D3.6M:2017
An American National Standard

Underwater Welding Code

American Welding Society®

AWS D3.6M:2017
An American National Standard

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Underwater Welding Code

6th Edition

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Prepared by the
American Welding Society (AWS) D3 Committee on Marine Welding

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This code covers the requirements for welding structures or components under the surface of water. It includes welding in both dry and wet environments. Clauses 1 through 8 constitute the general requirements for underwater welding, while clauses 9 through 11 contain the special requirements applicable to three individual classes of weld as follows:

Class A—Comparable to above-water welding
Class B—For less critical applications
Class O—To meet the requirements of another designated code or specification

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Foreword

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

In 1975, the AWS Committee on Marine Construction requested the Subcommittee on Underwater Welding to establish a standard reflecting state-of-the-art technology relative to underwater welding. The first edition of the code was published in 1983, with subsequent editions issued in 1989, 1993, 1999, and 2010.

Clauses 1 through 8 constitute the general requirements applicable to all classes of underwater welds. Clauses 9 through 11 contain unique requirements applicable to each class. Initially applied as a means of temporary repair for damaged steel-hulled vessels, underwater welding has evolved into an accepted method of construction and repair of engineered structures. Applications now include engineered repair and alteration of off-shore structures, submerged marine pipelines, underwater port facilities and nuclear power plant components.

This 6th edition incorporates the following major revisions:

(1) Cleaning requirements have been better defined (5.11)

(2) Acceptance of qualification to earlier editions of D3.6M is incorporated (7.1.3)

(3) Ultrasonic Examination Clause 8, Part IV, has been updated to better align with the UT technique described in AWS D1.1/D1.1M, *Structural Welding Code—Steel*

(4) Sample Forms have been revised (Annex A)

(5) An informative annex has been added to address the qualification of marine welding inspectors (Annex E)

(6) There is a restructuring of the clause numbers

(7) Ultrasonic Stress Relieving has been added to the document (Terms and Definitions, Workmanship, Welding Variables, and Annex C)

A vertical line in the margin or underlined text in clauses, tables, or figures indicates a technical or significant change from the 2010 edition.

Comments and suggestions for the improvement of this standard are welcome. They should be addressed to the Secretary, AWS D3B Subcommittee on Underwater Welding, American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.

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Underwater Welding Code

1. General Requirements

1.1 Scope. This code covers underwater welding in both dry and wet environments. Five basic methods for underwater welding are covered in this specification as follows:

(1) Welding in a pressure vessel in which the pressure is reduced to approximately one atmosphere, independent of depth (dry welding at one atmosphere).

(2) Welding at ambient pressure in a large chamber from which water has been displaced in an atmosphere such that the welder/diver does not work in diving equipment (dry welding in a habitat).

(3) Welding at ambient pressure in a simple open-bottomed dry chamber that accommodates, as a minimum, the head and shoulders of the welder/diver in full diving equipment (dry chamber welding).

(4) Welding at ambient pressure in a small, transparent, gas-filled enclosure with the welder/diver outside in the water (dry-spot welding).

(5) Welding at ambient pressure with the welder/diver in the water without any mechanical barrier between the water and the welding arc (wet welding).

This document is intended to define the important variables associated with underwater welding and to describe welding and inspection procedures so that work of a known quality level can be conveniently specified.

Three weld classes (A, B, and O) are specified herein. They encompass the range of quality and properties currently produced by application of the various methods. Each weld class defines a set of criteria for weldment properties that must be established during qualification, and a set of weld soundness requirements that are to be verified during construction. Welds in each class must meet all the criteria specified for that class. This code does not address the selection of the class that meets the service requirements of a particular application. The selection of the class of weld to be provided is to be prescribed by the Customer.

All provisions of this document apply equally to new construction and to modification and repair of existing structures underwater. This document may be used in conjunction with other applicable codes or specifications for design, construction, or repair.

1.2 Units of Measurement. This standard makes sole use of International System of Units (SI). Approximate mathematical equivalents in U.S. Customary Units are provided for comparison in parentheses or in appropriate columns in tables and figures.

1.3 Safety. Safety and health issues and concerns are beyond the scope of this standard; some safety and health information is provided, but such issues are not fully addressed herein. Recommended Guidelines for Safety in Underwater Welding are found in Annex B (Informative).

Safety and health information is available from the following sources:

American Welding Society:

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