INTERNATIONAL STANDARD

ISO 15011-2

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Health and safety in welding and allied processes — Laboratory method for sampling fume and gases generated by arc welding —

Part 2: Determination of emission rates of gases, except ozone

Hygiène et sécurité en soudage et techniques connexes — Méthode de laboratoire d'échantillonnage des fumées et des gaz émis par le soudage à l'arc —

Partie 2: Détermination du taux d'émission des gaz, à l'exception de l'ozone

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Foreword

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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 15011-2 was prepared by the European Committee for Standardization (CEN) in collaboration with Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 9, *Health and safety*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Throughout the text of this document, read "...this European Standard..." to mean "...this International Standard...".

ISO 15011 consists of the following parts, under the general title *Health and safety in welding and allied processes — Laboratory method for sampling fume and gases generated by arc welding*:

— *Part 1: Determination of emission rate and sampling for analysis of particulate fume*

— *Part 2: Determination of emission rates of gases, except ozone*

— *Part 3: Determination of ozone concentration using fixed point measurements*

Contents

Foreword

The text of EN ISO 15011-2:2003 has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DS, in collaboration with Technical Committee ISO/TC 44 “Welding and allied processes”.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2003, and conflicting national standards shall be withdrawn at the latest by November 2003.

This standard consists of the following parts:

- Part 1: Determination of emission rate and sampling for analysis of particulate fume;
- Part 2: Determination of emission rates of gases and vapours, except ozone;
- Part 3: Determination of ozone concentration using fixed point measurements.

The annexes A, B and C are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

Welding and allied processes produce airborne particles and gaseous by-products, which can be harmful to human health. Knowledge of the quantity and composition of the airborne particles and gases emitted can be useful for occupational hygienists in assessing workplace atmospheres and in determining appropriate control measures. Emission rates cannot be used directly to assess the welder's exposure, but it is expected that processes, consumables and welding parameters giving low emission rates will result in lower welder exposures than processes with high emission rates used in the same working situation.

The laboratory procedure described in this standard can be used to determine the emission rate of gases generated by arc welding and provides a method of sampling the gases for chemical analysis. The gases generated and their emission rates depend upon the welding process, welding parameters, work piece surface, coatings, etc.

In the context of this standard emission rate means the total amount of a substance per unit time that is produced under defined process conditions, by different reactions in the system defined in this standard.

Gases encountered in arc welding are so numerous that it would be impracticable to cover them all in this standard. The scope of this standard has therefore been limited to those gases, which are commonly generated during arc welding.

It has been assumed in the drafting of this standard that the executions of its provisions, and the interpretation of the results obtained, is entrusted to appropriately qualified and experienced people.

1 Scope

This European Standard provides guidance on the determination of emission rates of gases generated by arc welding using a fume box technique. It describes the test principle, gives a possible fume box arrangement and considers methods for sampling and analysis.

The following gases that can be produced during arc welding are covered:

- Carbon monoxide (CO);
- Carbon dioxide (CO_2);
- Nitrogen oxide (NO);
- Nitrogen dioxide (NO_2).

The fume box described in this standard can also be used for the determination of organic gases produced in the arc welding of coated metals, e.g. primed, painted or plastic coated material (see annex A for further information).

Ozone is considered in EN ISO 15011-3.

2 Normative references

This European Standard incorporates by dated or undated references, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 482, *Workplace atmospheres - General requirements for the performance of procedures for the measurement of chemical agents.*

EN 1076, *Workplace atmospheres - Pumped sorbent tubes for the determination of gases and vapours - Requirements and test methods.*

EN 1540, *Workplace atmospheres – Terminology.*

EN 45544-1, *Workplace atmospheres - Electrical apparatus used for the direct detection and direct concentration measurement of toxic gases and vapours – Part 1: General requirements and test methods.*

EN ISO 4063, *Welding and allied processes — Nomenclature of processes and reference numbers (ISO 4063:1998).*

EN ISO 10882–2, *Health and safety in welding and allied processes — Sampling of airborne particles and gases in the operator's breathing zone — Part 2: Sampling of gases (ISO 10882-2:2000).*

ISO 3534–1, *Statistics - Vocabulary and symbols - Part 1: Probability and general statistical terms.*

ISO 5167–1, *Measurements of fluid flow by means of pressure differential devices - Part 1: Orifice plates, nozzles and Venturi tubes inserted in circular cross sections conduits running full.*

ISO 6879, *Air quality - Performance characteristics and related concepts for air quality measuring methods.*

ISO 8756, *Air quality - Handling of temperature, pressure and humidity data.*