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Ventilation Guide for Weld Fume



American Welding Society



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Ventilation Guide **for Weld Fume**

Prepared by
AWS Project Committee on Fumes and Gases

Under the Direction of
AWS Technical Activities Committee

Approved by
AWS Board of Directors

Abstract

This document introduces the reader to various types of ventilation systems, including general supply and exhaust and local exhaust, for control of welding fumes. It contains or refers to information on air contaminants found in the welding fumes, principles of systems design and selection, and drawings that illustrate ventilation techniques.



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Table of Contents

	Page No.
<i>Personnel</i>	iii
<i>Foreword</i>	v
<i>List of Tables</i>	viii
<i>List of Figures</i>	viii
<i>Foreword</i>	v
1. Scope	1
2. Referenced Documents	1
3. Hazards of Welding Fume and Gases	1
3.1 Types of Contaminants	1
3.2 Particle Size	2
3.3 Specific Contaminants	2
4. Ventilation	3
4.1 Principles of Ventilation	3
4.2 Local Exhaust Ventilation	3
4.3 General Ventilation	3
5. Fume Filtration	8
5.1 Collector Selection	8
5.2 Cartridge Collectors	8
5.3 Electrostatic Precipitators	10
5.4 Fabric Collectors	11
5.5 Fire Precautions	11
5.6 Safe Handling and Disposal of Collectors	11
6. Duct Design	11
7. Ventilation System Design Cases	12
7.1 Natural Ventilation	12
7.2 General Ventilation Supply and Exhaust	12
7.3 Local Exhaust and Recirculation	13
7.4 Local Exhaust without Recirculation	13
7.5 Local Exhaust Combined with General Exhaust without Recirculation	13
7.6 Local High-Vacuum Exhaust System Combined with General Supply and Exhaust Systems without Recirculation	15
7.7 Local Exhaust Combined with General Recirculation and Air Cleaning	16
<i>Annexes—Nonmandatory Information</i>	
<i>Annex A—Ventilation Rates, Contaminant, and Heat Removal Efficiency</i>	19
<i>Annex B—Fume Generation Data</i>	21
<i>Annex C—Fume Constituent Concentration Data (%)</i>	23
<i>Annex D—Environmental Release Estimates</i>	25
<i>Annex E—Typical Welding Duty Cycles</i>	27
<i>Annex F—Pressure Loss in Welding Fume Extraction Arms</i>	29
<i>Annex G—Bibliography</i>	31
<i>Annex H—Guidelines for Preparation of Technical Inquiries for AWS Technical Committees</i>	33

List of Tables

Table		Page No.
1	Local Ventilation Systems for Welding and Cutting Processes	4
A1	Approximate Values for Ventilation Efficiency Coefficients	20
F1	Pressure Loss Coefficients for Typical Flexible Welding Fume Extraction Arms.....	30

List of Figures

Figure		Page No.
1	Welding Gun with Integral Fume Extraction	5
2	High-Vacuum Source Capture Nozzle	5
3	Flexible Extraction Arms	6
4	Cross-Draft Welding Table with Slotted Hood	6
5	Fixed Exhaust Hood.....	6
6	Push-Pull Hood over Welding Robot	7
7	Canopy Hood	7
8	Downdraft Cutting Table.....	7
9	Methods of Air Distribution.....	9
10	Typical Cartridge Collector.....	10
11	Typical Portable Collector.....	10
12	Typical Electrostatic Precipitator	10
13	Typical Fabric Collector.....	11
14	Illustration of Natural Ventilation	12
15	Illustration of General Ventilation Supply and Exhaust.....	13
16	Illustration of Local Exhaust and Recirculation	14
17	Illustration of Local Exhaust without Recirculation	14
18	Illustration of Local Exhaust Combined with General Exhaust without Recirculation.....	15
19	Illustration of Local High-Vacuum Exhaust System Combined with General Supply and Exhaust Systems without Recirculation.....	16
20	Illustration of Local Exhaust Combined with General Recirculation and Air Cleaning	17

Ventilation Guide for Weld Fume

1. Scope

This guide outlines recommended principles of ventilation systems for facilities with welding and allied processes. It is intended for those responsible for selecting and designing such systems. The primary objective of this document is to enhance the health and safety of all in the industrial environment. The secondary objective is energy conservation. This guide does not provide information on respiratory protection devices such as respirators, or specific precautions for confined spaces.

This standard makes use of both U.S. Customary Units and the International System of Units (SI). The measurements may not be exact equivalents; therefore, each system must be used independently of the other without combining in any way. The standard with the designation F3.2M:2001 uses SI Units. The standard designation F3.2:2001 uses U.S. Customary Units. The latter are shown within brackets [] or in appropriate columns in tables and figures.

2. Referenced Documents

2.1 The following ACGIH documents¹ are referenced in this document.

(1) *Threshold Limit Values for Chemical Substances and Physical Agents, Biological Exposure Indices*

(2) *Industrial Ventilation: A Manual of Recommended Practice*

2.2 The following ASHRAE documents² are referenced in this document.

(1) *ASHRAE Handbook, HVAC Applications*

(2) *ASHRAE Handbook, HVAC Systems and Equipment*

(3) *ASHRAE Handbook, Fundamentals*

1. ACGIH publications may be obtained from the American Conference of Governmental Industrial Hygienists, 1330 Kemper Meadow Drive, Suite 600, Cincinnati, OH 45240-1634.

2. ASHRAE publications may be obtained from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, 1791 Tullie Circle, N.E., Atlanta, GA 30329-2305.

(4) ASHRAE Standard 55-1992, *Thermal Environmental Conditions for Human Occupancy*

2.3 The following NFPA document³ is referenced in this document.

(1) NFPA 51B, *Standard for Fire Prevention During Welding, Cutting, and Other Hot Work*

2.4 The following NIOSH document⁴ is referenced in this document.

(1) NIOSH *Pocket Guide to Chemical Hazards*

3. Hazards of Welding Fume and Gases

3.1 Types of Contaminants. Many welding, cutting, and allied processes produce fumes and gases which may be harmful to health. Fumes are solid particles originating from welding consumables, the base metal, and any coating present on the base metal. Gases are produced during the welding process or may be produced by the effects of process radiation on the surrounding environment. While not normally produced in high quantities, these gases can be significant in some applications such as plasma arc cutting or high amperage welding of very reflective metals such as aluminum or stainless steel.

Welding fumes and gases are chemically very complex. Their amount and composition depend upon the composition of the filler metal and base material, welding process, current level, arc length, and other process factors. Awareness of these hazards is the first step in providing protection to the welder in the workplace.

Potential acute effects from welding fumes are eye and respiratory tract irritations, allergic reactions, metal fume fever, headaches, and other complications. Effects

3. NFPA publications may be obtained from the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

4. NIOSH publications may be obtained from the Superintendent of Documents, U.S. Government Printing Office, P.O. Box 371954, Pittsburgh, PA 15250-7954.