First edition
2010-12-15

Air quality — Determination of time-averaged mass emissions and emission factors — General approach

Qualité de l'air — Détermination de la moyenne temporelle des émissions massiques et des facteurs d'émission — Approche générale

Reference number
ISO 11771:2010(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11771 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 264, *Air quality*, in collaboration with Technical Committee ISO/TC 146, *Air quality*, Subcommittee SC 4, *General aspects*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Introduction

This Intenational Standard describes the measurement procedures necessary to determine the mass emission of substances from stationary sources. Empirically generated data are necessary to determine the uncertainty that can be associated with a stated result and to enable the verification of emission measurement reports.

This Intenational Standard also describes the measurement procedures necessary to determine emission factors. An emission factor is a value that relates the quantity of a pollutant released with an activity associated with the release of that pollutant. Emission factors are useful when the operational conditions and time period for which they are representative is known.

Emission factors are used to calculate and report mass emissions for both emission inventory and non-inventory uses. Inventory uses can include:

— emission trading;

— compiling polluting release and transfer registers;

— air quality modelling;

— air quality management;

— compliance with national emission limits.

Non-inventory uses can include:

— developing site-specific emission estimates;

— developing control strategies;

— risk assessments;

— deciding appropriate permit limits.

The most commonly used methodology for compiling an emission inventory is to combine information on the extent to which an activity takes place (quantified by activity data a) with representative values of the emissions or removals per unit activity, called emission factor F. The basic equation providing the emission as a mass emission rate $\dot{m}$ is given by

$$\dot{m} = aF$$

The basic equation can be modified in some circumstances to include, for instance, emission reduction efficiency (abatement) factors.

NOTE 1 Countries compiling inventories for reporting emissions under international agreements use methodologies agreed upon by convention {e.g. UN FCCC, UN ECE Long-range Transboundary Air Pollution (Reference [31]), or the UN ECE Aarhus Convention}. A common feature of all these conventions is a requirement to use good practice methodologies when estimating and reporting emissions. This is particularly important when providing emission estimates for base year emission inventories used in policy instruments. Good practice is usually taken to mean the use of procedures that ensure inventories are accurate (i.e. without bias) in the sense that they are systematically neither over- nor underestimates so far as can be judged, and that uncertainties are reduced so far as possible. Good practice guidance does not usually specify how to establish emission factors or what information should be reported and be available to allow broad application of emission factors. It is the goal of this International Standard to close this gap, to increase the quality of emission inventories and to improve efficiency.

Emission factors published in most compilations typically are:

— arithmetic averages of available source emission measurement data;

— based on a limited number of emission measurements;

— representative of a restricted period of process operating time;

— representative of a limited range of process operating conditions;

— representative of a limited sample of process units commonly used.

Emission factors are numerical estimates with uncertainties that can include systematic and random components, e.g. measurement uncertainty, fluctuations in pollutant emission control efficiency, and variability in process operation. The numerical uncertainty associated with a particular emission factor, for a single source, can be estimated provided that there is sufficient, high quality, source test data to estimate statistically the underlying variability of the more important influencing factors. Uncertainty also arises from the use of an emission factor applicable to one activity, process, technology or installation being used to represent a situation for which it is unsuitable. In many cases, it is not possible to quantify the uncertainty introduced through inappropriate use of emission factors, and this situation is discouraged.

Emission factors should be used with caution. Alternative means exist for estimating emissions that can be more appropriate under some circumstances.

A material balance can provide an adequate quantification of emissions in situations where a high percentage of material is lost to the atmosphere (e.g. carbon and sulfur in fuel, solvent loss in an uncontrolled coating process). Material or mass balance determinations can also account for fugitive emissions not easily measured otherwise. In contrast, material balances may be inappropriate where material is consumed or chemically combined in the process, or where losses to the atmosphere are a small portion of the total process throughput.

Data from frequent and representative source-specific emissions measurements or continuous emission monitoring systems can provide measures of actual pollutant emissions from a source.

Site-specific measurement data from a limited number of emissions measurements, while improving the certainty of the emission data, represent only the conditions existing at the time of the testing or monitoring. To improve the estimate of longer-term (e.g. daily, monthly, yearly) emissions, conditions under which tests occur should be representative of the source's expected range of operations.

NOTE 2 Even in the absence of representative source-specific data, emission information from process control technique and abatement system vendors, particularly emission performance guarantees or emission measurement data from similar equipment can still be a better source of information than source-category emission factors.

This International Standard requires the use of supporting standards not all of which are yet available.