



BSI Standards Publication

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

Part 6: Procedure for quantitative
determination of fume from resistance
spot welding

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National foreword

This Published Document is the UK implementation of CEN ISO/TS 15011-6:2012 incorporating corrigendum September 2012.

The UK participation in its preparation was entrusted to Technical Committee WEE/40, Health and safety in welding.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

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Méthode de laboratoire d'échantillonnage des fumées et
des gaz - Partie 6: Procédure pour la détermination
quantitative des fumées et des gaz générés par le soudage
par résistance par points (ISO/TS 15011-6:2012)

Arbeits- und Gesundheitsschutz beim Schweißen und bei
verwandten Verfahren - Laborverfahren zum Sammeln von
Rauch und Gasen - Teil 6: Verfahren zur quantitativen
Bestimmung von Rauchen und Gasen beim
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Foreword

This document (CEN ISO/TS 15011-6:2012) has been prepared by Technical Committee CEN/TC 121 "Welding", the secretariat of which is held by DIN, in collaboration with Technical Committee ISO/TC 44 "Welding and allied processes".

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Introduction

Welding and cutting activities generate fume and gases which can be harmful to health and should be controlled within the limits laid down by regulations.

Determination of the particle size distribution and the qualitative analysis (metallic and organic fraction and, if possible, speciation) of the dust collected are part of the current practices in human health risk assessment.

In addition, determination of the emission rate of fume and gases is essential for a proper hazard characterization (qualitative and quantitative analysis).

Emission rates cannot be used directly to assess the welder's exposure, but it is expected that materials giving low emission rates will result in lower welder exposures than materials with high emission rates used in the same working situation.

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

Part 6: Procedure for quantitative determination of fume and gases from resistance spot welding

1 Scope

This part of ISO 15011 provides guidance on determination of emission rates of fume and gases generated by spot welding of uncoated and coated steel sheets, expressed as the quantity of pollutants per spot weld. It describes the test principle and considers methods for sampling and analysis.

This part of ISO 15011 can be used for determining the influence of the type of material, the coating system, and the material thickness on the possible generation of fume and gases when using a fixed combination of electrodes, welding equipment, and testing conditions.

The data generated can be used by product manufacturers to provide information for inclusion in safety data sheets and by occupational hygienists to evaluate the significant substances emitted by spot welding in the performance of risk assessments and/or workplace exposure measurements.

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 7708, *Air quality — Particle size fraction definitions for health-related sampling*

ISO 15011-5, *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 15609-5, *Specification and qualification of welding procedures for metallic materials — Welding procedure specification — Part 5: Resistance welding*

ISO 15767, *Workplace atmospheres — Controlling and characterizing uncertainty in weighing collected aerosols*

ISO 18278-2:2004, *Resistance welding — Weldability — Part 2: Alternative procedures for the assessment of sheet steels for spot welding*

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

CEN/TR 15230, *Workplace atmospheres — Guidance for sampling of inhalable, thoracic and respirable aerosol fractions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in CEN/TR 14599 and the following apply.

3.1

gas

thermal degradation substance generated when welding and sampled in the gas phase

3.2

welding spatter

exit of molten metal from the overlapping area between the sheets and characterized by flying sparks and/or by plumes in the overlapping area emanating from the solidified weld nugget

NOTE The solidified weld nugget can be examined for signs of weld spatter by destructive testing.

3.3

surface spatter

exit of molten metal occurring in resistance spot welding at the contact area between electrode and sheet surface

NOTE Surface spatter is visible to the eye and can often be recognized after welding by means of a remaining dark trace of residues on, and/or light formation of plumes at, the sheet surface.

4 Principle

Fume and gases generated by resistance spot welding are extracted into a sampling chamber in order to determine the amount of dust generated. According to the principle of sedimentation, coarse particles are separated and the airborne particles are collected on a preweighed filter, which is then reweighed. The fume can then be chemically analysed, if required.

In order to determine the gaseous components, the emissions are collected in a fume box, then sampled and quantified in an appropriate manner. Identification of any thermal degradation products of occupational hygiene significance are undertaken in accordance with ISO 15011-5 prior to the welding test.

5 Apparatus

5.1 Resistance spot welding equipment. Refer to ISO 15609-5 for information and guidance on appropriate resistance spot welding equipment and resistance spot welding conditions.

5.2 Equipment for determination of fume emission rate.

5.2.1 Welding chamber for determination of fume emission rate. See Annex A.

5.2.2 Sampler.

5.2.2.1 Inhalable sampler, designed to collect the inhalable fraction of airborne particles, as defined in ISO 7708, with a high enough design flow rate to extract all the fume generated without loss on to the walls of the welding chamber.

5.2.2.2 Respirable sampler, designated to collect the respirable fraction of airborne particles, as defined in ISO 7708, with a high enough design flow rate to extract all the fume generated without loss on to the walls of the welding chamber.

5.2.3 Filters, with a suitable pore size, e.g. 8 µm, and of a diameter that is compatible with the sampler (5.2.2). Refer to ISO 15767 for guidance on selection of filters when carrying out gravimetric measurements.