AWS D14.4/D14.4M:2012
An American National Standard

Specification for the Design of Welded Joints in Machinery and Equipment

American Welding Society®

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Approved by the
American National Standards Institute
April 18, 2012

Specification for the Design of Welded Joints in Machinery and Equipment

4th Edition

Supersedes AWS D14.4/D14.4M:2005

Prepared by the
American Welding Society (AWS) D14 Committee 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, welding operator and welding procedure qualification, weld joint inspection (visual, radiographic, ultrasonic, magnetic particle, liquid penetrant), repair of weld defects, and heat treatment.

American Welding Society®
8669 Doral Blvd., Doral, FL 33166

International Standard Book Number: 978-0-87171-812-9
American Welding Society
8669 Doral Blvd., Doral, FL 33166

Printed in the United States of America

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D. J. Malito	*Girard Machine Company, Incorporated*
M. R. Malito	*Girard Machine Company, Incorporated*
D. C. Martinez	*Consultant*
H. W. Mishler	*Consultant*
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Foreword

This foreword is not part of AWS D14.4/D14.4M:2012, *Specification for the Design of Welded Joints in Machinery and Equipment*, 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. 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 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 fourth edition includes new clauses on general design requirements and welded connection design as well as the inclusion of measurable criteria for the control of excessive convexity utilizing the reentrant angle on welds.

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 Doral Blvd., Doral, 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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1. Scope

1.1 General

This specification sets forth requirements dealing with the allowable stresses, welded joint design, workmanship, procedure and performance qualification, inspection, repair and post weld treatments of welded connections used in machinery and equipment, subject to static and cyclic loading. It is intended to be used in conjunction with other specifications that provide application specific requirements (such as D14.1, D14.3, etc.). In the event a conflict arises between the application specific standard and AWS D14.4/D14.4M, the application specific standard shall take precedence. The intent of this document is to establish the effect of weld joint geometry, welding practices, and quality control on allowable stress levels. The specification also provides practices that can be used for examination of welded joints used in fabrication of machinery and equipment.

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 and which have been agreed to in writing by the Owner and Manufacturer.

1.3 Units of Measurement

This specification 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 specification with the designation D14.4 uses U.S. Customary Units. The specification D14.4M uses SI Units. The latter are shown in appropriate columns in tables and figures or within brackets [ ] when used in the text. Detailed dimensions on figures are in inches. A separate tabular form that relates the U.S. Customary Units with SI Units may be used in tables and figures.

1.4 Safety and Health

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) Material Safety Data Sheets supplied by materials manufacturers

(2) Operating Manuals supplied by equipment manufacturers Applicable Regulatory Agencies