


AWS F4.1:2007
An American National Standard



Safe Practices for the Preparation of Containers and Piping for Welding and Cutting



American Welding Society



AWS F4.1:2007
An American National Standard

Approved by the
American National Standards Institute
August 24, 2007

Safe Practices
for the Preparation of
Containers and Piping for
Welding and Cutting

5th Edition

Supersedes AWS F4.1:1999

Prepared by the
American Welding Society (AWS) Committee on Labeling and Safe Practices

Under the Direction of the
AWS Committee on Safety and Health

Approved by the
AWS Board of Directors

Abstract

This standard informs the reader of the necessary safe practices to be followed in the cleaning and preparation of containers and piping for welding or cutting. It describes various methods for cleaning, including water, steam, hot chemical, and mechanical, and techniques to be used for their proper preparation, such as inerting.



American Welding Society

550 N.W. LeJeune Road, Miami, FL 33126

Table of Contents

	Page No.
<i>Personnel</i>	v
<i>Foreword</i>	vii
1. Introduction and Scope	1
1.1 Introduction.....	1
1.2 Scope.....	1
2. Definitions	1
2.1 Hazardous Substances	1
2.2 Qualified Person	1
3. Preparing the Container for Cleaning	2
3.1 Determination of Hazardous Characteristics of Contents	2
3.2 Unknown Substances.....	2
3.3 Designation of Cleaning Procedure.....	2
3.4 Cleaning Containers.....	2
3.5 Other Precautions.....	2
4. Methods of Cleaning and Guidelines for Selection	2
4.1 Water Cleaning	2
4.2 Hot Chemical Solution Cleaning.....	2
4.3 Steam Cleaning	3
4.4 Mechanical Cleaning	3
4.5 Chemical Cleaning.....	3
4.6 Combination of Methods	3
5. Preparation for Welding and Cutting	3
5.1 Guidelines	3
5.2 Safe Practices.....	3
Annex A (Informative)—Bibliography	5
Annex B (Informative)—Guidelines for the Preparation of Technical Inquiries	7

Safe Practices for the Preparation of Containers and Piping for Welding and Cutting

1. Introduction and Scope

1.1 Introduction. Explosions, fires, and health hazards may result if welding, cutting, or other hot work is performed on containers that are not free of hazardous substances, such as combustible, reactive, or toxic solids, liquids, vapors, dusts, and gases. No container shall be presumed to be clean or safe, but containers can be made safe for work, provided the safe practices prescribed herein or their equivalent are followed.

1.2 Scope. These safe practices shall apply to the preparation for welding of metal containers and piping. For the purposes of this document, references to precautions for welding are also intended to apply to all metal working operations (such as cutting or brazing) involving the application of heat. Cleaning of used containers is necessary in all cases before welding. The term *container*, as used herein, includes piping.

The safe practices presented here are not intended to replace either regulatory standards or more stringent practices of industries that have expert knowledge of handling hazardous substances. Consequently, safe practices presented here are not intended to apply to the following:¹

- (1) Containers and confined spaces that can be entered by workers (see ANSI Z117.1, *Safety Requirements for Confined Spaces*²).
- (2) Containers that have contained radioactive substances
- (3) Compressed gas containers
- (4) Containers that have held explosive substances (such as nitrocellulose, pyroxylin solution, etc.)

- (5) Tanks, bunkers, or compartments on ships
- (6) Gasometers or gas holders for natural and manufactured gases
- (7) Outside, above-ground, vertical petroleum storage tanks
- (8) Containers holding flammables that are to be repaired while in service

2. Definitions

2.1 Hazardous Substances. Hazardous substances include, but are not limited to, those that are explosive, combustible, toxic, or corrosive. They may be present in a container having previously held one of the following:

- (1) Volatile liquid that can release potentially hazardous flammable or toxic vapors, or any combination thereof.
- (2) An acid or alkaline material that reacts with metals to produce hydrogen.
- (3) A nonvolatile liquid or solid that at ordinary temperatures will not release potentially hazardous vapors, but will do so if the container is heated. (*NOTE: Combustible vapors or hazardous decomposition products may be generated by the heat of welding or cutting.*)
- (4) A dust cloud or finely divided airborne particles that may still be present in an explosive concentration.
- (5) A flammable or toxic gas.
- (6) Corrosion by-products due to reaction of the container with its contents.

2.2 Qualified Person. A person designated by the employer or contractor, in writing, as capable by education or specialized training, or both, of anticipating, recognizing, and evaluating employee exposure to hazardous substances or other unsafe conditions. This

¹ See Annex A, Bibliography, for other standards and practices.
² This ANSI standard is published by the American Society of Safety Engineers, 1800 East Oakton Street, Des Plaines, IL 60018.