

AWS F1.3M:2006
An American National Standard



A Sampling Strategy Guide for Evaluating Contaminants in the Welding Environment



American Welding Society



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American Welding Society (AWS) Project Committee on Fumes and Gases

Under the Direction of the
AWS Committee on Safety and Health

Approved by the
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Abstract

This guide provides advice on contaminants that may be present in the welding environment, and presents a strategy for collecting valid samples from the welder's breathing zone. Recommendations for fume analysis for various elements found in AWS filler metal specifications are presented in a table. A checklist to use in observing the workplace is provided in Annex B.



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A Sampling Strategy Guide for Evaluating Contaminants in the Welding Environment

1. Scope, Purpose, and Application

1.1 Scope. This guide presents an overall sampling strategy for the following purposes:

1. Determining the contaminants that might be present in significant quantities in a given welding environment;
2. Deciding which of these contaminants should be sampled and analyzed; and
3. Selecting a strategy for collecting samples that will provide valid, accurate measurements of workers' exposure to various contaminants.

Safety and health issues and concerns are beyond the scope of this standard, and therefore are not fully addressed herein. Safety and health information is available from other sources, including, but not limited to, ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes* and applicable federal and state regulations.

This standard makes sole use of the International System of Units (SI).

1.2 Purpose. This guide is primarily directed toward arc welding, but the approach is considered to be useful for other welding and allied processes as well. It is not mandatory; however, it does present the best judgment of experienced professionals. Guidance on the details of sampling and analysis for specific contaminants is contained in other AWS publications, listed in Annex A.

As further information concerning the welding environment becomes available, the guide will be updated.

1.3 Application. The welding environment is very complex. Contaminants in the form of fumes (particulates) and gases can be generated in the process itself and in surrounding areas. The type and quantity of contaminants generated are functions of many factors including, but not limited to, the process, process variables, number of process stations, consumables employed, base materials, and surface preparation. These contaminants may

have an effect on persons in the welding environment, ranging from mere nuisance to severe toxicity. A very few may be potentially carcinogenic.

To sample and analyze for every contaminant known to occur in welding environments is a difficult task and generally an unnecessary one. The safety and health professional responsible for monitoring worker exposure to welding contaminants has the need for a rationale by which the specific contaminants that are likely to occur in significant quantities in a particular welding environment can be anticipated. After deciding which contaminants are likely to be significant, the professional needs to formulate a strategy for sampling the welding environment. This sampling strategy involves questions such as: where to sample, who to sample, how to sample, how long to sample, how many samples to take, and for what contaminants to analyze. The goal of such sampling is to obtain a valid, accurate measurement of worker exposure within a reasonable expenditure of time, resources, and effort.

2. Referenced Documents

2.1 The following AWS standards¹ are referenced in the mandatory section of this document.

1. AWS F1.1, *Methods for Sampling Airborne Particulates Generated by Welding and Allied Processes*
2. AWS A5.1/A5.1M, *Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding*
3. AWS A5.2, *Specification for Carbon and Low-Alloy Steel Rods for Oxyfuel Gas Welding*
4. AWS A5.3/A5.3M, *Specification for Aluminum and Aluminum Alloy Electrodes for Shielded Metal Arc Welding*

¹ AWS standards are published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.