-in aircraft;

- (d) a description of the procedures used to monitor the completeness of the list of flights operated under the unique designator by aerodrome pair, and the procedures used for determining whether flights are covered by Annex I to Directive 2003/87/EC for the purpose of ensuring completeness of flights and avoiding double-counting;
 - (e) a description of the procedure for managing and assigning responsibilities for monitoring and reporting, and for managing the competences of responsible personnel;
 - (f) a description of the procedure for regular evaluation of the monitoring plan's appropriateness, including any potential measures for the improvement of the monitoring methodology and related procedures applied;
 - (g) a description of the written procedures of the data flow activities as required by Article 57, including a diagram, where appropriate, for clarification;
 - (h) a description of the written procedures for the control activities established under Article 58;
 - (i) where applicable, information on relevant links with activities undertaken in the framework of EMAS, systems covered by harmonised standard ISO 14001:2004 and other environmental management systems, including information on procedures and controls with relevance to greenhouse gas emissions monitoring and reporting;
 - (j) the version number of the monitoring plan.
2. The monitoring plan shall contain the following information for aircraft operators which are not small emitters in accordance with Article 54(1) or which do not intend to use a small emitter tool in accordance with Article 54(2):
- (a) a description of the written procedure to be used for defining the monitoring methodology for additional aircraft types which an aircraft operator expects to use;
 - (b) a description of the written procedures for monitoring fuel consumption in every aircraft, including:
 - (i) the chosen methodology (Method A or Method B) for calculating the fuel consumption; and where the same method is not applied for all aircraft types, a justification for that methodology, as well as a list specifying which method is used under which conditions;
 - (ii) procedures for the measurement of fuel uplifts and fuel in tanks, including the selected tiers, a description of the measuring instruments involved and the procedures for recording, retrieving, transmitting and storing information regarding measurements, as applicable;
 - (iii) the chosen method for the determination of density, where applicable;
 - (iv) a procedure to ensure that the total uncertainty of fuel measurements is consistent with the requirements of the required tier, where possible referring to national laws, clauses in customer contracts or fuel supplier accuracy standards;
 - (c) a list of deviations for specific aerodromes from the general monitoring methodology as described in point (b) where it is not possible for the aircraft operator due to special circumstances to provide all the required data for the required monitoring methodology;
 - (d) where relevant, the procedures for the measurement of the density used for fuel uplifts and fuel in tanks, including a description of the measuring instruments involved, or where measurement is not feasible, the standard value used and a justification for that methodology;
 - (e) emission factors used for each fuel type, or in the case of alternative fuels, the methodologies for determining the emission factors, including the methodology for sampling, methods of analysis, a description of the laboratories used and of their accreditation and/or of their quality assurance procedures;
 - (f) a description of the method to be used to determine surrogate data for closing data gaps pursuant to Article 65(2).

3. Minimum content of monitoring plans for tonne-kilometre data

The monitoring plan for tonne-kilometre data shall contain the following information:

- (a) the elements listed in point 1 of section 2 of this Annex;

- (b) a description of the written procedures used for determining tonne-kilometre data per flight, including:
- (i) the procedures, responsibilities, data sources and calculation formulae for determining and recording the distance per aerodrome pair;
 - (ii) the tier used for determining the mass of passengers including the checked in baggage; in the case of tier 2, a description of the procedure for obtaining the mass of passengers and baggage is to be provided;
 - (iii) a description of the procedures used to determine the mass of freight and mail, where applicable;
 - (iv) a description of the measurement devices used for measuring the mass of passengers, freight and mail as applicable.
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ANNEX II

Tier thresholds for calculation-based methodologies related to installations (Article 12(1))**1. Definition of tiers for activity data**

The uncertainty thresholds in Table 1 shall apply to tiers relevant to activity data requirements in accordance with point (a) of Article 28(1) and the first subparagraph of Article 29(2), and Annex IV, of this Regulation. The uncertainty thresholds shall be interpreted as maximum permissible uncertainties for the determination of source streams over a reporting period.

Where Table 1 does not include activities listed in Annex I to Directive 2003/87/EC and the mass balance is not applied, the operator shall use the tiers listed in Table 1 under 'Combustion of fuels and fuels used as process input' for those activities.

Table 1

Tiers for activity data (maximum permissible uncertainty for each tier)

Activity/source stream type	Parameter to which the uncertainty is applied	Tier 1	Tier 2	Tier 3	Tier 4
Combustion of fuels and fuels used as process input					
Commercial standard fuels	Amount of fuel [t] or [Nm ³]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
Other gaseous and liquid fuels	Amount of fuel [t] or [Nm ³]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
Solid fuels	Amount of fuel [t]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
Flaring	Amount of flare gas [Nm ³]	± 17,5 %	± 12,5 %	± 7,5 %	
Scrubbing: carbonate (Method A)	Amount carbonate consumed [t]	± 7,5 %			
Scrubbing: gypsum (Method B)	Amount gypsum produced [t]	± 7,5 %			
Refining of mineral oil					
Catalytic cracker regeneration (*)	Uncertainty requirements apply separately for each emission source	± 10 %	± 7,5 %	± 5 %	± 2,5 %
Hydrogen production	Hydrocarbon feed [t]	± 7,5 %	± 2,5 %		
Production of coke					
Mass balance methodology	Each input and output material [t]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
Metal ore roasting and sintering					
Carbonate input	Carbonate input material and process residues [t]	± 5 %	± 2,5 %		
Mass balance methodology	Each input and output material [t]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
Production of iron and steel					
Fuel as process input	Each mass flow into and from the installation [t]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
Mass balance methodology	Each input and output material [t]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
Production of cement clinker					
Kiln input based (Method A)	Each relevant kiln input [t]	± 7,5 %	± 5 %	± 2,5 %	
Clinker output (Method B)	Clinker produced [t]	± 5 %	± 2,5 %		

Activity/source stream type	Parameter to which the uncertainty is applied	Tier 1	Tier 2	Tier 3	Tier 4
CKD	CKD or bypass dust [t]	n.a. (**)	± 7,5 %		
Non-carbonate carbon	Each raw material [t]	± 15 %	± 7,5 %		

Production of lime and calcination of dolomite and magnesite

Carbonates (Method A)	Each relevant kiln input [t]	± 7,5 %	± 5 %	± 2,5 %	
Alkali earth oxide (Method B)	Lime produced [t]	± 5 %	± 2,5 %		
Kiln dust (Method B)	Kiln dust [t]	n.a. (**)	± 7,5 %		

Manufacture of glass and mineral wool

Carbonates (input)	Each carbonate raw material or additives associated with CO ₂ emissions [t]	± 2,5 %	± 1,5 %		
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Manufacture of ceramic products

Carbon inputs (Method A)	Each carbonate raw material or additive associated with CO ₂ emissions [t]	± 7,5 %	± 5 %	± 2,5 %	
Alkali oxide (Method B)	Gross production including rejected products and cullet from the kilns and shipment [t]	± 7,5 %	± 5 %	± 2,5 %	
Scrubbing	Dry CaCO ₃ consumed [t]	± 7,5 %			

Production of pulp and paper

Make up chemicals	Amount of CaCO ₃ and Na ₂ CO ₃ [t]	± 2,5 %	± 1,5 %		
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Production of carbon black

Mass balance methodology	Each input and output material [t]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
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Production of ammonia

Fuel as process input	Amount fuel used as process input [t] or [Nm ³]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
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Production of hydrogen and synthesis gas

Fuel as process input	Amount fuel used as process input for hydrogen production [t] or [Nm ³]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
Mass balance methodology	Each input and output material [t]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %

Production of bulk organic chemicals

Mass balance methodology	Each input and output material [t]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
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Production or processing of ferrous and non-ferrous metals, including secondary aluminium

Process emissions	Each input material or process residue used as input material in the process [t]	± 5 %	± 2,5 %		
Mass balance methodology	Each input and output material [t]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %

Primary aluminium production

Mass balance methodology	Each input and output material [t]	± 7,5 %	± 5 %	± 2,5 %	± 1,5 %
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Activity/source stream type	Parameter to which the uncertainty is applied	Tier 1	Tier 2	Tier 3	Tier 4
PFC emissions (slope method)	primary aluminium production in [t], anode effect minutes in [number anode effects/cell day] and [anode effect minutes/occurrence]	± 2,5 %	± 1,5 %		
PFC emissions (overvoltage method)	primary aluminium production in [t], anode effect overvoltage [mV] and current efficiency [-]	± 2,5 %	± 1,5 %		

(*) For monitoring emissions from catalytic cracker regeneration (other catalyst regeneration and flexi-cokers) in mineral oil refineries, the required uncertainty is related to the total uncertainty of all emissions from that source.

(**) Amount [t] of CKD or bypass dust (where relevant) leaving the kiln system over a reporting period estimated using industry best practice guidelines.

2. Definition of tiers for calculation factors for combustion emissions

Operators shall monitor CO₂ emissions from all types of combustion processes taking place under all activities as listed in Annex I to Directive 2003/87/EC or included in the Union Scheme under Article 24 of that Directive using the tier definitions laid down in this section. Where fuels are used as a process input, the same rules as for combustion emissions shall apply. Where fuels form part of a mass balance in accordance with Article 25(1) of this Regulation, the tier definitions for mass balances in section 3 of this Annex apply.

Process emissions from related exhaust gas scrubbing shall be monitored in accordance with subsection C of section 1 of Annex IV.

2.1. Tiers for emission factors

Where a biomass fraction is determined for a mixed fuel or material, the tiers defined shall relate to the preliminary emission factor. For fossil fuels and materials the tiers shall relate to the emission factor.

Tier 1: The operator shall apply one of the following:

- (a) the standard factors listed in section 1 of Annex VI;
- (b) other constant values in accordance with points (d) or (e) of Article 31(1), where no applicable value is contained in section 1 of Annex VI.

Tier 2a: The operator shall apply country specific emission factors for the respective fuel or material in accordance with points (b) and (c) of Article 31(1).

Tier 2b: The operator shall derive emission factors for the fuel based on one of the following established proxies, in combination with an empirical correlation as determined at least once per year in accordance with Articles 32 to 35 and 39:

- (a) density measurement of specific oils or gases, including those common to the refinery or steel industry;
- (b) net calorific value for specific coal types.

The operator shall ensure that the correlation satisfies the requirements of good engineering practice and that it is applied only to values of the proxy which fall into the range for which it was established.

Tier 3: The operator shall determine the emission factor in accordance with the relevant provisions of Articles 32 to 35.

2.2. Tiers for net calorific value (NCV)

Tier 1: The operator shall apply one of the following:

- (a) the standard factors listed in section 1 of Annex VI;
- (b) other constant values in accordance with points (d) or (e) of Article 31(1), where no applicable value is contained in section 1 of Annex VI.

Tier 2a: The operator shall apply country specific factors for the respective fuel in accordance with points (b) or (c) of Article 31(1).

Tier 2b: For commercially traded fuels the net calorific value as derived from the purchasing records for the respective fuel provided by the fuel supplier shall be used provided it has been derived based on accepted national or international standards.

Tier 3: The operator shall determine the net calorific value in accordance with Article 32 to 35.

2.3. Tiers for oxidation factors

Tier 1: The operator shall apply an oxidation factor of 1.

Tier 2: The operator shall apply oxidation factors for the respective fuel in accordance with points (b) or (c) of Article 31(1).

Tier 3: For fuels, the operator shall derive activity-specific factors based on the relevant carbon contents of ashes, effluents and other wastes and by-products, and other relevant incompletely oxidised gaseous forms of carbon emitted except CO. Composition data shall be determined in accordance with Article 32 to 35.

2.4. Tiers for biomass fraction

Tier 1: The operator shall apply a value from those published in accordance with the first subparagraph of Article 39(2) or a value determined in accordance with the second subparagraph of Article 39(2) or Article 39(3).

Tier 2: The operator shall determine specific factors in accordance with Article 39(1).

3. Definition of tiers for calculation factors for mass balances

Where an operator uses a mass balance in accordance with Article 25, it shall use the tier definitions of this section.

3.1. Tiers for carbon content

The operator shall apply one of the tiers listed in this point. For deriving the carbon content from an emission factor, the operator shall use the following equations:

(a) for emission factors expressed as t CO₂/TJ: $C = (EF \times NCV) / f$

(b) for emission factors expressed as t CO₂/t: $C = EF / f$

In those formulae, C is the carbon content expressed as fraction (tonne carbon per tonne product), EF is the emission factor, NCV is the net calorific value, and f is the factor laid down in Article 36(3).

Where a biomass fraction is determined for a mixed fuel or material, the tiers defined shall relate to the total carbon content. The biomass fraction of the carbon shall be determined using the tiers defined in section 2.4 of this Annex.

Tier 1: The operator shall apply one of the following:

- (a) the carbon content derived from standard factors listed in Annex VI sections 1 and 2;
- (b) other constant values in accordance with points (d) or (e) of Article 31(1), where no applicable value is contained in Annex VI sections 1 and 2.

Tier 2a: The operator shall derive the carbon content from country specific emission factors for the respective fuel or material in accordance with points (b) or (c) of Article 31(1).

Tier 2b: The operator shall derive the carbon content from emission factors for the fuel based on one of the following established proxies in combination with an empirical correlation as determined at least once per year in accordance with Articles 32 to 35:

- (a) density measurement of specific oils or gases common, for example, to the refinery or steel industry;
- (b) net calorific value for specific coals types.

The operator shall ensure that the correlation satisfies the requirements of good engineering practice and that it is applied only to values of the proxy which fall into the range for which it was established.

Tier 3: The operator shall determine the carbon content in accordance with the relevant provisions of Articles 32 to 35.

3.2. Tiers for net calorific values

The tiers defined in section 2.2 of this Annex shall be used.

4. Definition of tiers for the calculation factors for process emissions from carbonate decomposition

For all process emissions, where they are monitored using the standard methodology in accordance with Article 24(2), the following tier definitions for the emission factor shall be applied in the case of:

(a) Method A: Input based, the emission factor and activity data related to the amount of material input into the process.

(b) Method B: Output based, the emission factor and activity data related to the amount of output from the process.

4.1. *Tiers for the emission factor using Method A*

Tier 1: The determination of the amount of relevant carbonates in each relevant input material shall be carried out according to Articles 32 to 35. Stoichiometric ratios as listed in section 2 of Annex VI shall be used to convert composition data into emission factors.

4.2. *Tiers for the conversion factor using Method A*

Tier 1: A conversion factor of 1 shall be used.

Tier 2: Carbonates and other carbon leaving the process shall be considered by means of a conversion factor with a value between 0 and 1. The operator may assume complete conversion for one or several inputs and attribute unconverted materials or other carbon to the remaining inputs. The additional determination of relevant chemical parameters of the products shall be carried out in accordance with Articles 32 to 35.

4.3. *Tiers for the emission factor using Method B*

Tier 1: The operator shall apply the standard factors listed in Annex VI, section 2, Table 3.

Tier 2: The operator shall apply a country specific emission factor in accordance with points (b) or (c) of Article 31(1).

Tier 3: The determination of the amount of relevant metal oxides stemming from the decomposition of carbonates in the product shall be carried out in accordance with Articles 32 to 35. Stoichiometric ratios referred to in Annex VI, section 2, Table 3 shall be used to convert composition data into emission factors assuming that all of the relevant metal oxides have been derived from respective carbonates.

4.4. *Tiers for the conversion factor using Method B*

Tier 1: A conversion factor of 1 shall be used.

Tier 2: The amount of non-carbonate compounds of the relevant metals in the raw materials, including return dust or fly ash or other already calcined materials, shall be reflected by means of conversion factors with a value between 0 and 1 with a value of 1 corresponding to a full conversion of raw material carbonates into oxides. The additional determination of relevant chemical parameters of the process inputs shall be carried out in accordance with Articles 32 to 35.

ANNEX III

Monitoring methodologies for aviation (Article 52 and Article 56)**1. Calculation methodologies for the determination of GHGs in the aviation sector****Method A**

The operator shall use the following formula:

Actual fuel consumption for each flight [t] = Amount of fuel contained in aircraft tanks once fuel uplift for the flight is complete [t] – Amount of fuel contained in aircraft tanks once fuel uplift for subsequent flight is complete [t] + Fuel uplift for that subsequent flight [t]

Where there is no fuel uplift for the flight or subsequent flight, the amount of fuel contained in aircraft tanks shall be determined at block-off for the flight or subsequent flight. In the exceptional case that an aircraft performs activities other than a flight, including undergoing major maintenance involving the emptying of the tanks, after the flight for which fuel consumption is being monitored, the aircraft operator may substitute the quantity 'Amount of fuel contained in aircraft tanks once fuel uplift for subsequent flight is complete + Fuel uplift for that subsequent flight' with the 'Amount of fuel remaining in tanks at the start of the subsequent activity of the aircraft', as recorded by technical logs.

Method B

The operator shall use the following formula:

Actual fuel consumption for each flight [t] = Amount of fuel remaining in aircraft tanks at block-on at the end of the previous flight [t] + Fuel uplift for the flight [t] - Amount of fuel contained in tanks at block-on at the end of the flight [t]

The moment of block-on may be considered equivalent to the moment of engine shut down. Where an aircraft does not perform a flight previous to the flight for which fuel consumption is being monitored, the aircraft operator may substitute the quantity 'Amount of fuel remaining in aircraft tanks at block-on at the end of the previous flight' with the 'Amount of fuel remaining in aircraft tanks at the end of the previous activity of the aircraft', as recorded by technical logs.

2. Tier levels for fuel consumption

Table 1

Tier levels for activity data for aviation emissions

	Tier level	
	Tier 1	Tier 2
Maximum uncertainty regarding the overall amount of fuel in tonnes consumed by an aircraft operator over the reporting period	± 5,0 %.	± 2,5 %.

3. Emission factors for standard fuels

Table 2

Aviation fuel CO₂ emission factors

Fuel	Emission factor (t CO ₂ /t fuel)
Aviation gasoline (AvGas)	3,10
Jet gasoline (Jet B)	3,10
Jet kerosene (Jet A1 or Jet A)	3,15

4. Calculation of Great Circle Distance

Distance [km] = Great Circle Distance [km] + 95 km

The Great Circle Distance shall be the shortest distance between any two points on the surface of the Earth, which shall be approximated using the system referred to in Article 3.7.1.1 of Annex 15 to the Chicago Convention (WGS 84).

The latitude and longitude of aerodromes shall be taken either from aerodrome location data published in Aeronautical Information Publications (AIP) in compliance with Annex 15 to the Chicago Convention or from a source using AIP data.

Distances calculated by software or by a third party may also be used, provided that the calculation methodology is based on the formula set out in this section, AIP data and WGS 84 requirements.

ANNEX IV

Activity-specific monitoring methodologies related to installations (Article 20(2))**1. Specific monitoring rules for emissions from combustion processes****A. Scope**

Operators shall monitor CO₂ emissions from all types of combustion processes taking place under all activities as listed in Annex I to Directive 2003/87/EC or included in the Union Scheme under Article 24 of that Directive including the related scrubbing processes using the rules laid down in this Annex. Any emissions from fuels used as process input shall be treated like combustion emissions with regard to monitoring and reporting methodologies, without prejudice to other classifications applied to emissions.

The operator shall not monitor and report emissions from internal combustion engines for transportation purposes. The operator shall assign all emissions from the combustion of fuels at the installation to the installation, regardless of exports of heat or electricity to other installations. The operator shall not assign emissions associated with the production of heat or electricity that is imported from other installations to the importing installation.

The operator shall include at least the following emission sources: boilers, burners, turbines, heaters, furnaces, incinerators, kilns, ovens, dryers, engines, flares, scrubbers (process emissions) and any other equipment or machinery that uses fuel, excluding equipment or machinery with combustion engines that are used for transportation purposes.

B. Specific monitoring rules

The emissions from combustion processes shall be calculated in accordance with Article 24(1), unless the fuels are included in a mass balance in accordance with Article 25. The tiers defined in section 2 of Annex II shall apply. In addition, process emissions from flue gas scrubbing shall be monitored using the provisions laid down in subsection C.

For emissions from flares special requirements shall apply, as laid down in subsection D of this section.

Combustion processes taking place in gas processing terminals may be monitored using a mass balance in accordance with Article 25.

C. Flue gas scrubbing

Process CO₂ emissions from the use of carbonate for acid gas scrubbing from the flue gas stream shall be calculated in accordance with Article 24(2) on the basis of carbonate consumed, Method A as follows, or gypsum produced, Method B as follows.

Method A: Emission factor

Tier 1: The emission factor shall be determined from stoichiometric ratios as laid down in section 2 of Annex VI. The determination of the amount of CaCO₃ and MgCO₃ in the relevant input material shall be carried out using best industry practice guidelines.

Method B: Emission factor

Tier 1: The emission factor shall be the stoichiometric ratio of dry gypsum (CaSO₄ × 2H₂O) to CO₂ emitted: 0,2558 t CO₂/t gypsum.

D. Flares

When calculating emissions from flares the operator shall include routine flaring and operational flaring (trips, start-up and shutdown as well as emergency relieves). The operator shall also include inherent CO₂ in accordance with Article 48.

By way of derogation from section 2.1 of Annex II, tiers 1 and 2b for the emission factor shall be defined as follows:

Tier 1: The operator shall use a reference emission factor of 0,00393 t CO₂/Nm³ derived from the combustion of pure ethane used as a conservative proxy for flare gases.

Tier 2b: Installation-specific emission factors shall be derived from an estimate of the molecular weight of the flare stream, using process modelling based on industry standard models. By considering the relative proportions and the molecular weights of each of the contributing streams, a weighted annual average figure shall be derived for the molecular weight of the flare gas.

By way of derogation from section 2.3 of Annex II, only tiers 1 and 2 shall be applied for the oxidation factor in the case of flares.

2. Refining of Mineral Oil as Listed in Annex I to Directive 2003/87/EC

A. Scope

The operator shall monitor and report all CO₂ emissions from combustion and production processes as occurring in refineries.

The operator shall include at least the following potential sources of CO₂ emissions: boilers, process heaters/treaters, internal combustion engines/turbines, catalytic and thermal oxidisers, coke calcining kilns, firewater pumps, emergency/standby generators, flares, incinerators, crackers, hydrogen production units, Claus process units, catalyst regeneration (from catalytic cracking and other catalytic processes) and cokers (flexi-coking, delayed coking).

B. Specific monitoring rules

The monitoring of mineral oil refining activities shall be carried out in accordance with section 1 of this Annex for combustion emissions including flue gas scrubbing. The operator may choose to use the mass balance methodology in accordance with Article 25 for the whole refinery or individual process units such as heavy oil gasification or calcinations plants. Where combinations of standard methodology and mass balance are used, the operator shall provide evidence to the competent authority demonstrating the completeness of emissions covered, and that no double counting of emissions occurs.

By way of derogation from Article 24 and 25, emissions from catalytic cracker regeneration, other catalyst regeneration and flexi-cokers shall be monitored using a mass balance, taking into account the state of the input air and the flue gas. All CO in the flue gas shall be accounted for as CO₂, applying the mass relation: $t\text{ CO}_2 = t\text{ CO} * 1,571$. The analysis of input air and flue gases and the choice of tiers shall be in accordance with the provisions of Articles 32 to 35. The specific calculation methodology shall be approved by the competent authority.

By way of derogation from Article 24, emissions from hydrogen production shall be calculated as activity data (expressed as tonnes of hydrocarbon feed) multiplied by the emission factor (expressed as t CO₂/t feed). The following tiers are defined for the emission factor:

Tier 1: The operator shall use a reference value of 2,9 t CO₂ per tonne feed processed, conservatively based on ethane.

Tier 2: The operator shall use an activity-specific emission factor calculated from the carbon content of the feed gas determined in accordance with Articles 32 to 35.

3. Production of coke as listed in Annex I to Directive 2003/87/EC

A. Scope

The operator shall include at least the following potential sources of CO₂ emissions: raw materials (including coal or petroleum coke), conventional fuels (including natural gas), process gases (including blast furnace gas — BFG), other fuels and waste gas scrubbing.

B. Specific monitoring rules

For the monitoring of emissions from the production of coke, the operator may choose to use a mass balance in accordance with Article 25 and section 3 of Annex II, or the standard methodology in accordance with Article 24 and sections 2 and 4 of Annex II.

4. Metal ore roasting and sintering as listed in Annex I to Directive 2003/87/EC

A. Scope

The operator shall include at least the following potential sources of CO₂ emissions: raw materials (calcination of limestone, dolomite and carbonatic iron ores, including FeCO₃), conventional fuels (including natural gas and coke/coke breeze), process gases (including coke oven gas — COG, and blast furnace gas — BFG), process residues used as input material including filtered dust from the sintering plant, the converter and the blast furnace, other fuels and flue gas scrubbing.

B. Specific monitoring rules

For the monitoring of emissions from metal ore roasting, sintering or pelletisation, the operator may choose to use a mass balance in accordance with Article 25 and section 3 of Annex II or the standard methodology in accordance with Article 24 and sections 2 and 4 of Annex II.

5. Production of pig iron and steel as listed in Annex I to Directive 2003/87/EC**A. Scope**

The operator shall include at least the following potential sources of CO₂ emissions: raw materials (calcination of limestone, dolomite and carbonatic iron ores, including FeCO₃), conventional fuels (natural gas, coal and coke), reducing agents (including coke, coal and plastics), process gases (coke oven gas — COG, blast furnace gas — BFG and basic oxygen furnace gas — BOFG), consumption of graphite electrodes, other fuels and waste gas scrubbing.

B. Specific monitoring rules

For the monitoring of emissions from production of pig iron and steel, the operator may choose to use a mass balance in accordance with Article 25 and section 3 of Annex II, or the standard methodology in accordance with Article 24 and sections 2 and 4 of Annex II, at least for a part of the source streams, avoiding any gaps or double counting of emissions.

By way of derogation from section 3.1 of Annex II, tier 3 for the carbon content is defined as follows:

Tier 3: The operator shall derive the carbon content of input or output stream following Articles 32 to 35 in respect to the representative sampling of fuels, products and by-products, the determination of their carbon contents and biomass fraction. The operator shall base the carbon content of products or semi-finished products on annual analyses following Articles 32 to 35 or derive the carbon content from mid-range composition values as specified by relevant international or national standards.

6. Production or processing of ferrous and non-ferrous metals as listed in Annex I to Directive 2003/87/EC**A. Scope**

The operator shall not apply the provisions in this section for the monitoring and reporting of CO₂ emissions from the production of pig iron and steel and primary aluminium.

The operator shall consider at least the following potential emission sources for CO₂ emissions: conventional fuels; alternative fuels including plastics granulated material from post shredder plants; reducing agents including coke, graphite electrodes; raw materials including limestone and dolomite; carbon containing metal ores and concentrates; and secondary feed materials.

B. Specific monitoring rules

Where carbon stemming from fuels or input materials used at this installation remains in the products or other outputs of the production, the operator shall use a mass balance in accordance with Article 25 and section 3 of Annex II. Where this is not the case the operator shall calculate combustion and process emission separately using the standard methodology in accordance with Article 24 and sections 2 and 4 of Annex II.

Where a mass balance is used, the operator may choose to include emissions from combustion processes in the mass balance or to use the standard methodology in accordance with Article 24 and section 1 of this Annex for a part of the source streams, avoiding any gaps or double counting of emissions.

7. CO₂ Emissions from production or processing of primary aluminium as listed in Annex I to Directive 2003/87/EC**A. Scope**

The operator shall apply the provisions of this section to the monitoring and reporting of CO₂ emissions from the production of electrodes for primary aluminium smelting, including stand-alone plants for the production of such electrodes.

The operator shall consider at least the following potential sources for CO₂ emissions: fuels for the production of heat or steam, electrode production, reduction of Al₂O₃ during electrolysis which is related to electrode consumption, and use of soda ash or other carbonates for waste gas scrubbing.

The associated emissions of perfluorocarbons — PFCs, resulting from anode effects, including fugitive emissions, shall be monitored in accordance with section 8 of this Annex.

B. Specific monitoring rules

The operator shall determine CO₂ emissions from the production or processing of primary aluminium using the mass balance methodology in accordance with Article 25. The mass balance methodology shall consider all carbon in inputs, stocks, products and other exports from the mixing, forming, baking and recycling of electrodes as well as from electrode consumption in electrolysis. Where pre-baked anodes are used, either separate mass balances for production and consumption may be applied, or one common mass balance taking into account both production and consumption of electrodes. In the case of Söderberg cells, the operator shall use one common mass balance.

For emissions from combustion processes the operator may choose to include them in the mass balance or to use the standard methodology in accordance with Article 24 and section 1 of this Annex at least for a part of the source streams, avoiding any gaps or double counting of emissions.

8. PFC emissions from production or processing of primary aluminium as listed in Annex I to Directive 2003/87/EC

A. Scope

The operator shall apply the following for emissions of perfluorocarbons (PFCs) resulting from anode effects including fugitive emissions of PFCs. For associated CO₂ emissions, including emissions from electrode production, the operator shall apply section 7 of this Annex.

B. Determination of PFC emissions

PFC emissions shall be calculated from the emissions measurable in a duct or stack ('point source emissions') as well as fugitive emissions using the collection efficiency of the duct:

$$\text{PFC emissions (total)} = \text{PFC emissions (duct)} / \text{collection efficiency}$$

The collection efficiency shall be measured when the installation-specific emission factors are determined. For its determination the most recent version of the guidance mentioned under Tier 3 of section 4.4.2.4 of the 2006 IPCC Guidelines shall be used.

The operator shall calculate emissions of CF₄ and C₂F₆ emitted through a duct or stack using one of the following methods:

(a) Method A where the anode effect minutes per cell-day are recorded;

(b) Method B where the anode effect overvoltage is recorded.

Calculation Method A — Slope Method

The operator shall use the following equations for determining PFC emissions:

$$\text{CF}_4 \text{ emissions [t]} = \text{AEM} \times (\text{SEF}_{\text{CF}_4} / 1\,000) \times \text{Pr}_{\text{Al}}$$

$$\text{C}_2\text{F}_6 \text{ emissions [t]} = \text{CF}_4 \text{ emissions} \times \text{F}_{\text{C}_2\text{F}_6}$$

Where:

AEM = Anode effect minutes/cell-day;

SEF_{CF₄} = Slope emission factor [(kg CF₄/t Al produced)/(anode effect minutes/cell-day)]. Where different cell-types are used, different SEF may be applied as appropriate;

Pr_{Al} = Annual production of primary Aluminium [t];

F_{C₂F₆} = Weight fraction of C₂F₆ (t C₂F₆/t CF₄).

The anode effect minutes per cell-day shall express the frequency of anode effects (number anode effects/cell-day) multiplied by the average duration of anode effects (anode effect minutes/occurrence):

$$\text{AEM} = \text{frequency} \times \text{average duration}$$

Emission factor: The emission factor for CF₄ (slope emission factor, SEF_{CF₄}) expresses the amount [kg] of CF₄ emitted per tonne of aluminium produced per anode effect minute/cell-day. The emission factor (weight fraction F_{C₂F₆}) of C₂F₆ expresses the amount [t] of C₂F₆ emitted proportionate to the amount [t] of CF₄ emitted.

Tier 1: The operator shall use technology-specific emission factors from Table 1 of this section of Annex IV.

Tier 2: The operator shall use installation-specific emission factors for CF₄ and C₂F₆ established through continuous or intermittent field measurements. For the determination of those emission factors the operator shall use the most recent version of the guidance mentioned under tier 3 of section 4.4.2.4 of the 2006 IPCC Guidelines ⁽¹⁾. The operator shall determine each emission factor with a maximum uncertainty of ± 15 %.

The operator shall determine the emission factors at least every three years or earlier where necessary due to relevant changes at the installation. Relevant changes shall include a change in the distribution of anode effect duration, or a change in the control algorithm affecting the mix of the types of anode effects or the nature of the anode effect termination routine.

Table 1: Technology-specific emission factors related to activity data for the slope method

Technology	Emission factor for CF ₄ (SEF _{CF4}) [(kg CF ₄ /t Al)/(AE-Mins/cell-day)]	Emission factor for C ₂ F ₆ (F _{C2F6}) [t C ₂ F ₆ /t CF ₄]
Centre Worked Prebake (CWPB)	0,143	0,121
Vertical Stud Søderberg (VSS)	0,092	0,053

Calculation Method B — Overvoltage Method

Where the anode effect overvoltage is measured, the operator shall use the following equations for the determination of PFC emissions:

$$\text{CF}_4 \text{ emissions [t]} = \text{OVC} \times (\text{AEO/CE}) \times \text{Pr}_{\text{Al}} \times 0,001$$

$$\text{C}_2\text{F}_6 \text{ emissions [t]} = \text{CF}_4 \text{ emissions} \times \text{F}_{\text{C}_2\text{F}_6}$$

Where:

OVC = Overvoltage coefficient ('emission factor') expressed as kg CF₄ per tonne of aluminium produced per mV overvoltage;

AEO = Anode effect overvoltage per cell [mV] determined as the integral of (time × voltage above the target voltage) divided by the time (duration) of data collection;

CE = Average current efficiency of aluminium production [%];

Pr_{Al} = Annual production of primary Aluminium [t];

F_{C2F6} = Weight fraction of C₂F₆ (t C₂F₆/t CF₄);

The term AEO/CE (Anode effect overvoltage/current efficiency) expresses the time-integrated average anode effect overvoltage [mV overvoltage] per average current efficiency [%].

Emission factor: The emission factor for CF₄ ('overvoltage coefficient' OVC) shall express the amount [kg] of CF₄ emitted per tonne of aluminium produced per millivolt overvoltage [mV]. The emission factor of C₂F₆ (weight fraction F_{C2F6}) shall express the amount [t] of C₂F₆ emitted proportionate to the amount [t] of CF₄ emitted.

Tier 1: The operator shall apply technology-specific emission factors from Table 2 of this section of Annex IV.

Tier 2: The operator shall use installation-specific emission factors for CF₄ [(kg CF₄/t Al)/(mV)] and C₂F₆ [t C₂F₆/t CF₄] established through continuous or intermittent field measurements. For the determination of those emission factors, the operator shall use the most recent version of the guidance mentioned under tier 3 of section 4.4.2.4 of the 2006 IPCC Guidelines. The operator shall determine the emission factors with a maximum uncertainty of ± 15 % each.

⁽¹⁾ International Aluminium Institute; The Aluminium Sector Greenhouse Gas Protocol; October 2006; US Environmental Protection Agency and International Aluminium Institute; Protocol for Measurement of Tetrafluoromethane (CF₄) and Hexafluoroethane (C₂F₆) Emissions from Primary Aluminum Production; April 2008.

The operator shall determine the emission factors at least every three years or earlier where necessary due to relevant changes at the installation. Relevant changes shall include a change in the distribution of anode effect duration or a change in the control algorithm affecting the mix of the types of anode effects or the nature of the anode effect termination routine.

Table 2: Technology-specific emission factors related to overvoltage activity data

Technology	Emission factor for CF ₄ [(kg CF ₄ /t Al)/mV]	Emission factor for C ₂ F ₆ [t C ₂ F ₆ /t CF ₄]
Centre Worked Prebake (CWPB)	1,16	0,121
Vertical Stud Søderberg (VSS)	N.A.	0,053

C. *Determination of CO_{2(e)} emissions*

The operator shall calculate CO_{2(e)} emissions from CF₄ and C₂F₆ emissions as follows, using the global warming potentials listed in Annex VI, section 3, Table 6:

$$\text{PFC emissions [t CO}_{2(e)}\text{]} = \text{CF}_4 \text{ emissions [t]} * \text{GWP}_{\text{CF}_4} + \text{C}_2\text{F}_6 \text{ emissions [t]} * \text{GWP}_{\text{C}_2\text{F}_6}$$

9. **Production of cement clinker as listed in Annex I to Directive 2003/87/EC**

A. *Scope*

The operator shall include at least the following potential sources of CO₂ emissions: calcination of limestone in the raw materials, conventional fossil kiln fuels, alternative fossil-based kiln fuels and raw materials, biomass kiln fuels (biomass wastes), non-kiln fuels, organic carbon content of limestone and shales and raw materials used for waste gas scrubbing.

B. *Specific monitoring rules*

Emissions from combustion shall be monitored in accordance with section 1 of this Annex. Process emissions from raw meal components shall be monitored in accordance with section 4 of Annex II based on the carbonate content of the process input (calculation Method A) or on the amount of clinker produced (calculation Method B). Carbonates to be taken into account shall at least include CaCO₃, MgCO₃ and FeCO₃.

CO₂ emissions related to dust removed from the process and organic carbon in the raw materials shall be added in accordance with subsections C and D of this section of Annex IV.

Calculation Method A: Kiln Input Based

Where cement kiln dust (CKD) and bypass dust leave the kiln system the operator shall not consider the related raw material as process input, but calculate emissions from CKD in accordance with subsection C.

Unless the raw meal is characterised, the operator shall apply the uncertainty requirements for activity data separately to each of the relevant carbon-bearing kiln inputs, avoiding double counting or omissions from returned or by-passed materials. Where activity data is determined based on the clinker produced, the net amount of raw meal may be determined by means of a site-specific empirical raw meal/clinker ratio. That ratio shall be updated at least once per year applying industry best practice guidelines.

Calculation Method B: Clinker Output Based

The operator shall determine activity data as the clinker production [t] over the reporting period in one of the following ways:

- by direct weighing of clinker;
- based on cement deliveries, by material balance taking into account dispatch of clinker, clinker supplies as well as clinker stock variation, using the following formula:

$$\text{clinker produced [t]} = ((\text{cement deliveries [t]} - \text{cement stock variation [t]}) * \text{clinker/cement ratio [t clinker/t cement]}) - (\text{clinker supplied [t]} + (\text{clinker dispatched [t]} - (\text{clinker stock variation [t]})).$$

The operator shall either derive the cement/clinker ratio for each of the different cement products based on the provisions of Articles 32 to 35 or calculate the ratio from the difference of cement deliveries and stock changes and all materials used as additives to the cement including by-pass dust and cement kiln dust.

By way of derogation from section 4 of Annex II, tier 1 for the emission factor shall be defined as follows:

Tier 1: The operator shall apply an emission factor of 0,525 t CO₂/t clinker.

C. *Emissions related to discarded dust*

The operator shall add CO₂ emissions, from bypass dust or cement kiln dust (CKD) leaving the kiln system, corrected for a partial calcination ratio of CKD calculated as process emissions in accordance with Article 24(2). By way of derogation from section 4 of Annex II, tiers 1 and 2 for the emission factor shall be defined as follows:

Tier 1: The operator shall apply an emission factor of 0,525 t CO₂/t dust.

Tier 2: The operator shall determine the emission factor (EF) at least once annually following Articles 32 to 35 and using the following formula:

$$EF_{CKD} = \frac{\frac{EF_{Cli}}{1 + EF_{Cli}} * d}{1 - \frac{EF_{Cli}}{1 + EF_{Cli}} * d}$$

Where:

EF_{CKD} = Emission factor of partially calcined cement kiln dust [t CO₂/t CKD];

EF_{Cli} = Installation-specific emission factor of clinker [t CO₂/t clinker];

d = Degree of CKD calcination (released CO₂ as % of total carbonate CO₂ in the raw mix).

Tier 3 for the emission factor is not applicable.

D. *Emissions from non-carbonate carbon in raw meal*

The operator shall determine the emissions from non-carbonate carbon at least from limestone, shale or alternative raw materials (for example, fly ash) used in the raw meal in the kiln in accordance with Article 24(2).

The following tier definitions for the emission factor shall apply:

Tier 1: The content of non-carbonate carbon in the relevant raw material shall be estimated using industry best practice guidelines.

Tier 2: The content of non-carbonate carbon in the relevant raw material shall be determined at least annually following the provisions of Article 32 to 35.

The following tier definitions for the conversion factor shall apply:

Tier 1: A conversion factor of 1 shall be applied.

Tier 2: The conversion factor shall be calculated applying best industry practice.

10. Production of lime or calcination of dolomite or magnesite as listed in Annex I to Directive 2003/87/EC

A. *Scope*

The operator shall include at least the following potential sources of CO₂ emissions: calcination of limestone, dolomite or magnesite in the raw materials, conventional fossil kiln fuels, alternative fossil-based kiln fuels and raw materials, biomass kiln fuels (biomass wastes) and other fuels.

Where the burnt lime and the CO₂ stemming from the limestone are used for purification processes, such that approximately the same amount of CO₂ is bound again, the decomposition of carbonates as well as the purification process shall not be required to be included separately in the monitoring plan of the installation.

B. *Specific monitoring rules*

Emissions from combustion shall be monitored in accordance with section 1 of this Annex. Process emissions from raw materials shall be monitored in accordance with section 4 of Annex II. Carbonates of calcium and magnesium shall be always taken into account. Other carbonates and organic carbon in the raw material shall be taken into account, where relevant.

For the input based methodology, carbonate content values shall be adjusted for the respective moisture and gangue content of the material. In the case of magnesia production, other magnesium bearing minerals than carbonates must be taken into account, as appropriate.

Double counting or omissions resulting from returned or by-pass material must be avoided. When applying Method B, lime kiln dust shall be considered a separate source stream where relevant.

Where CO₂ is used in the plant or transferred to another plant for the production of PCC (precipitated calcium carbonate), that amount of CO₂ shall be considered emitted by the installation producing the CO₂.

11. **Manufacture of glass, glass fibre or mineral wool insulation material as listed in Annex I to Directive 2003/87/EC**

A. *Scope*

The operator shall apply the provisions in this section also to installations for the production of water glass and stone/rock wool.

The operator shall include at least the following potential sources of CO₂ emissions: decomposition of alkali- and alkali earth carbonates as the result of melting the raw material, conventional fossil fuels, alternative fossil-based fuels and raw materials, biomass fuels (biomass wastes), other fuels, carbon containing additives including coke, coal dust and graphite, post-combustion of flue gases and flue gas scrubbing.

B. *Specific monitoring rules*

Emissions from combustion, including flue gas scrubbing, and from process materials including coke, graphite and coal dust shall be monitored in accordance with section 1 of this Annex. Process emissions from raw materials shall be monitored in accordance with section 4 of Annex II. Carbonates to be taken into account include at least CaCO₃, MgCO₃, Na₂CO₃, NaHCO₃, BaCO₃, Li₂CO₃, K₂CO₃, and SrCO₃. Only Method A shall be used.

The following tier definitions for the emission factor shall apply:

Tier 1: Stoichiometric ratios as listed in section 2 of Annex VI shall be used. The purity of relevant input materials shall be determined by means of industry best practice.

Tier 2: The determination of the amount of relevant carbonates in each relevant input material shall be carried out in accordance with Articles 32 to 35.

For the conversion factor, only tier 1 shall be applicable.

12. **Manufacture of ceramic products as listed in Annex I to Directive 2003/87/EC**

A. *Scope*

The operator shall include at least the following potential sources of CO₂ emissions: kiln fuels, calcination of limestone/dolomite and other carbonates in the raw material, limestone and other carbonates for reducing air pollutants and other flue gas cleaning, fossil/biomass additives used to induce porosity including polystyrol, residues from paper production or sawdust, fossil organic material in the clay and other raw materials.

B. *Specific monitoring rules*

Emissions from combustion including flue gas scrubbing shall be monitored in accordance with section 1 of this Annex. Process emissions from raw meal components shall be monitored in accordance with section 4 of Annex II. For ceramics based on purified or synthetic clays the operator may use either Method A or Method B. For ceramic products based on unprocessed clays and whenever clays or additives with significant organic content are used, the operator shall use Method A. Carbonates of calcium shall be always taken into account. Other carbonates and organic carbon in the raw material shall be taken into account, where relevant.

By way of derogation from section 4 of Annex II, the following tier definitions for emission factors for process emissions shall apply:

Method A (Input based)

Tier 1: A conservative value of 0,2 tonnes CaCO₃ (corresponding to 0,08794 tonnes of CO₂) per tonne of dry clay shall be applied for the calculation of the emission factor instead of results of analyses.

Tier 2: An emission factor for each source stream shall be derived and updated at least once per year using best industry practice reflecting site-specific conditions and the product mix of the installation.

Tier 3: The determination of the composition of the relevant raw materials shall be carried out in accordance with Articles 32 to 35.

Method B (Output based)

Tier 1: A conservative value of 0,123 tonnes of CaO (corresponding to 0,09642 tonnes of CO₂) per tonne of product shall be applied for the calculation of the emission factor instead of the results of analyses.

Tier 2: An emission factor shall be derived and updated at least once per year using best industry practice reflecting site-specific conditions and the product mix of the installation.

Tier 3: The determination of the composition of the products shall be carried out in accordance with Articles 32 to 35.

By way of derogation from section 1 of this Annex, for the scrubbing of flue gases the following tier for the emission factor shall apply:

Tier 1: The operator shall apply the stoichiometric ratio of CaCO₃ as shown in section 2 of Annex VI.

For scrubbing, no other tier and no conversion factor shall be used. Double counting from used limestone recycled as raw material in the same installation shall be avoided.

13. Production of gypsum products and plaster boards as listed in Annex I to Directive 2003/87/EC

A. Scope

The operator shall include at least CO₂ emissions from all types of combustion activities.

B. Specific monitoring rules

Emissions from combustion shall be monitored in accordance with section 1 of this Annex.

14. Pulp and paper production as listed in Annex I to Directive 2003/87/EC

A. Scope

The operator shall include at least the following potential sources of CO₂ emissions: boilers, gas turbines, and other combustion devices producing steam or power, recovery boilers and other devices burning spent pulping liquors, incinerators, lime kilns and calciners, waste gas scrubbing and fuel-fired dryers (such as infrared dryers).

B. Specific monitoring rules

The monitoring of emissions from combustion including flue gas scrubbing shall be carried out in accordance with section 1 of this Annex.

Process emissions from raw materials used as make-up chemicals, including at least limestone or soda ash, shall be monitored by Method A in accordance with section 4 of Annex II. CO₂ emissions from the recovery of limestone sludge in pulp production shall be assumed to be recycled biomass CO₂. Only the amount of CO₂ proportional to the input from make-up chemicals shall be assumed to give rise to fossil CO₂ emissions.

Where CO₂ is used in the plant or transferred to another plant for the production of PCC (precipitated calcium carbonate), that amount of CO₂ shall be considered as emitted by the installation producing the CO₂.

For emissions from make-up chemicals, the following tier definitions for the emission factor shall apply:

Tier 1: Stoichiometric ratios as listed in section 2 of Annex VI shall be used. The purity of relevant input materials shall be determined by means of best industry practice. The derived values shall be adjusted in accordance with the moisture and gangue content of the applied carbonate materials.

Tier 2: The determination of the amount of relevant carbonates in each relevant input material shall be carried out in accordance with Articles 32 to 35.

For the conversion factor, only tier 1 shall be applicable.

15. Production of carbon black as listed in Annex I to Directive 2003/87/EC

A. Scope

The operator shall include at least all fuels for combustion and all fuels used as process material as sources for CO₂ emissions.

B. Specific monitoring rules

The monitoring of emissions from carbon black production may be monitored either as a combustion process, including flue gas scrubbing, in accordance with section 1 of this Annex or using a mass balance in accordance with Article 25 and section 3 of Annex II.

16. Determination of nitrous oxide (N₂O) emissions from nitric acid, adipic acid, caprolactam, glyoxal and glyoxylic acid production as listed in Annex I to Directive 2003/87/EC

A. Scope

Each operator shall consider for each activity from which N₂O emissions result, all sources emitting N₂O from production processes, including where N₂O emissions from production are channelled through any abatement equipment. This includes any of the following:

- nitric acid production — N₂O emissions from the catalytic oxidation of ammonia and/or from the NO_x/N₂O abatement units;
- adipic acid production — N₂O emissions including from the oxidation reaction, any direct process venting and/or any emissions control equipment;
- glyoxal and glyoxylic acid production — N₂O emissions including from the process reactions, any direct process venting and/or any emissions control equipment;
- caprolactam production — N₂O emissions including from the process reactions, any direct process venting and/or any emissions control equipment.

These provisions shall not apply to any N₂O emissions from the combustion of fuels.

B. Determination of N₂O emissions

B.1. Annual N₂O emissions

The operator shall monitor emissions of N₂O from nitric acid production using continuous emissions measurement. The operator shall monitor emissions of N₂O from adipic acid, caprolactam, glyoxal and glyoxylic acid production using a measurement-based methodology for abated emissions and a calculation-based method (based on a mass balance methodology) for temporary occurrences of unabated emissions.

For each emission source where continuous emissions measurement is applied, the operator shall consider the total annual emissions to be the sum of all hourly emissions using the following formula:

$$\text{N}_2\text{O emissions}_{\text{annual}} [\text{t}] = \sum [\text{N}_2\text{O conc}_{\text{hourly}} [\text{mg}/\text{Nm}^3] * \text{flue gas flow}_{\text{hourly}} [\text{Nm}^3/\text{h}]] * 10^{-9}$$

Where:

N₂O emissions_{annual} = total annual emissions of N₂O from the emission source in tonnes N₂O

N₂O conc_{hourly} = hourly concentrations of N₂O in mg/Nm³ in the flue gas flow measured during operation

Flue gas flow = flue gas flow determined in Nm³/h for each hourly concentration

B.2. Hourly N₂O emissions

The operator shall calculate annual average hourly N₂O emissions for each source where continuous emission measurement is applied using the following equation:

$$\text{N}_2\text{O emissions}_{\text{av hourly}} [\text{kg}/\text{h}] = \frac{\sum (\text{N}_2\text{O conc}_{\text{hourly}} [\text{mg}/\text{Nm}^3] * \text{flue gas flow} [\text{Nm}^3/\text{h}] * 10^{-6})}{\text{Hours of operation} [\text{h}]}$$

Where:

N₂O emissions_{av hourly} = annual average hourly N₂O emissions in kg/h from the source;

N₂O conc_{hourly} = hourly concentrations of N₂O in mg/Nm³ in the flue gas flow measured during operation;

Flue gas flow = flue gas flow determined in Nm³/h for each hourly concentration.

The operator shall determine hourly N₂O concentrations [mg/Nm³] in the flue gas from each emission source using a measurement-based methodology at a representative point, after the NO_x/N₂O abatement equipment, where abatement is used. The operator shall apply techniques capable of measuring N₂O concentrations of all emission sources during both abated and unabated conditions. Where uncertainties increase during such periods, the operator shall take them into account in the uncertainty assessment.

The operator shall adjust all measurements to a dry gas basis where required and report them consistently.

B.3. Determination of flue gas flow

The operator shall use the methods for monitoring flue gas flow set out in Article 43(5) of this Regulation for measuring the flue gas flow for N₂O emissions monitoring. For nitric acid production, the operator shall apply the method in accordance with point (a) of Article 43(5) unless it is technically not feasible. In that case and upon approval by the competent authority, the operator shall apply an alternative method, including by a mass balance methodology based on significant parameters such as ammonia input load, or determination of flow by continuous emissions flow measurement.

The flue gas flow shall be calculated in accordance with the following formula:

$$V_{\text{flue gas flow}} [\text{Nm}^3/\text{h}] = V_{\text{air}} * (1 - O_{2,\text{air}})/(1 - O_{2,\text{flue gas}})$$

Where:

V_{air} = Total input air flow in Nm³/h at standard conditions;

$O_{2,\text{air}}$ = Volume fraction of O₂ in dry air [= 0,2095];

$O_{2,\text{flue gas}}$ = Volume fraction of O₂ in the flue gas.

The V_{air} shall be calculated as the sum of all air flows entering the nitric acid production unit.

The operator shall apply the following formula, unless stated otherwise in its monitoring plan:

$$V_{\text{air}} = V_{\text{prim}} + V_{\text{sec}} + V_{\text{seal}}$$

Where:

V_{prim} = Primary input air flow in Nm³/h at standard conditions;

V_{sec} = Secondary input air flow in Nm³/h at standard conditions;

V_{seal} = Seal input air flow in Nm³/h at standard conditions.

The operator shall determine V_{prim} by continuous flow measurement before the mixing with ammonia takes place. The operator shall determine V_{sec} by continuous flow measurement, including where the measurement is before the heat recovery unit. For V_{seal} the operator shall consider the purged airflow within the nitric acid production process.

For input air streams accounting for cumulatively less than 2,5 % of the total air flow, the competent authority may accept estimation methods for the determination of that air flow rate proposed by the operator based on industry best practices.

The operator shall provide evidence through measurements under normal operating conditions that the flue gas flow measured is sufficiently homogeneous to allow for the proposed measurement method. Where non-homogeneous flow is confirmed through these measurements, the operator shall take that into account when determining appropriate monitoring methods and when calculating the uncertainty in the N₂O emissions.

The operator shall adjust all measurements to a dry gas basis and report them consistently.

B.4. Oxygen (O₂) concentrations

The operator shall measure the oxygen concentrations in the flue gas where necessary for calculating the flue gas flow in accordance with subsection B.3 of this section of Annex IV. In doing so, the operator shall comply with the requirements for concentration measurements within Article 41(1) and (2). In determining the uncertainty of N₂O emissions, the operator shall take the uncertainty of O₂ concentration measurements into account.

The operator shall adjust all measurements to a dry gas basis where required and report them consistently.

B.5. Calculation of N₂O emissions

For specific periods of unabated emissions of N₂O from adipic acid, caprolactam, glyoxal and glyoxylic acid production, including unabated emissions from venting for safety reasons and when abatement plant fails, and where continuous emissions monitoring of N₂O is technically not feasible, the operator shall subject to the approval of the specific methodology by the competent authority calculate N₂O emissions using a mass balance methodology. For this purpose the overall uncertainty shall be similar to the result of applying the tier requirements of Article 41(1) and (2). The operator shall base the calculation method on the maximum potential emission rate of N₂O from the chemical reaction taking place at the time and the period of the emission.

The operator shall take the uncertainty in any calculated emissions for a specific emission source into account in determining the annual average hourly uncertainty for the emission source.

B.6. Determination of activity production rates

Production rates shall be calculated using daily production reports and hours of operation.

B.7. Sampling rates

Valid hourly averages or averages for shorter reference periods shall be calculated in accordance with Article 44 for:

- (a) concentration of N₂O in the flue gas;
- (b) total flue gas flow where this is measured directly and where required;
- (c) all gas flows and oxygen concentrations necessary to determine the total flue gas flow indirectly.

C. Determination of annual CO₂ equivalent — CO_{2(e)}

The operator shall convert the total annual N₂O emissions from all emissions sources, measured in tonnes to three decimal places, to annual CO_{2(e)} in rounded tonnes, using the following formula and the GWP values in Annex VI, section 3:

$$\text{CO}_{2(e)} [\text{t}] = \text{N}_2\text{O}_{\text{annual}}[\text{t}] * \text{GWP}_{\text{N}_2\text{O}}$$

The total annual CO_{2(e)} generated by all emission sources and any direct CO₂ emissions from other emission sources included under the greenhouse gas permit shall be added to the total annual CO₂ emissions generated by the installation and shall be used for reporting and surrendering allowances.

Total annual emissions of N₂O shall be reported in tonnes to three decimal places and as CO_{2(e)} in rounded tonnes.

17. Production of ammonia as listed in Annex I to Directive 2003/87/EC

A. Scope

The operator shall include at least the following potential emission sources for CO₂ emissions: combustion of fuels supplying the heat for reforming or partial oxidation, fuels used as process input in the ammonia production process (reforming or partial oxidation), fuels used for other combustion processes including for the purpose of producing hot water or steam.

B. Specific monitoring rules

For monitoring of emissions from combustion processes and from fuels used as process inputs, the standard methodology in accordance with Article 24 and section 1 of this Annex shall be applied.

Where CO₂ from ammonia production is used as feedstock for the production of urea or other chemicals, or transferred out of the installation for any use not covered by Article 49(1), the related amount of CO₂ shall be considered as emitted by the installation producing the CO₂.

18. Production of bulk organic chemicals as listed in Annex I to Directive 2003/87/EC

A. Scope

The operator shall take into account at least the following sources of CO₂ emissions: cracking (catalytic and non-catalytic), reforming, partial or full oxidation, similar processes which lead to CO₂ emissions from carbon contained in hydrocarbon based feedstock, combustion of waste gases and flaring, and the burning of fuel in other combustion processes.

B. *Specific monitoring rules*

Where the production of bulk organic chemicals is technically integrated in a mineral oil refinery, the operator of that installation shall apply the relevant provisions of section 2 of this Annex.

Notwithstanding the first subparagraph, the operator shall monitor emissions from combustion processes where the fuels used do not take part in or stem from chemical reactions for the production of bulk organic chemicals using the standard methodology in accordance with Article 24 and section 1 of this Annex. In all other cases, the operator may choose to monitor the emissions from bulk organic chemicals production by mass balance methodology in accordance with Article 25 or the standard methodology in accordance with Article 24. Where using the standard methodology, the operator shall provide evidence to the competent authority that the chosen methodology covers all relevant emissions that would also be covered by a mass-balance methodology.

For the determination of the carbon content under Tier 1, the reference emission factors as listed in Table 5 in Annex VI shall be applied. For substances not listed in Table 5 of Annex VI or other provisions of this Regulation, the operator shall calculate the carbon content from the stoichiometric carbon content in the pure substance and the concentration of the substance in the input or output stream.

19. Production of hydrogen and synthesis gas as listed in Annex I to Directive 2003/87/EC

A. *Scope*

The operator shall include at least the following potential emission sources for CO₂ emissions: fuels used in the hydrogen or synthesis gas production process (reforming or partial oxidation), and fuels used for other combustion processes including for the purpose of producing hot water or steam. Synthesis gas produced shall be considered as source stream under the mass balance methodology.

B. *Specific monitoring rules*

For monitoring of emissions from combustion processes and from fuels used as process inputs in hydrogen production, the standard methodology in accordance with Article 24 and section 1 of this Annex shall be used.

For the monitoring of emissions from the production of synthesis gas, a mass balance in accordance with Article 25 shall be used. For emissions from separate combustion processes, the operator may choose to include them in the mass balance or to use the standard methodology in accordance with Article 24 at least for a part of the source streams, avoiding any gaps or double counting of emissions.

Where hydrogen and synthesis gas are produced at the same installation, the operator shall calculate CO₂ emissions using either separate methodologies for hydrogen and for synthesis gas as outlined in the first two paragraphs of this subsection, or using one common mass balance.

20. Production of soda ash and sodium bicarbonate as listed in Annex I to Directive 2003/87/EC

A. *Scope*

The emission sources and source streams for CO₂ emissions from installations for the production of soda ash and sodium bicarbonate shall include:

- (a) fuels used for combustion processes, including fuels used for the purpose of producing hot water or steam;
- (b) raw materials, including vent gas from calcination of limestone, to the extent it is not used for carbonation;
- (c) waste gases from washing or filtration steps after carbonation, to the extent it is not used for carbonation.

B. *Specific monitoring rules*

For the monitoring of emissions from the production of soda ash and sodium bicarbonate, the operator shall use a mass balance in accordance with Article 25. For emissions from combustion processes, the operator may choose to include them in the mass balance or to use the standard methodology in accordance with Article 24 at least for a part of the source streams, avoiding any gaps or double counting of emissions.

Where CO₂ from the production of soda ash is used for the production of sodium bicarbonate, the amount of CO₂ used for producing sodium bicarbonate from soda ash shall be considered as emitted by the installation producing the CO₂.

21. Determination of greenhouse gas emissions from CO₂ capture activities for the purposes of transport and geological storage in a storage site permitted under Directive 2009/31/EC

A. Scope

CO₂ capture shall be performed either by a dedicated installation receiving CO₂ by transfer from one or more other installations, or by the same installation carrying out the activities producing the captured CO₂ under the same greenhouse gas emissions permit. All parts of the installation related to CO₂ capture, intermediate storage, transfer to a CO₂ transport network or to a site for geological storage of CO₂ greenhouse gas emissions shall be included in the greenhouse gas emissions permit and accounted for in the associated monitoring plan. In the case of the installation carrying out other activities covered by Directive 2003/87/EC, the emissions of those activities shall be monitored in accordance with the other relevant sections of this Annex.

The operator of a CO₂ capture activity shall at least include the following potential sources of CO₂ emission:

- (a) CO₂ transferred to the capture installation;
- (b) combustion and other associated activities at the installation that are related to the capture activity, including fuel and input material use.

B. Quantification of transferred and emitted CO₂ amounts

B.1. Installation level quantification

Each operator shall calculate the emissions by taking into account the potential CO₂ emissions from all emission relevant processes at the installation, as well as the amount of CO₂ captured and transferred to the transport network, using the following formula:

$$E_{\text{capture installation}} = T_{\text{input}} + E_{\text{without capture}} - T_{\text{for storage}}$$

Where:

$E_{\text{capture installation}}$ = Total greenhouse gas emissions of the capture installation;

T_{input} = Amount of CO₂ transferred to the capture installation, determined in accordance with Article 40 to 46 and Article 49.

$E_{\text{without capture}}$ = Emissions of the installation assuming the CO₂ were not captured, meaning the sum of the emissions from all other activities at the installation, monitored in accordance with relevant sections of Annex IV;

$T_{\text{for storage}}$ = Amount of CO₂ transferred to a transport network or a storage site, determined in accordance with Article 40 to 46 and Article 49.

In cases where CO₂ capture is carried out by the same installation as the one from which the captured CO₂ originates, the operator shall use zero for T_{input} .

In cases of stand-alone capture installations, the operator shall consider $E_{\text{without capture}}$ to represent the amount of emissions that occur from other sources than the CO₂ transferred to the installation for capture. The operator shall determine those emissions in accordance with this Regulation.

In the case of stand-alone capture installations, the operator of the installation transferring CO₂ to the capture installation shall deduct the amount T_{input} from the emissions of its installation in accordance with Article 49.

B.2. Determination of transferred CO₂

Each operator shall determine the amount of CO₂ transferred from and to the capture installation in accordance with Article 49 by means of measurement methodologies carried out in accordance with Articles 40 to 46.

Only where the operator of the installation transferring CO₂ to the capture installation demonstrates to the satisfaction of the competent authority that CO₂ transferred to the capture installation is transferred in total and to at least equivalent accuracy, may the competent authority allow that operator to use a calculation-based methodology in accordance with Article 24 or 25 to determine the amount T_{input} instead of a measurement-based methodology in accordance with Article 40 to 46 and Article 49.

22. Determination of greenhouse gas emissions from the transport of CO₂ by pipelines for geological storage in a storage site permitted under Directive 2009/31/EC

A. Scope

The boundaries for monitoring and reporting emissions from CO₂ transport by pipeline shall be laid down in the transport network's greenhouse gas emissions permit, including all ancillary plant functionally connected to the transport network, including booster stations and heaters. Each transport network shall have a minimum of one start point and one end point, each connected to other installations carrying out one or more of the activities: capture, transport or geological storage of CO₂. Start and end points may include bifurcations of the transport network and cross national borders. Start and end points as well as the installations they are connecting to, shall be laid down in the greenhouse gas emissions permit.

Each operator shall consider at least the following potential emission sources for CO₂ emissions: combustion and other processes at installations functionally connected to the transport network including booster stations; fugitive emissions from the transport network; vented emissions from the transport network; and emissions from leakage incidents in the transport network.

B. Quantification methodologies for CO₂

The operator of transport networks shall determine emissions using one of the following methods:

- (a) Method A (overall mass balance of all input and output streams) set out in subsection B.1;
- (b) Method B (monitoring of emission sources individually) set out in subsection B.2.

In choosing either Method A or Method B, each operator shall demonstrate to the competent authority that the chosen methodology will lead to more reliable results with lower uncertainty of the overall emissions, using best available technology and knowledge at the time of the application for the greenhouse gas emissions permit and approval of the monitoring plan, without incurring unreasonable costs. Where Method B is chosen each operator shall demonstrate to the satisfaction of the competent authority that the overall uncertainty for the annual level of greenhouse gas emissions for the operator's transport network does not exceed 7,5 %.

The operator of a transport network using Method B shall not add CO₂ received from another installation permitted in accordance with Directive 2003/87/EC to its calculated level of emissions, and shall not subtract from its calculated level of emissions any CO₂ transferred to another installation permitted in accordance with Directive 2003/87/EC.

Each operator of a transport network shall use Method A for the validation of the results of Method B at least once annually. For that validation, the operator may use lower tiers for the application of Method A.

B.1. Method A

Each operator shall determine emissions in accordance with the following formula:

$$\text{Emissions [t CO}_2\text{]} = E_{\text{own activity}} + \sum_i T_{\text{IN}, i} - \sum_j T_{\text{OUT}, j}$$

Where:

Emissions = Total CO₂ emissions of the transport network [t CO₂];

$E_{\text{own activity}}$ = Emissions from the transport network's own activity, meaning not emissions stemming from the CO₂ transported, but including emissions from fuel used in booster stations, monitored in accordance with the relevant sections of Annex IV;

$T_{\text{IN}, i}$ = Amount of CO₂ transferred to the transport network at entry point i , determined in accordance with Articles 40 to 46 and Article 49.

$T_{\text{OUT}, j}$ = Amount of CO₂ transferred out of the transport network at exit point j , determined in accordance with Articles 40 to 46 and Article 49.

B.2. Method B

Each operator shall determine emissions considering all processes relevant to emissions at the installation as well as the amount of CO₂ captured and transferred to the transport facility using the following formula:

$$\text{Emissions [t CO}_2\text{]} = \text{CO}_2 \text{ fugitive} + \text{CO}_2 \text{ vented} + \text{CO}_2 \text{ leakage events} + \text{CO}_2 \text{ installations}$$

Where:

Emissions = Total CO₂ emissions of the transport network [t CO₂];

CO₂ fugitive = Amount of fugitive emissions [t CO₂] from CO₂ transported in the transport network, including from seals, valves, intermediate compressor stations and intermediate storage facilities;

CO₂ vented = Amount of vented emissions [t CO₂] from CO₂ transported in the transport network;

CO₂ leakage events = Amount of CO₂ [t CO₂] transported in the transport network, which is emitted as the result of the failure of one or more components of the transport network;

CO₂ installations = Amount of CO₂ [t CO₂] being emitted from combustion or other processes functionally connected to the pipeline transport in the transport network, monitored in accordance with the relevant sections of Annex IV.

B.2.1. Fugitive emissions from the transport network

The operator shall consider fugitive emissions from any of the following types of equipment:

- (a) seals;
- (b) measurement devices;
- (c) valves;
- (d) intermediate compressor stations;
- (e) intermediate storage facilities.

The operator shall determine average emission factors *EF* (expressed in g CO₂/unit time) per piece of equipment per occurrence where fugitive emissions can be anticipated at the beginning of operation, and by the end of the first reporting year in which the transport network is in operation at the latest. The operator shall review those factors at least every 5 years in the light of the best available techniques and knowledge.

The operator shall calculate fugitive emissions by multiplying the number of pieces of equipment in each category by the emission factor and adding up the results for the single categories as shown in the following equation:

$$\text{Fugitive emissions [tCO}_2\text{]} = \left(\sum_{\text{Category}} EF[\text{gCO}_2/\text{occurrence}] * \text{number of occurrences} \right) / 1\,000\,000$$

The number of occurrences shall be the number of pieces of the given equipment per category, multiplied by the number of time units per year.

B.2.2. Emissions from leakage events

The operator of a transport network shall provide evidence of the network integrity by using representative (spatial and time-related) temperature and pressure data. Where the data indicates that a leakage has occurred, the operator shall calculate the amount of CO₂ leaked with a suitable methodology documented in the monitoring plan, based on industry best practice guidelines, including by use of the differences in temperature and pressure data compared to integrity related average pressure and temperature values.

B.2.3. Vented emissions

Each operator shall provide in the monitoring plan an analysis regarding potential situations of venting emissions, including for maintenance or emergency reasons, and provide a suitable documented methodology for calculating the amount of CO₂ vented, based on industry best practice guidelines.

23. Geological storage of CO₂ in a storage site permitted under Directive 2009/31/EC

A. Scope

The competent authority shall base the boundaries for monitoring and reporting of emissions from geological storage of CO₂ on the delimitation of the storage site and storage complex as specified in the permit pursuant Directive 2009/31/EC. Where leakages from the storage complex are identified and lead to emissions or release of CO₂ into the water column, the operator shall immediately carry out all of the following:

- (a) notify the competent authority;
- (b) include the leakage as an emission source for the respective installation;
- (c) monitor and report the emissions.

Only when corrective measures in accordance with Article 16 of Directive 2009/31/EC have been taken and emissions or release into the water column from that leakage can no longer be detected shall the operator delete the respective leakage as emission source from the monitoring plan and no longer monitor and report those emissions.

Each operator of a geological storage activity shall consider at least the following potential emission sources for CO₂ overall: fuel use by associated booster stations and other combustion activities including on-site power plants; venting from injection or enhanced hydrocarbon recovery operations; fugitive emissions from injection; breakthrough CO₂ from enhanced hydrocarbon recovery operations; and leakages.

B. Quantification of CO₂ emissions

The operator of the geological storage activity shall not add CO₂ received from another installation to its calculated level of emissions, and shall not subtract from its calculated level of emissions any CO₂ which is geologically stored in the storage site or which is transferred to another installation.

B.1. Vented and fugitive emissions from injection

The operator shall determine emissions from venting and fugitive emissions as follows:

$$\text{CO}_2 \text{ emitted [t CO}_2\text{]} = V \text{ CO}_2 \text{ [t CO}_2\text{]} + F \text{ CO}_2 \text{ [t CO}_2\text{]}$$

Where:

V CO₂ = amount of CO₂ vented;

F CO₂ = amount of CO₂ from fugitive emissions.

Each operator shall determine V CO₂ using measurement-based methodologies in accordance with Articles 41 to 46 of this Regulation. By way of derogation from the first sentence and upon approval by the competent authority, the operator may include in the monitoring plan an appropriate methodology for determining V CO₂ based on industry best practice, where the application of measurement-based methodologies would incur unreasonable costs.

The operator shall consider F CO₂ as one source, meaning that the uncertainty requirements associated with the tiers in accordance with section 1 of Annex VIII are applied to the total value instead of the individual emission points. Each operator shall provide in the monitoring plan an analysis regarding potential sources of fugitive emissions, and provide a suitable documented methodology to calculate or measure the amount of F CO₂, based on industry best practice guidelines. For the determination of F CO₂ the operator may use data collected in accordance with Article 32 to 35 and Annex II(1.1)(e) to (h) of Directive 2009/31/EC for the injection facility, where they comply with the requirements of this Regulation.

B.2. Vented and fugitive emissions from enhanced hydrocarbon recovery operations

Each operator shall consider the following potential additional emission sources from enhanced hydrocarbon recovery (EHR):

- (a) the oil-gas separation units and gas recycling plant, where fugitive emissions of CO₂ could occur;
- (b) the flare stack, where emissions might occur due to the application of continuous positive purge systems and during depressurisation of the hydrocarbon production installation;
- (c) the CO₂ purge system, to avoid high concentrations of CO₂ extinguishing the flare.

Each operator shall determine fugitive emissions or vented CO₂ in accordance with subsection B.1 of this section of Annex IV.

Each operator shall determine emissions from the flare stack in accordance with subsection D of section 1 of this Annex, taking into account potential inherent CO₂ in the flare gas in accordance with Article 48.

B.3. Leakage from the storage complex

Emissions and release to the water column shall be quantified as follows:

$$\text{CO}_2 \text{ emitted [t CO}_2\text{]} = \sum_{T_{\text{Start}}}^{T_{\text{End}}} L \text{ CO}_2 \text{ [t CO}_2\text{/d]}$$

Where:

L CO₂ = the mass of CO₂ emitted or released per calendar day due to the leakage in accordance with all of the following:

- (a) for each calendar day for which leakage is monitored, each operator shall calculate L_{CO_2} as the average of the mass leaked per hour [t CO₂/h] multiplied by 24;
- (b) each operator shall determine the mass leaked per hour in accordance with the provisions in the approved monitoring plan for the storage site and the leakage;
- (c) for each calendar day prior to commencement of monitoring, the operator shall take the mass leaked per day to equal the mass leaked per day for the first day of monitoring ensuring no under-estimation occurs;

T_{start} = the latest of:

- (a) the last date when no emissions or release of CO₂ into the water column from the source under consideration were reported;
- (b) the date the CO₂ injection started;
- (c) another date such that there is evidence demonstrating to the satisfaction of the competent authority that the emission or release into the water column cannot have started before that date.

T_{end} = the date by which corrective measures in accordance with Article 16 of Directive 2009/31/EC have been taken and emissions or release of CO₂ into the water column can no longer be detected.

The competent authority shall approve and allow the use of other methods for the quantification of emissions or release of CO₂ into the water column from leakages where the operator can show to the satisfaction of the competent authority that such methods lead to a higher accuracy than the methodology set out in this subsection.

The operator shall quantify the amount of emissions leaked from the storage complex for each of the leakage events with a maximum overall uncertainty over the reporting period of 7,5 %. Where the overall uncertainty of the applied quantification methodology exceeds 7,5 %, each operator shall apply an adjustment, as follows:

$$CO_{2,Reported} [t CO_2] = CO_{2,Quantified} [t CO_2] * (1 + (Uncertainty_{System} [\%]/100) - 0,075)$$

Where:

$CO_{2,Reported}$ = the amount of CO₂ to be included in the annual emission report with regards to the leakage event in question;

$CO_{2,Quantified}$ = the amount of CO₂ determined through the used quantification methodology for the leakage event in question;

$Uncertainty_{System}$ = the level of uncertainty associated with the quantification methodology used for the leakage event in question.

ANNEX V

Minimum tier requirements for calculation-based methodologies involving Category A installations and calculation factors for commercial standard fuels used by Category B and C installations (Article 26(1))

Table 1

Minimum tiers to be applied for calculation-based methodologies in the case of category A installations and in the case of calculation factors for commercial standard fuels for all installations in accordance with point (a) of Article 26(1); ('n.a.' means 'not applicable')

Activity/Source stream type	Activity data		Emission factor	Composition data (Carbon content)	Oxidation factor	Conversion factor
	Amount of fuel or material	Net calorific value				
Combustion of fuels						
Commercial standard fuels	2	2a/2b	2a/2b	n.a.	1	n.a.
Other gaseous and liquid fuels	2	2a/2b	2a/2b	n.a.	1	n.a.
Solid fuels	1	2a/2b	2a/2b	n.a.	1	n.a.
Mass balance methodology for Gas Processing Terminals	1	n.a.	n.a.	1	n.a.	n.a.
Flares	1	n.a.	1	n.a.	1	n.a.
Scrubbing (carbonate)	1	n.a.	1	n.a.	n.a.	n.a.
Scrubbing (gypsum)	1	n.a.	1	n.a.	n.a.	n.a.
Refining of mineral oil						
Catalytic cracker regeneration	1	n.a.	n.a.	n.a.	n.a.	n.a.
Hydrogen production	1	n.a.	1	n.a.	n.a.	n.a.
Production of coke						
Mass balance	1	n.a.	n.a.	2	n.a.	n.a.
Fuel as process input	1	2	2	n.a.	n.a.	n.a.
Metal ore roasting and sintering						
Mass balance	1	n.a.	n.a.	2	n.a.	n.a.
Carbonate input	1	n.a.	1	n.a.	n.a.	1
Production of iron and steel						
Mass balance	1	n.a.	n.a.	2	n.a.	n.a.
Fuel as process input	1	2a/2b	2	n.a.	n.a.	n.a.
Production or processing of ferrous and non-ferrous metals, including secondary aluminium						
Mass balance	1	n.a.	n.a.	2	n.a.	n.a.

Activity/Source stream type	Activity data		Emission factor	Composition data (Carbon content)	Oxidation factor	Conversion factor
	Amount of fuel or material	Net calorific value				
Process emissions	1	n.a.	1	n.a.	n.a.	1
Primary aluminium production						
Mass balance for CO ₂ emissions	1	n.a.	n.a.	2	n.a.	n.a.
PFC emissions (slope method)	1	n.a.	1	n.a.	n.a.	n.a.
PFC emissions (overtoltage method)	1	n.a.	1	n.a.	n.a.	n.a.
Production of cement clinker						
Kiln input based	1	n.a.	1	n.a.	n.a.	1
Clinker output	1	n.a.	1	n.a.	n.a.	1
CKD	1	n.a.	1	n.a.	n.a.	n.a.
Non-carbonate carbon	1	n.a.	1	n.a.	n.a.	1
Production of lime and calcination of dolomite and magnesite						
Carbonates	1	n.a.	1	n.a.	n.a.	1
Alkali earth oxide	1	n.a.	1	n.a.	n.a.	1
Manufacture of glass and mineral wool						
Carbonates	1	n.a.	1	n.a.	n.a.	n.a.
Manufacture of ceramic products						
Carbon inputs	1	n.a.	1	n.a.	n.a.	1
Alkali oxide	1	n.a.	1	n.a.	n.a.	1
Scrubbing	1	n.a.	1	n.a.	n.a.	n.a.
Production of gypsum and plasterboard: see Combustion of fuels						
Production of pulp and paper						
Make up chemicals	1	n.a.	1	n.a.	n.a.	n.a.
Production of carbon black						
Mass balance methodology	1	n.a.	n.a.	1	n.a.	n.a.
Production of ammonia						
Fuel as process input	2	2a/2b	2a/2b	n.a.	n.a.	n.a.
Production of bulk organic chemicals						
Mass balance	1	n.a.	n.a.	2	n.a.	n.a.

Activity/Source stream type	Activity data		Emission factor	Composition data (Carbon content)	Oxidation factor	Conversion factor
	Amount of fuel or material	Net calorific value				
Production of hydrogen and synthesis gas						
Fuel as process input	2	2a/2b	2a/2b	n.a.	n.a.	n.a.
Mass balance	1	n.a.	n.a.	2	n.a.	n.a.
Soda ash and sodium bicarbonate						
Mass balance	1	n.a.	n.a.	2	n.a.	n.a.

ANNEX VI

Reference values for calculation factors (Article 31(1)(a))

1. Fuel emission factors related to net calorific values (NCV)

Table 1: Fuel emission factors related to net calorific value (NCV) and net calorific values per mass of fuel

Fuel type description	Emission factor (t CO ₂ /TJ)	Net calorific value (TJ/Gg)	Source
Crude oil	73,3	42,3	IPCC 2006 GL
Orimulsion	77,0	27,5	IPCC 2006 GL
Natural gas Liquids	64,2	44,2	IPCC 2006 GL
Motor gasoline	69,3	44,3	IPCC 2006 GL
Kerosene (other than jet kerosene)	71,9	43,8	IPCC 2006 GL
Shale oil	73,3	38,1	IPCC 2006 GL
Gas/Diesel oil	74,1	43,0	IPCC 2006 GL
Residual fuel oil	77,4	40,4	IPCC 2006 GL
Liquefied petroleum gases	63,1	47,3	IPCC 2006 GL
Ethane	61,6	46,4	IPCC 2006 GL
Naphtha	73,3	44,5	IPCC 2006 GL
Bitumen	80,7	40,2	IPCC 2006 GL
Lubricants	73,3	40,2	IPCC 2006 GL
Petroleum coke	97,5	32,5	IPCC 2006 GL
Refinery feedstocks	73,3	43,0	IPCC 2006 GL
Refinery gas	57,6	49,5	IPCC 2006 GL
Paraffin waxes	73,3	40,2	IPCC 2006 GL
White spirit and SBP	73,3	40,2	IPCC 2006 GL
Other petroleum products	73,3	40,2	IPCC 2006 GL
Anthracite	98,3	26,7	IPCC 2006 GL
Coking coal	94,6	28,2	IPCC 2006 GL
Other bituminous coal	94,6	25,8	IPCC 2006 GL
Sub-bituminous coal	96,1	18,9	IPCC 2006 GL
Lignite	101,0	11,9	IPCC 2006 GL
Oil shale and tar sands	107,0	8,9	IPCC 2006 GL
Patent fuel	97,5	20,7	IPCC 2006 GL

Fuel type description	Emission factor (t CO ₂ /TJ)	Net calorific value (TJ/Gg)	Source
Coke oven coke and lignite coke	107,0	28,2	IPCC 2006 GL
Gas coke	107,0	28,2	IPCC 2006 GL
Coal tar	80,7	28,0	IPCC 2006 GL
Gas works gas	44,4	38,7	IPCC 2006 GL
Coke oven gas	44,4	38,7	IPCC 2006 GL
Blast furnace gas	260	2,47	IPCC 2006 GL
Oxygen steel furnace gas	182	7,06	IPCC 2006 GL
Natural gas	56,1	48,0	IPCC 2006 GL
Industrial wastes	143	n.a.	IPCC 2006 GL
Waste oils	73,3	40,2	IPCC 2006 GL
Peat	106,0	9,76	IPCC 2006 GL
Wood/Wood waste	—	15,6	IPCC 2006 GL
Other primary solid biomass	—	11,6	IPCC 2006 GL (only NCV)
Charcoal	—	29,5	IPCC 2006 GL (only NCV)
Biogasoline	—	27,0	IPCC 2006 GL (only NCV)
Biodiesels	—	27,0	IPCC 2006 GL (only NCV)
Other liquid biofuels	—	27,4	IPCC 2006 GL (only NCV)
Landfill gas	—	50,4	IPCC 2006 GL (only NCV)
Sludge gas	—	50,4	IPCC 2006 GL (only NCV)
Other biogas	—	50,4	IPCC 2006 GL (only NCV)
Waste tyres	85,0	n.a.	WBCSD CSI
Carbon monoxide	155,2 ⁽¹⁾	10,1	J. Falbe and M. Regitz, Römpp Chemie Lexikon, Stuttgart, 1995
Methane	54,9 ⁽²⁾	50,0	J. Falbe and M. Regitz, Römpp Chemie Lexikon, Stuttgart, 1995

⁽¹⁾ Based on NCV of 10,12 TJ/t.

⁽²⁾ Based on NCV of 50,01 TJ/t.

2. Emission factors related to process emissions

Table 2: Stoichiometric emission factor for process emissions from carbonate decomposition (Method A)

Carbonate	Emission factor [t CO ₂ /t Carbonate]
CaCO ₃	0,440
MgCO ₃	0,522
Na ₂ CO ₃	0,415
BaCO ₃	0,223
Li ₂ CO ₃	0,596
K ₂ CO ₃	0,318
SrCO ₃	0,298
NaHCO ₃	0,524
FeCO ₃	0,380
General	$\text{Emission factor} = [M(\text{CO}_2)] / \{Y * [M(x)] + Z * [M(\text{CO}_3^{2-})]\}$ <p> X = metal M(x) = molecular weight of X in [g/mol] M(CO₂) = molecular weight of CO₂ in [g/mol] M(CO₃²⁻) = molecular weight of CO₃²⁻ in [g/mol] Y = stoichiometric number of X Z = stoichiometric number of CO₃²⁻ </p>

Table 3: Stoichiometric emission factor for process emissions from carbonate decomposition based on alkali earth oxides (Method B)

Oxide	Emission factor [t CO ₂ /t Oxide]
CaO	0,785
MgO	1,092
BaO	0,287
general: X _Y O _Z	$\text{Emission factor} = [M(\text{CO}_2)] / \{Y * [M(x)] + Z * [M(\text{O})]\}$ <p> X = alkali earth or alkali metal M(x) = molecular weight of X in [g/mol] M(CO₂) = molecular weight of CO₂ [g/mol] M(O) = molecular weight of O [g/mol] Y = stoichiometric number of X = 1 (for alkali earth metals) = 2 (for alkali metals) Z = stoichiometric number of O = 1 </p>

Table 4: Stoichiometric emission factors for process emissions from other process materials (production of iron and steel, and processing of ferrous metals) ⁽¹⁾

Input or output material	Carbon content (t C/t)	Emission factor (t CO ₂ /t)
Direct reduced iron (DRI)	0,0191	0,07
EAF carbon electrodes	0,8188	3,00

⁽¹⁾ IPCC 2006 Guidelines for National Greenhouse Gas Inventories.

Input or output material	Carbon content (t C/t)	Emission factor (t CO ₂ /t)
EAF charge carbon	0,8297	3,04
Hot briquetted iron	0,0191	0,07
Oxygen steel furnace gas	0,3493	1,28
Petroleum coke	0,8706	3,19
Purchased pig iron	0,0409	0,15
Scrap iron	0,0409	0,15
Steel	0,0109	0,04

Table 5: Stoichiometric emission factors for process emissions from other process materials (Bulk organic chemicals) ⁽¹⁾

Substance	Carbon content (t C/t)	Emission factor (t CO ₂ /t)
Acetonitril	0,5852	2,144
Acrylonitrile	0,6664	2,442
Butadiene	0,888	3,254
Carbon black	0,97	3,554
Ethylene	0,856	3,136
Ethylene dichloride	0,245	0,898
Ethylene glycol	0,387	1,418
Ethylene oxide	0,545	1,997
Hydrogen cyanide	0,4444	1,628
Methanol	0,375	1,374
Methane	0,749	2,744
Propane	0,817	2,993
Propylene	0,8563	3,137
Vinyl chloride monomer	0,384	1,407

3. Global warming potentials for non-CO₂ greenhouse gases

Table 6: Global warming potentials

Gas	Global warming potential
N ₂ O	310 t CO _{2(e)} /t N ₂ O
CF ₄	6 500 t CO _{2(e)} /t CF ₄
C ₂ F ₆	9 200 t CO _{2(e)} /t C ₂ F ₆

⁽¹⁾ IPCC 2006 Guidelines for National Greenhouse Gas Inventories.

ANNEX VII

Minimum frequency of analyses (Article 35)

Fuel/material	Minimum frequency of analyses
Natural gas	At least weekly
Process gas (refinery mixed gas, coke oven gas, blast-furnace gas and convertor gas)	At least daily — using appropriate procedures at different parts of the day
Fuel oil	Every 20 000 tonnes and at least six times a year
Coal, coking coal, petroleum coke	Every 20 000 tonnes and at least six times a year
Solid waste (pure fossil or mixed biomass fossil)	Every 5 000 tonnes and at least four times a year
Liquid waste	Every 10 000 tonnes and at least four times a year
Carbonate minerals (including limestone and dolomite)	Every 50 000 tonnes and at least four times a year
Clays and shales	Amounts of material corresponding to 50 000 tonnes of CO ₂ and at least four times a year
Other input and output streams in the mass balance (not applicable for fuels or reducing agents)	Every 20 000 tonnes and at least once every month
Other materials	Depending on the type of material and the variation, amounts of material corresponding to 50 000 tonnes of CO ₂ and at least four times a year

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)

	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 requirements

Table 2

Minimum requirements for measurement-based methodologies

Greenhouse gas	Minimum tier level required		
	Category A	Category B	Category C
CO ₂	2	2	3
N ₂ O	2	2	3

3. Determination of GHGs using measurement-based methodologies

Equation 1: Calculation of Annual Emissions

$$GHG_{\text{tot ann}}[t] = \sum_{i=1}^{\text{operating hours p.a.}} GHG_{\text{conc hourly } i} * \text{flue gas flow}_i * 10^{-6} [t/g]$$

Where:

$GHG_{\text{conc hourly}}$ = hourly concentrations of emissions in g/Nm³ in the flue gas flow measured during operation;

Flue gas flow = flue gas flow in Nm³ for each hour.

Equation 2: Determination of average hourly concentrations

$$GHG_{\text{emissions av hourly}}[kg/h] = \frac{\sum GHG_{\text{concentration hourly}}[g/Nm^3] * \text{flue gas flow}[Nm^3/h]}{\text{Hours of operation} * 1\,000}$$

Where:

$GHG_{\text{emissions av hourly}}$ = annual average hourly emissions in kg/h from the source;

$GHG_{\text{conc hourly}}$ = hourly concentrations of emissions in g/Nm³ in the flue gas flow measured during operation;

Flue gas flow = flue gas flow in Nm³ for each hour.

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

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

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;

σ_{C_-} = 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.

ANNEX IX

Minimum data and information to be retained in accordance with Article 66(1)

Operators and aircraft operators shall retain at least the following:

1. Common elements for installations and aircraft operators

- (1) The monitoring plan approved by the competent authority;
- (2) Documents justifying the selection of the monitoring methodology and the documents justifying temporal or non-temporal changes of monitoring methodologies and tiers approved by the competent authority;
- (3) All relevant updates of monitoring plans notified to the competent authority in accordance with Article 15, and the competent authority's replies;
- (4) All written procedures referred to in the monitoring plan, including the sampling plan where relevant, the procedures for data flow activities and the procedures for control activities;
- (5) A list of all versions used of the monitoring plan and all related procedures;
- (6) Documentation of the responsibilities in connection to the monitoring and reporting;
- (7) The risk assessment performed by the operator or aircraft operator, where applicable;
- (8) The improvement reports in accordance with Article 69;
- (9) The verified annual emission report;
- (10) The verification report;
- (11) Any other information that is identified as required for the verification of the annual emissions report.

2. Specific elements for stationary source installations

- (1) The greenhouse gas emissions permit, and any updates thereof;
- (2) Any uncertainty assessments, where applicable;
- (3) For calculation-based methodologies applied in installations:
 - (a) the activity data used for any calculation of the emissions for each source stream, categorised according to process and fuel or material type;
 - (b) a list of all default values used as calculation factors, where applicable;
 - (c) the full set of sampling and analysis results for the determination of calculation factors;
 - (d) documentation about all ineffective procedures corrected and correction action taken in accordance with Article 63;
 - (e) any results of calibration and maintenance of measuring instruments;
- (4) For measurement-based methodologies in installations, the following additional elements:
 - (a) documentation justifying the selection of a measurement-based methodology;
 - (b) the data used for the uncertainty analysis of emissions from each emission source, categorised according to process;
 - (c) the data used for the corroborating calculations and results of the calculations;
 - (d) a detailed technical description of the continuous measurement system including the documentation of the approval from the competent authority;
 - (e) raw and aggregated data from the continuous measurement system, including documentation of changes over time, the log-book on tests, down-times, calibrations, servicing and maintenance;
 - (f) documentation of any changes to the continuous measurement system;

- (g) any results of the calibration and maintenance of measuring instruments;
 - (h) where applicable, the mass or energy balance model used for the purpose of determining surrogate data in accordance with Article 45(4) and underlying assumptions;
- (5) Where a fall-back methodology as referred to in Article 22 is applied, all data necessary for determining the emissions for the emission sources and source streams for which that methodology is applied, as well as proxy data for activity data, calculation factors and other parameters which would be reported under a tier methodology;
- (6) For primary aluminium production, the following additional elements:
- (a) documentation of results from measurement campaigns for the determination of the installation specific emission factors for CF₄ and C₂F₆;
 - (b) documentation of the results of the determination of the collection efficiency for fugitive emissions;
 - (c) all relevant data on primary aluminium production, anode effect frequency and duration or overvoltage data;
- (7) For CO₂ capture, transport and geological storage activities, where applicable, the following additional elements:
- (a) documentation of the amount of CO₂ injected into the storage complex by installations carrying out geological storage of CO₂;
 - (b) representatively aggregated pressure and temperature data from a transport network;
 - (c) a copy of the storage permit, including the approved monitoring plan, pursuant to Article 9 of Directive 2009/31/EC;
 - (d) the reports submitted in accordance with Article 14 of Directive 2009/31/EC;
 - (e) reports on the results of the inspections carried out in accordance with Article 15 of Directive 2009/31/EC;
 - (f) documentation on corrective measures taken in accordance with Article 16 of Directive 2009/31/EC.

3. Specific elements for aviation activities

- (1) A list of aircraft owned, leased-in and leased-out, and necessary evidence for the completeness of that list; for each aircraft the date when it is added to or removed from the aircraft operator's fleet;
 - (2) A list of flights covered in each reporting period, and necessary evidence for the completeness of that list;
 - (3) Relevant data used for determining the fuel consumption and emissions;
 - (4) Data used for determining the payload and distance relevant for the years for which tonne-kilometre data are reported;
 - (5) Documentation on the methodology for data gaps where applicable, and the data used for closing the data gaps where they have occurred.
-

ANNEX X

Minimum content of Annual Reports (Article 67(3))**1. Annual emission reports of stationary source installations**

The annual emission report of an installation shall at least contain the following information:

- (1) Data identifying the installation, as specified in Annex IV to Directive 2003/87/EC, and its unique permit number;
- (2) Name and address of the verifier of the report;
- (3) The reporting year;
- (4) Reference to and version number of the relevant approved monitoring plan;
- (5) Relevant changes in the operations of an installation and changes as well as temporary deviations that occurred during the reporting period to the monitoring plan approved by the competent authority; including temporal or permanent changes of tiers, reasons for those changes, starting date for the changes, and starting and ending dates of temporal changes;
- (6) Information for all emissions sources and source streams consisting of at least:
 - (a) the total emissions expressed as t CO_{2(e)};
 - (b) where greenhouse gases other than CO₂ are emitted, the total emissions expressed as t;
 - (c) whether the measurement or the calculation methodology referred to in Article 21 is applied;
 - (d) the tiers applied;
 - (e) activity data:
 - (i) in the case of fuels the amount of fuel (expressed as tonnes or Nm³) and the net calorific value (GJ/t or GJ/Nm³) reported separately;
 - (ii) for all other source streams the amount expressed as tonnes or Nm³;
 - (f) emission factors, expressed in accordance with the requirements set out in Article 36(2); biomass fraction, oxidation and conversion factors, expressed as dimensionless fractions;
 - (g) where emission factors for fuels are related to mass instead of energy, proxy data for the net calorific value of the respective source stream;
- (7) Where a mass balance methodology is applied, the mass flow, and carbon content for each source stream into and out of the installation; biomass fraction and net calorific value, where relevant;
- (8) Information to be reported as memo items, consisting of at least:
 - (a) amounts of biomass combusted, expressed in TJ, or employed in processes, expressed in t or Nm³;
 - (b) CO₂ emissions from biomass, expressed in t CO₂, where measurement-based methodology is used to determine emissions;
 - (c) a proxy for the net calorific value of the biomass source streams used as fuel, where relevant;
 - (d) amounts and energy content of bioliquids and biofuels combusted, expressed in t and TJ;
 - (e) CO₂ transferred to an installation or received from an installation, where Article 49 is applicable, expressed in t CO₂;
 - (f) inherent CO₂ transferred to an installation or received from an installation, where Article 48 is applicable, expressed in t CO₂;
 - (g) where applicable, the name of the installation and its identification code as recognised in accordance with Regulation (EU) No 1193/2011:
 - (i) of the installation(s) to which CO₂ is transferred in accordance with points (e) and (f) of this point (8);
 - (ii) of the installation(s) from which CO₂ is received in accordance with points (e) and (f) of this point (8);
 - (h) transferred CO₂ from biomass, expressed in t CO₂;

- (9) Where a measurement methodology is applied:
- (a) where CO₂ is measured as the annual fossil CO₂-emissions and the annual CO₂-emissions from biomass use;
 - (b) the measured greenhouse gas concentrations and the flue gas flow expressed as an annual hourly average, and as an annual total value;
- (10) Where a methodology referred to in Article 22 is applied, all data necessary for determining the emissions for the emission sources and source streams for which that methodology is applied, as well as proxy data for activity data, calculation factors and other parameters which would be reported under a tier methodology;
- (11) Where data gaps have occurred and have been closed by surrogate data in accordance with Article 65(1):
- (a) the source stream or emission source to which each data gap applies;
 - (b) the reasons for each data gap;
 - (c) the starting and ending date and time of each data gap;
 - (d) the emissions calculated based on surrogate data;
 - (e) where the estimation method for surrogate data has not yet been included in the monitoring plan, a detailed description of the estimation method including evidence that the methodology used does not lead to an underestimation of emissions for the respective time period;
- (12) Any other changes in the installation during the reporting period with relevance for that installation's greenhouse gas emissions during the reporting year;
- (13) Where applicable, the production level of primary aluminium, the frequency and average duration of anode effects during the reporting period, or the anode effect overvoltage data during the reporting period, as well as the results of the most recent determination of the installation-specific emission factors for CF₄ and C₂F₆ as outlined in Annex IV, and of the most recent determination of the collection efficiency of the ducts;
- (14) Waste types used within the installation and emissions resulting from their use as fuels or input materials shall be reported using the classification of the Community list of wastes specified in Commission Decision 2000/532/EC of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste ⁽¹⁾. For those purposes the respective six digit codes shall be added to the names of the relevant waste types used in the installation.

Emissions occurring from different emission sources, or source streams of the same type of a single installation belonging to the same type of activity may be reported in an aggregate manner for the type of activity.

Where tiers have been changed within a reporting period, the operator shall calculate and report emission as separate sections of the annual report for the respective parts of the reporting period.

Operators of CO₂ storage sites may use simplified emission reports after closure of the storage site in accordance with Article 17 of Directive 2009/31/EC containing at least the elements listed under points 1 to 5, provided the greenhouse gas emissions permit contains no emission sources.

2. Annual emission reports of aircraft operators

The emission report for an aircraft operator shall at least contain the following information:

- (1) Data identifying the aircraft operator as set out by Annex IV to Directive 2003/87/EC, and the call sign or other unique designators used for air traffic control purposes, as well as relevant contact details;
- (2) Name and address of the verifier of the report;
- (3) The reporting year;
- (4) Reference to and version number of the relevant approved monitoring plan;
- (5) Relevant changes in the operations and deviations from the approved monitoring plan during the reporting period;

⁽¹⁾ OJ L 226, 6.9.2000, p. 3.

- (6) The aircraft registration numbers and types of aircraft used in the period covered by the report to perform the aviation activities covered by Annex I to Directive 2003/87/EC carried out by the aircraft operator;
- (7) The total number of flights covered by the report;
- (8) Total CO₂ emissions in tonnes of CO₂ disaggregated by the Member State of departure and arrival;
- (9) Where emissions are calculated using an emission factor or carbon content related to mass or volume, proxy data for the net calorific value of the fuel;
- (10) Where data gaps have occurred and have been closed by surrogate data in accordance with Article 65(2):
 - (a) the circumstances and reasons for data gaps that apply;
 - (b) the estimation method for surrogate data applied;
 - (c) the emissions calculated based on surrogate data;
- (11) Memo-items:
 - (a) amount of biomass used as fuel during the reporting year (in tonnes or m³) listed per fuel type;
 - (b) the net calorific value of alternative fuels;
- (12) As an annex to the annual emission report, the operator shall include annual emissions and annual numbers of flights per aerodrome pair. Upon request of the operator the competent authority shall treat that information as confidential.

3. Tonne-kilometre data reports of aircraft operators

The tonne-kilometre data report for an aircraft operator shall at least contain the following information:

- (1) Data identifying the aircraft operator as set out by Annex IV to Directive 2003/87/EC, and the call sign or other unique designator used for air traffic control purposes, as well as relevant contact details;
 - (2) Name and address of the verifier of the report;
 - (3) The reporting year;
 - (4) Reference to and version number of the relevant approved monitoring plan;
 - (5) Relevant changes in the operations and deviations from the approved monitoring plan during the reporting period;
 - (6) The aircraft registration numbers and types of aircraft used in the period covered by the report to perform the aviation activities covered by Annex I to Directive 2003/87/EC carried out by the aircraft operator;
 - (7) Chosen method for calculating the mass of passengers and checked baggage, as well as freight and mail;
 - (8) Total number of passenger-kilometres and tonne-kilometres for all flights performed during the year to which the report relates falling within the aviation activities listed in Annex I to Directive 2003/87/EC;
 - (9) For each aerodrome pair, the: ICAO designator of the two aerodromes; distance (great circle distance + 95 km) in km; total number of flights per aerodrome pair in the reporting period; total mass of passengers and checked baggage (tonnes) during the reporting period per aerodrome pair; total number of passengers during the reporting period; total number of passenger multiplied by kilometres per aerodrome pair; total mass of freight and mail (tonnes) during the reporting period per aerodrome pair; total tonne-kilometres per aerodrome pair (t km).
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