

ICS 25.160.10
CCS J 33



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 43905.1-2024

**Laboratory method for sampling fume and gases in welding
and allied processes - Part 1: Determination of fume emission
rate during arc welding and collection of fume for analysis**

(English Translation)

Issued on: April 25, 2024

Implemented on: November 1, 2024

**Issued by: State Administration for Market Regulation, China National
Standardization Administration**

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Foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for standardization work Part 1: Structure and drafting rules for standardization documents" Drafting:

This document is Part 1 of GB/T 43905 "Laboratory methods for sampling of fumes and gases for welding and allied processes":

GB/T 43905 has published the following parts:

- Part 1: Determination of fume emission rate during arc welding and collection of fume for analysis;
- Part 2: Determination of emission rates of carbon monoxide, carbon dioxide, nitric oxide and nitrogen dioxide during arc welding, cutting and gouging;
- Part 3: Determination of ozone emission rate during arc welding;
- Part 4: Emission limits of welding fume from welding materials;
- Part 5: Identification of thermal degradation products of organic materials during welding

or cutting based on pyrolysis-gas chromatography-mass spectrometry;

--- Part 6: Quantitative determination of smoke and gases during resistance spot welding:

This document is modified to adopt ISO 15011-1:2009 "Health and safety for welding and allied processes - Laboratory methods for sampling of fumes and gases" Part 1: Determination of the fume emission rate during arc welding and collection of fume for analysis:

This document has the following structural adjustments compared to ISO 15011-1:2009:

--- Part of Chapter 4 corresponds to 6:4 in ISO 15011-1:2009:

The technical differences between this document and ISO 15011-1:2009 and their reasons are as follows:

--- Deleted the normative reference document ISO/T R25901, added the normative reference document GB/T 3375 (see Chapter 3), to apply Use our country's technical requirements;

--- Added the term and definition of "emission rate" (see 3.1) to facilitate the implementation of this document;

--- Deleted the smoke composition analysis method (see 6.4 of ISO 15011-1:2009) and incorporated 6:4 of ISO 15011-1:2009 into in Chapter 4, the content is in accordance with the scope and principles of this document;

--- Deleted the requirements for calibration (see 5.5 and 5:6) to conform to the actual situation in my country;

--- Added general requirements for measuring and recording instruments and equipment (see 6.1) to facilitate the implementation of this document;

--- Clearly state the filter paper used during the test (see 6.2:2:2, 6:2:3, 6:2:4, 6:3:2:2, 6:3:3 and 6:3:4);

--- The normative reference GB/T 27418 replaces ISO/IEC Guide 98-3 (see Chapter 7) to apply my country's technical requirements:

The following editorial changes were made to this document:

--- According to the content and scope of application of the standard, the name of the standard is changed to "Laboratory Methods for Sampling Fumes and Gases in Welding and Related Processes" Methods for the determination of the emission rate of smoke from arc welding and collection of smoke for analysis";

--- Move part of the content in 3:2 definition to Note 1, change the expression of test chamber classification in 3:2, and delete the items;

---5:4, 5:7, 6:2:2:1, 6:2:2:2, 6:2:3, 6:2:4, 6:3:2:1, 6:3:2:2, 6:3:3, 6:3:4 use itemized

expressions;

--- The informative reference GB/T 43905.4 replaces ISO 15011-4 (see introduction), and GB/T 16672 replaces ISO 6947 (see C:2);

--- Deleted the "Notes" in 6:1 and 6:3:2:2 of ISO 15011-1:2009;

--- Deleted "Note 1 and Note 2" in 6:2:4 and 6:3:4 of ISO 15011-1:2009:

Introduction

GB/T 43905 "Laboratory methods for sampling of fumes and gases during welding and related processes" provides laboratory methods for sampling and analysis of fumes and gases:

GB/T 43905 is a universal standard for the analysis of dust and gas generated by different process methods:

The basic method standard consists of six parts:

--- Part 1: Determination of smoke emission rate during arc welding and collection of smoke for analysis: The purpose is to specify the conditions applicable to welding that is prone to generate smoke:

Laboratory method for determination of welding fume emission rate from open arc welding of fumes and collection methods for analysis:

--- Part 2: Determination of emission rates of carbon monoxide, carbon dioxide, nitric oxide and nitrogen dioxide during arc welding, cutting and gouging:

The purpose is to specify the carbon monoxide, carbon dioxide, nitrogen monoxide, and carbon dioxide generated during arc welding, cutting, and gouging:

Laboratory method for determination of nitrogen emission rate:

--- Part 3: Determination of ozone emission rate during arc welding: The purpose is to specify the ozone emission rate applicable to automatic arc welding process Laboratory method for determination of emission rates:

--- Part 4: Limits of welding fume emissions from welding materials: The purpose is to specify the limits applicable to non-alloy steel, alloy steel and non-ferrous metals:

Method for compiling welding fume emission limits for all welding materials used for manual, semi-automatic or fully automatic arc welding connections or cladding:

--- Part 5: Identification of thermal degradation products of organic materials during welding or cutting based on pyrolysis-gas chromatography-mass spectrometry:

The regulations apply to coatings composed wholly or partly of organic materials that are subjected to thermal degradation during welding, cutting, preheating and straightening:

Laboratory method for identification and semi-quantitative measurement of the components of undefined products:

--- Part 6: Quantitative determination of smoke and gases in resistance spot welding: The purpose is to specify the application of the resistance spot welding of coated and uncoated steel sheets:

Laboratory method for determination of emission rates of fumes and gases generated by welding:

Welding and related processes generate fumes and gases which are harmful to human health if inhaled:

The information can help occupational health professionals assess worker exposure and determine appropriate control measures:

The absolute exposure concentration depends on factors such as the position of the welder relative to the fume and airflow and cannot be predicted from emission rate data:

Generally speaking, under the same operating conditions, a higher emission rate is expected to have a higher exposure concentration, and a lower emission rate is expected to have a lower exposure concentration:

Therefore, the emission rate data can be used to predict the relative changes in exposure that may occur in the workplace under different welding conditions and to it is used to determine measures to reduce such exposure but cannot be used to calculate ventilation requirements:

This document specifies methods for determining the emission rate of smoke and laboratory methods for collecting smoke for subsequent analysis, and recommends suitable analytical methods:

The program provides a simple definition of the test method and the user can select the test parameters to evaluate the impact of different variables:

The determination of emission rate depends on correct test conditions, otherwise the data will fluctuate greatly: Therefore, GB/T 43905.4 specifies the generation of Test parameters for fume emission rate data, used to compare emission rates of welding materials:

This document can be used to evaluate the effects of welding rods, welding wires, welding parameters, process methods, shielding gases, specimen composition, and specimen surface conditions on smoke emissions:

By analyzing the collected flue gas, the influence of the test parameters on the smoke composition can also be determined:

The execution of this document and the interpretation of the results obtained are the responsibility of qualified and experienced personnel: