

**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 using
pyrolysis-gas chromatography-mass spectrometry (ISO
15011-5:2011)**

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 15011-5:2011 sisaldab Euroopa standardi EN ISO 15011-5:2011 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 31.10.2011 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 01.10.2011.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN ISO 15011-5:2011 consists of the English text of the European standard EN ISO 15011-5:2011.

This standard is ratified with the order of Estonian Centre for Standardisation dated 31.10.2011 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 01.10.2011.

The standard is available from Estonian standardisation organisation.

ICS 13.100, 25.160.10

Standardite reprodutseerimis- ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

Right to reproduce and distribute belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without permission in writing from Estonian Centre for Standardisation.

If you have any questions about standards copyright, please contact Estonian Centre for Standardisation:
Aru str 10 Tallinn 10317 Estonia; www.evs.ee; Phone: 605 5050; E-mail: info@evs.ee

English Version

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 using pyrolysis-gas chromatography-mass spectrometry (ISO 15011-5:2011)

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, par pyrolyse-chromatographie en phase gazeuse-spectrométrie de masse (ISO 15011-5:2011)

Arbeits- und Gesundheitsschutz beim Schweißen und bei verwandten Verfahren - Laborverfahren zum Sammeln von Rauch und Gasen - Teil 5: Identifizierung von thermischen Zersetzungsprodukten erzeugt beim Schweißen oder Schneiden von ganz oder teilweise aus organischen Materialien bestehenden Produkten mittels der Pyrolyse-Gaschromatographie-Massenspektrometrie (ISO 15011-5:2011)

This European Standard was approved by CEN on 30 September 2011.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

This document (EN ISO 15011-5:2011) has been prepared by Technical Committee ISO/TC 44 "Welding and allied processes" in collaboration with Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DIN.

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 April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

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

This document supersedes CEN ISO/TS 15011-5:2006.

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

Endorsement notice

The text of ISO 15011-5:2011 has been approved by CEN as a EN ISO 15011-5:2011 without any modification.

Contents

Page

Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	2
5 Procedure	3
5.1 Identification of thermal degradation products	3
5.2 Data analysis	3
6 Use of data on thermal degradation products	3
7 Test report	3
Annex A (normative) Test procedure	4
Annex B (informative) Pyrolysis	6
Annex C (informative) Chromatographic conditions	8
Annex D (informative) System and performance checks	9
Annex E (informative) Example of a test report	11
Annex F (informative) Use of data on thermal degradation products	13
Bibliography	14

Introduction

Welding and allied processes generate fume and gases, which, if inhaled, can be harmful to human health. Knowledge of the composition and the emission rate of the fume and gases can be useful to occupational hygienists in assessing worker exposure and in determining appropriate control measures.

ISO 15011-1^[1] and ISO 15011-2^[2] have been promulgated primarily to generate emission rate data when welding uncoated metals. However, it is now common practice in the welding industry to weld or cut through a variety of coatings that are composed wholly or partly of organic materials. These coatings include shop primers, paints, oils, waxes and inter-weld materials such as adhesives and sealants. When heated, these coatings give rise to a wide range of thermal degradation products, the composition of which depends upon the temperatures to which the coatings are subjected. During welding and cutting activities, the coating material is subjected to a range of temperatures due to the existence of temperature profiles within the material being processed.

The purpose of this part of ISO 15011 is to describe procedures that can be used to identify and make semi-quantitative measurements of the organic components generated when welding and cutting, preheating and straightening metal treated with the coatings mentioned above, with a view to identifying those components that are significant hygienically. The data generated can be used to provide information on degradation products for use on safety data sheets. If desired, the degradation products identified in these tests can then be measured quantitatively using existing standards for making workplace exposure measurements.

Comparative testing of various weld-through coatings has been carried out using laboratory based heating tests, pyrolysis, and different welding techniques^{[3][4][5]}. From the results of these tests, it was decided that pyrolysis should be adopted as the basis for the testing procedure^[6] prescribed in this part of ISO 15011. This was based on the following observations and conclusions:

- pyrolysis successfully identifies most of the hygienically significant components;
- despite the fact that pyrolysis tests are carried out in an atmosphere of helium, results are very comparable with those obtained in air by thermal decomposition in a furnace;
- the cost of pyrolysis testing is significantly lower than the cost of welding tests;
- pyrolysis test results show good interlaboratory consistency;
- it is easier to define standard conditions for pyrolysis tests than for welding tests; and
- in order to reduce the sampling regime required, any welding test programme would, in all likelihood, need to incorporate some pre-testing in the laboratory, probably using pyrolysis.

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 using pyrolysis-gas chromatography-mass spectrometry

1 Scope

This part of ISO 15011 specifies procedures for obtaining information about thermal degradation products generated when welding, cutting through, preheating and straightening metal treated with coatings composed wholly or partly of organic substances, e.g. shop primers, paints, oils, waxes and inter-weld materials such as adhesives and sealants. It is aimed primarily at test laboratories performing such procedures. The data generated can be used by coating 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 part of ISO 15011 is applicable to all coatings composed partly or wholly of organic materials that can be heated during welding and cutting, preheating and straightening to temperatures at which thermal degradation products are generated and where it is not apparent what those degradation products are.

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 16000-6, *Indoor air — Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax TA® sorbent, thermal desorption and gas chromatography using MS/FID*

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^[7], Art. 2(a)]