AWS C4.9/C4.9M:2024
An American National Standard

Recommended Practices for Oxyacetylene Cutting of Steel

American Welding Society®

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American National Standards Institute
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Recommended Practices for Oxyacetylene Cutting of Steel

1st Edition

Prepared by the
American Welding Society (AWS) C4 Committee on Oxyfuel Gas Welding and Cutting

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This recommended practice for oxyacetylene cutting includes general procedures to be used in conjunction with oxyacetylene equipment and the latest safety recommendations. If not found in this recommended practice, lists of additional equipment are available from individual manufacturers.

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Foreword

This foreword is not part of this standard but is included for information purposes only.

Oxyacetylene cutting is active and thriving in educational laboratories and manufacturing facilities worldwide. This process is very useful in fabrication, maintenance, and repair work. The process is flexible and mobile, and it can be used as a stand alone process or as a supplement to other cutting processes in large fabricating facilities concerned with job-shop type work and industrial processes. AWS C4.9/C4.9M, *Recommended Practices for Oxyacetylene Cutting of Steel,* has been structured in a format like AWS C4.7/C4.7M, *Recommended Practices for Oxyacetylene Welding of Steel*, which provides flexibility in how users can apply these guidelines and recommendations. Users can choose to implement the entire AWS C4.9/C4.9M as a comprehensive recommended practice or selectively use specific sections (clauses and annexes) based on their needs and settings. This means that certain parts of the AWS C4.9/C4.9M, such as narratives and figures found in Clause 7, Clause 8, and Annex D, can be used independently (separately) or sequentially (in a specific order), depending on the requirements of the situation. This adaptability allows for better customization to different environments like offices, classrooms, laboratories, or field settings. The goal of the C4 Committee has been and continues to be improving the understanding and retention of information among diverse audiences. These audiences include end users (likely individuals who perform oxyacetylene cutting e.g., cutters, otherwise students), management (managers, otherwise supervisors) administration (instructors, otherwise teachers). Imparting the essential knowledge and skills of oxyacetylene cutting uses both pedagogical (teaching methods for young [<18 years old] adult learners) and andragogical (teaching methods for older [>18 years old] adult learners) approaches. In summary, AWS C4.9/C4.9M provides guidelines and recommendations for oxyacetylene cutting of steel, and it offers flexibility in how this recommended practice can be applied in various educational and practical settings to cater to a wide range of users. This is the first edition of the document.

The safety concerns necessary for AWS C4.9/C4.9M, *Recommended Practices for Oxyacetylene Cutting of Steel* are similar to those documented in AWS C4.2/C4.2M, *Recommended Practices for Oxyfuel Gas Cutting Torch Operation*, AWS C4.3/C4.3M, *Recommended Practices for Oxyfuel Gas Heating Torch Operation*, AWS C4.4/C4.4M, *Recommended Practices for Heat Shaping and Straightening with Oxyfuel Gas Heating Torches,* AWS C4.7/C4.7M, *Recommended Practices for Oxyacetylene Welding of Steel* and ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*.

This recommended practice describes the equipment, applications, and safe practices for oxyacetylene cutting operations. It can be used as a teaching and training tool to safely operate an oxyacetylene torch in cutting operations. This document is intended for use by the oxyacetylene cutter or his or her instructor. This recommended practice includes all the information necessary for the end users (cutters, otherwise students) and management (managers, otherwise supervisors) or administration (instructors, otherwise teachers) to oxyacetylene cut steel. Oxyacetylene cutting produces high-quality cuts. It is inexpensive, flexible, and mobile. It requires no electricity. It is clean and produces little slag or spatter. Much of the information in this recommended practice is general in nature. There is a variety of equipment available from several manufacturers; therefore, it is recommended that each manufacturer's equipment manual be consulted for details concerning the selection, setup, maintenance, and troubleshooting of said equipment before using it.

Acetylene is the primary fuel gas to be considered in this document. The other alternative fuel gases (i.e., propane, propylene, and natural gas) are viable fuel gases for gas cutting, but the equipment is different than that which is used for oxyacetylene cutting (OFC-A). This process (i.e., oxyfuel gas cutting) will be hereby known as oxyacetylene cutting in this recommended practice. Thus, oxyacetylene cutting can be used to cut steel pipe and tubing, sheet metal, and small-sized structural steel shapes and bars. It does not cover cutting in confined spaces, cutting over coatings of any kind, and cutting where there may be exposure to potentially hazardous substances.

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Comments and suggestions for the improvement of this recommended practice are welcome. They should be sent to the Secretary, AWS C4 Committee on Oxyfuel Gas Welding and Cutting, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166-6672.

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Recommended Practices for Oxyacetylene Cutting of Steel

1. General Requirements

1.1 Scope. This recommended practice describes the equipment, procedures, and safe practices for the oxyacetylene cutting of steel. This oxy-fuel gas cutting (OFC-A) process is the most used process for cutting carbon steel; however, it is sometimes used on alloy steel and cast iron. The fuel gas generally used is acetylene, and it will be the fuel gas used throughout this recommended practice. Although oxyacetylene cutting (OFC-A) can be used for semi-automatic and automatic cutting, only manual cutting will be discussed in this recommended practice. Manual cutting using hand torches are recommended for users (cutters otherwise students) and management (managers otherwise supervisors) or administration (instructors otherwise teachers) associated with the OFC-A process. The users can choose to implement the entire AWS C4.9/C4.9M as a comprehensive recommended practice or selectively use specific sections (clauses and annexes) based on their needs and settings. In short, these guidelines for oxyacetylene cutting of steel offer flexibility in how this recommended practice can be applied in various educational and practical settings to cater to a wide range of users

Oxyacetylene cutting (OFC-A) is a process where a metal (usually an iron base alloy) is heated to its ignition temperature (well below its kindling temperature) by an oxyacetylene flame. A cutting torch is used for this operation as a regulated jet of oxygen from the cutting torch causes the metal to be oxidized quickly into liquid iron oxide that flows out of the kerf as dross, producing the cut. Acetylene is the fuel gas of choice because it has the ability, along with oxygen, to form a gaseous shield around the cherry red metal (around 1400ºF [760ºC]), protecting it from ambient contaminants as the cut progresses. Virtually all commercial fuel gases can produce temperatures high enough to liquefy most metals and allow cuts to occur in the realm of pure oxygen. However, acetylene remains the fuel gas of choice as OFC-A (whether implementing reducing, neutral, or oxidizing flames) is easier to adjust compared to other fuel gas mixtures. OFC-A is used in fabrication, maintenance, and repair, where flexibility and mobility are important.

Although this recommended practice is not written with mandatory requirements, mandatory language, such as the use of "shall," will be found in those portions of the document where failure to follow the instructions or procedures could produce inferior, misleading, or unsafe results.

Appropriate terms and definitions from AWS A3.0M/A3.0, *Standard Welding Terms and Definitions, Including Terms for Adhesive Bonding, Brazing, Soldering, Thermal Cutting, and Thermal Spraying*, are included in Annex B of this Recommended Practice for information only.

1.2 Units of Measure. This standard (recommended practice) uses both U.S. Customary Units and the International System of Units (SI). The latter are shown within brackets ([ ]) or in appropriate columns in tables and figures. The measurements may not be exact equivalents; therefore, each system must be used independently.

1.3 Safety. Safety issues and concerns are addressed in this standard (recommended practice), although some health issues are beyond the scope of this standard (recommended practice).

Safety and health information is available from the following sources:

American Welding Society:

(1) ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*

(2) ANSI Z87.1, *American National Standard for Occupational and Educational Eye and Face Protection*

(3) ANSI Z89.1, *Industrial Head Protection*

(4) AWS Safety and Health Fact Sheets

(5) Other safety and health information on the AWS website