


**AWS F1.1M:2006**  
**An American National Standard**



**Method for  
Sampling Airborne  
Particulates  
Generated by  
Welding and  
Allied Processes**



**American Welding Society**



**AWS F1.1M:2006**  
**An American National Standard**

**Approved by the**  
**American National Standards Institute**  
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# **Method for Sampling Airborne Particulates Generated by Welding and Allied Processes**

**Supersedes AWS F1.1:1999**

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

Under the Direction of the  
AWS Committee on Safety and Health

Approved by the  
AWS Board of Directors

## **Abstract**

This document aids the reader in the proper technique for sampling welding fume in the workplace. Emphasis is placed on positioning the sampling device and calibration of the equipment.



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# Method for Sampling Airborne Particulates Generated by Welding and Allied Processes

## 1. Scope

This standard prescribes a procedure for sampling fumes generated by welding and allied processes. Because it is limited to health hazard evaluation, the standard is primarily concerned with sampling at the worker's breathing zone (see 4.1). It also prescribes procedures for general area sampling of fumes. However, the sampling methods described by this standard apply only to the sampling of solid particulate matter.

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).

## 2. Referenced Documents

1. ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*<sup>1</sup>
2. NIOSH Manual of Analytical Methods (NMAM), 4th Edition<sup>2</sup>

## 3. Definitions

**general area.** Sampling zone located at an appropriate location within the operating work area but outside the

welder's helmet. The general area sample is taken during the performance of normal working operations.

**breathing zone.** The area immediately adjacent to the welder's nose and mouth, inside the welder's helmet when worn, or within 230 mm of the welder's nose and mouth when a helmet is not worn.

**welding fume.** Airborne solid particulate matter generated by the welding process. Fume particles are usually submicron in size, and thus tend to remain airborne and drift with air currents.

**weld zone.** The localized area including the weld metal, heat-affected zone (HAZ), and adjacent surfaces from which contaminants may be volatilized by the heat of welding to form welding fumes.

## 4. Summary of Methods

**4.1** The breathing zone test is designed to measure the exposure of an individual welder to the welding fume generated by welding processes. When a helmet is worn, sampling is performed by drawing a measured volume of air through a filter assembly, and trapping the solid particulate matter on the filter. The filter cassette inlet is positioned inside the welding helmet at mouth level, approximately 50 mm to the right or left of the breathing zone centerline. If a helmet is not worn, the breathing zone sample is obtained by placing the filter cassette within 230 mm of the operator's nose.

**4.2** The general area sampling test is designed to measure the concentration level of welding fumes and other particulate matter that may be present or generated from other sources in the environment. The general area sample is not indicative of personal exposure levels, but can provide information on contaminant background levels in the vicinity. Sampling is performed by drawing a measured volume of air through a filter cassette assembly positioned at a selected point of interest and trapping the solid particulate matter on the filter.

<sup>1</sup> ANSI Z49.1 and AWS standards are published by the American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

<sup>2</sup> NIOSH documents are available from the Superintendent of Documents, Government Printing Office, 732 North Capitol Street, N.W., Washington, DC 20401.