AWS D14.4/D14.4M:2019
An American National Standard

Specification for the Design of Welded Joints in Machinery and Equipment

American Welding Society®

Approved American National Standard
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American National Standards Institute
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Specification for the Design of Welded Joints in Machinery and Equipment

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Prepared by the
American Welding Society (AWS) D14 Committee on Machinery and Equipment

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This specification establishes common acceptance criteria for classifying and applying carbon and low-alloy steel welded joints used in the manufacture of machines and equipment. It also covers weld joint design, workmanship, quality control requirements and procedures, weld joint inspection, nondestructive testing, repair of weld defects, and postweld treatment.

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Foreword

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

In 1967, the Technical Activities Committee of AWS established a technical committee to provide standards and recommended practices for the welding and fabrication of industrial equipment and machinery. The scope of that technical committee, identified as D14 committee, was to collect, review, and promulgate minimum requirements considered necessary for the control of welding in the fabrication of industrial machinery and equipment. This included weld design data, welding process selection, materials control, fabrication practices, quality standards, inspection and testing. The committee determined that a single universal standard and guide covering all machinery and equipment was impractical due to differences in utilization and operational requirements. Therefore, it became the policy of the D14 committee to establish subcommittees as may be required to consider specific types of machinery and equipment within the scope of the main committee. A listing of the subcommittees for D14 at the time of approval of this document is as follows:

D14B – Subcommittee on General Design and Practices

D14C – Subcommittee on Earthmoving and Construction Equipment

D14E – Subcommittee on Welding Cranes and Presses

D14G – Subcommittee on Welding Rotating Equipment

D14H – Subcommittee on the Surfacing of Industrial Rolls and Equipment

D14I – Subcommittee on Hydraulic Cylinders

The first edition of this Standard was published in 1977 to provide a standard for the classification of welded joints for machinery and equipment. It included weld joint design, welding fabrication practices, quality control, and inspection indices to meet general machinery performance requirements. Over time, other standards for specific areas in the machinery and equipment field were developed by the D14 committee (see list on back page of this document) and this standard then served as a supplement to these standards and continued to provide a basis for other areas in the machinery and equipment field not served by a specific standard. This standard was revised in 1997, 2005, and 2012. Today, this standard is still intended to be referenced by all D14 standards as applicable.

Thus, as the purpose of this document has undergone a subtle change, the committee has changed the title of this document to *Specification for the Design of Welded Joints in Machinery and Equipment* from its former titles of *Specification for Welded Joints in Machinery and Equipment* and *Classification and Application of Welded Joints for Machinery and Equipment*.

The purpose of this Specification is not to restrict the use of other proven methods and procedures for welding machinery and equipment. Where such methods and procedures exist, this Specification should be referenced as a supplement.

This fifth edition has been expanded to include terminology and references to numerous ISO, EN and IIW documents to better establish global relevancy and usage of this Specification throughout all International markets. To aid in communication, when appropriate, international terms shall be included in brackets "[]", as stated in clause 1.5.

Underlined text or a vertical line in the margin indicates a change from the previous edition.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS D14 Committee on Machinery and Equipment, American Welding Society, 8669 NW 36th St #130, Miami, FL 33166.

This document will be reviewed periodically to assure its success in serving all parties concerned with its provisions. Revisions will be issued when warranted.

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Specification for the Design of Welded Joints in Machinery and Equipment

1. General Requirements

1.1 Scope. This specification establishes design, quality, and inspection requirements for carbon and low-alloy steel welded connections in machinery and equipment. It addresses topics including weld joint design, workmanship, quality acceptance criteria, non-destructive inspection methods (visual, radiographic, ultrasonic, magnetic particle, and liquid penetrant), repair of weld defects, and heat treatment.

1.2 Limitations. This specification does not dictate load determination, design assumptions, safety factors, or calculation methods. It is not the intent of this specification to restrict the use of other proven welding methods and procedures that are not mentioned herein, which achieve acceptable results as determined by the Engineer. In the case where this specification is used between the Owner and Manufacturer, the use of other proven welding methods and procedures that are not mentioned herein shall be agreed to in writing by the Owner and Manufacturer.

1.3 Units of Measurement. This standard makes use of 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.

1.4 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.

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) AWS Safety and Health Fact Sheets

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

Material or Equipment Manufacturers:

(1) Safety Data Sheets supplied by materials manufacturers

(2) Operating Manuals supplied by equipment manufacturers

Applicable Regulatory Agencies

Work performed in accordance with this standard may involve the use of materials that have been deemed hazardous, and may involve operations or equipment that may cause injury or death. This standard does not purport to address all safety and health risks that may be encountered. The user of this standard should establish an appropriate safety program to address such risks as well as to meet applicable regulatory requirements. ANSI Z49.1 should be considered when developing the safety program.

1.5 International Usage. This specification includes terms and symbols that are more commonly used outside of the North American market. These terms are shown in brackets [ ] when used in the specification.

1.6 Engineer Responsibility.

1.6.1 The 'Engineer' in this document shall have specific technical expertise in welding engineering or design engineering; the expertise is not limited to these two areas of engineering. Unless otherwise specified in the contract