
**Health and safety in welding and allied
processes — Laboratory method for
sampling fume and gases —**

Part 5:

**Identification of thermal-degradation
products generated when welding or
cutting through products composed
wholly or partly of organic materials**

*Hygiène et sécurité en soudage et techniques connexes — Méthode de
laboratoire d'échantillonnage des fumées et des gaz —*

*Partie 5: Identification des produits de dégradation thermique générés
lors du soudage ou du coupage de produits entièrement ou
partiellement constitués de matériaux organiques*



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Published in Switzerland

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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.

In other circumstances, particularly when there is an urgent market requirement for such documents, a technical committee may decide to publish other types of normative document:

- an ISO Publicly Available Specification (ISO/PAS) represents an agreement between technical experts in an ISO working group and is accepted for publication if it is approved by more than 50 % of the members of the parent committee casting a vote;
- an ISO Technical Specification (ISO/TS) represents an agreement between the members of a technical committee and is accepted for publication if it is approved by 2/3 of the members of the committee casting a vote.

An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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/TS 15011-5 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 44, *Welding and allied processes*, 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).

ISO/TS 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*:

- *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*
- *Part 4: Fume data sheets*
- *Part 5: Identification of thermal-degradation products generated when welding or cutting through products composed wholly or partly of organic materials* [Technical Specification]

Introduction

Welding and cutting activities generate fumes and gases that can be harmful to health and that must be controlled within limits laid down in regulations. To assess the risks to health arising from such activities it is necessary to acquire knowledge of the quantity and composition of the fumes and gases emitted.

ISO 15011-1^[1] and ISO 15011-2^[2] have been promulgated to generate these data when welding with consumables comprised mainly of metals and other inorganic substances. However, it is now common practice in the welding industry to weld or cut through a range of products including coatings such as shop primers, paints, oils, waxes and pressing lubricants, and inter-weld materials such as adhesives and sealants.

When heated, these products, which can be composed wholly or partly of organic materials, typically give rise to a wide range of thermal degradation products, the composition of which is difficult to predict from a knowledge of the product composition. It is expected that the composition of these degradation products will depend upon the temperatures encountered during welding and cutting activities and that a range of temperatures will exist for every activity due to the existence of temperature profiles within the material being processed.

As a result, several fume generation methods, providing temperatures and temperature profiles similar to those generated by welding processes and parameters used in the workplace, will be required to provide the data. Therefore, the purpose of this Technical Specification is to describe procedures that may be used to make semi-quantitative measurements of the organic components generated when welding and cutting through the products mentioned above, with a view to identifying those components that are significant hygienically. The data generated may be used to provide information on degradation products for use in safety data sheets. The degradation products identified in these tests may then be measured quantitatively using existing standards for measuring emission rate or by monitoring workplace atmospheres directly.

Requests for official interpretations of any aspect of this Technical Specification should be directed to the Secretariat of ISO/TC 44/SC 9 via your national standards body, a complete listing of which can be found at www.iso.org.

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

Part 5:

Identification of thermal-degradation products generated when welding or cutting through products composed wholly or partly of organic materials

1 Scope

This Technical Specification specifies procedures for obtaining information about thermal degradation products generated when welding, cutting through, preheating and straightening products composed wholly or partly of organic substances, e.g. shop primers, paints, adhesives, waxes, sealants, pressing lubricant, oils, etc. It is aimed primarily at test laboratories performing such procedures. The data generated may be used by product manufacturers to provide information for inclusion in safety data sheets and by occupational hygienists to identify thermal degradation products of significance in the performance of risk assessments and/or workplace exposure measurements. The data cannot be used to estimate workplace exposure directly.

This Technical Specification is applicable to all products composed partly or wholly of organic materials that could be heated, during welding and cutting, to temperatures at which thermal degradation products are generated and where it is not apparent what those degradation products will be.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 14327, *Resistance welding — Procedures for determining the weldability lobe for resistance spot, projection and seam welding*

ISO 14373, *Resistance welding — Procedure for spot welding of uncoated and coated low carbon steels*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

chemical agent

any chemical element or compound, on its own or admixed as it occurs in the natural state or as produced, used or released, including release as waste, by any work activity, whether or not produced intentionally and whether or not placed on the market

[Council Directive 98/24/EC^[3]