INTERNATIONAL STANDARD

ISO 15011-4

Second edition
2017-12

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

Part 4: Fume data sheets

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

Partie 4: Fiches d'information sur les fumées

Reference number
ISO 15011-4:2017(E)

© ISO 2017



COPYRIGHT PROTECTED DOCUMENT

© ISO 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Principle **2**
5 Procedure **2**
6 Test conditions **3**
6.1 Generic test parameters 3
6.2 Testing of manual metal arc welding electrodes 5
6.3 Testing of solid, metal-cored and flux-cored wires used in gas-shielded metal arc welding 5
6.4 Testing of flux-cored wires used in self-shielded metal arc welding 7
7 Reporting of results **8**
7.1 Fume data sheet 8
7.2 Transitional arrangements 9
7.3 Retesting 9
7.4 Data sharing 9
7.5 Validation of fume data sheets 10
Annex A (normative) **Fume data sheet** **11**
Annex B (informative) **Optional additional section of a fume data sheet** **13**
Annex C (informative) **Examples of performance data** **14**
Annex D (informative) **Uses of welding fume data** **16**
Annex E (informative) **Principal and key components of welding fume** **19**
Annex F (informative) **Example of a welding consumable classification system** **21**
Annex G (informative) **Example of a fume data sheet for a stainless steel manual metal arc welding electrode (including the optional additional section)** **22**
Bibliography **24**

© ISO 2017 – All rights reserved

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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 44, *Welding and allied processes*, Subcommittee SC 9, *Health and safety*.

This second edition cancels and replaces the first edition (ISO 15011-4:2006), which has been technically revised. It also incorporates the Amendment ISO 15011-4:2006/Amd.1:2008. The main change compared to the previous edition is the replacement of indium (In) 3 times in Table C.4 to nickel (Ni).

Requests for official interpretations of any aspect of this document should be directed to the Secretariat of ISO/TC 44/SC 9 via your national standards body. A complete listing of these bodies can be found at www.iso.org.

© ISO 2017 – All rights reserved

Introduction

Welding and allied processes produce airborne particles and gaseous by-products that 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 exposure and in determining appropriate control measures.

Welding processes, consumables and parameters give rise to various fume emission rates, which in turn lead to different welder exposures. Emission rate cannot be used directly to assess exposure. However, processes, consumables and welding parameters that give lower emission rates generally result in lower welder exposures than processes with higher emission rates used in the same working situation.

Clear instructions and supporting informative guidance are provided in order to ensure that the welding conditions used are selected thoughtfully according to a standardized procedure. The need to fully report the welding conditions used in the test is emphasized, and an example is provided of how such information should be conveyed on a fume data sheet. This document also gives information about how the data obtained can be used.

It has been assumed in the drafting of this document that the execution of its provisions and the interpretation of the results obtained are entrusted to appropriately qualified and experienced people.

© ISO 2017 – All rights reserved

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

Part 4: Fume data sheets

1 Scope

This document covers health and safety in welding and allied processes. It specifies requirements for determination of the emission rate and chemical composition of welding fume in order to prepare fume data sheets.

It applies to all filler materials used for joining or surfacing by arc welding using a manual, partly mechanized or fully automatic process, depositing unalloyed steel, alloyed steel and non-ferrous alloys. Manual metal arc welding, gas-shielded metal arc welding with solid wires, metal-cored and flux-cored wires and arc welding with self-shielded flux-cored wires are included within the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 15011-1, *Health and safety in welding and allied processes — Laboratory method for sampling fume and gases — Part 1: Determination of fume emission rate during arc welding and collection of fume for analysis*

ISO/TR 25901-2, *Welding and allied processes — Vocabulary — Part 2: Safety and health*

ISO/TR 25901-3, *Welding and allied processes — Vocabulary — Part 3: Welding processes*

EN 1540, *Workplace atmospheres — Terminology*

EN/TR 14599, *Terms and definitions for welding purposes in relation with EN 1792*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/TR 25901-2, ISO/TR 25901-3, EN 1540, EN/TR 14599 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

© ISO 2017 – All rights reserved

3.1
additive limit value
limit value that, in the absence of specific knowledge of the combined health effects of a mixture of chemical agents, is calculated on the basis that the health effects of the various components are at least additive

Note 1 to entry: For complex substances that are mixtures of chemical agents, such as welding fume, individual substances can have specific, independent health effects or they can have synergistic, additive or antagonistic health effects.

3.2
additive welding fume limit value
additive limit value (3.1) for welding fume

3.3
key component of a welding fume
component of a welding fume that has the greatest occupational hygienic significance and therefore requires the most stringent control measures to ensure that a welder is not exposed to an excessive level of the substance concerned, i.e. it is the component whose limit value is exceeded at the lowest welding fume concentration

3.4
key component welding fume limit value
limit value which, if not exceeded, ensures that no component of the welding fume has a concentration above its limit value

3.5
principal component of the welding fume
component of a welding fume that is of occupational hygienic significance

3.6
single component welding fume limit value
limit value calculated for a single component which, if not exceeded, ensures that the component does not have a concentration above its limit value

4 Principle

4.1 Tests are carried out to determine the emission rate and chemical composition of welding fume produced when a welding consumable is used under a defined set of operating conditions. The welding fume is generated in accordance with the procedure described in ISO 15011-1 and under the conditions specified in this document.

4.2 Emission rate and chemical composition data are reported in a recommended format, and various ways in which the data may be used are described.

5 Procedure

5.1 Determine the fume emission rate and/or collect fume samples for analysis, as required, in accordance with the procedure described in ISO 15011-1. Carry out the tests under the conditions prescribed in 6.2, 6.3 and 6.4 as appropriate.

NOTE In practice, emission rates can vary significantly from those determined under the test conditions specified in 6.2, 6.3 and 6.4 This is because the welding conditions used in the workplace can be significantly different from those specified in this document. The conditions specified are typical of common practice and have been standardized to generate comparative data for a welding fume consumable classification.

© ISO 2017 – All rights reserved