AWS D14.9/D14.9M:2022-AMD1
An American National Standard

Specification for the Welding of Hydraulic Cylinders

American Welding Society®

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Specification for the Welding of Hydraulic Cylinders

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Prepared by the
American Welding Society (AWS) D10 Committee on Piping and Tubing

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This specification provides standards for the design and manufacture of pressure containing welded joints and structural welded joints used in the manufacture of hydraulic cylinders. Manufacturer's responsibilities are presented as they relate to the welding practices that have been proven successful within the industry in the production of hydraulic cylinders. Included are clauses defining procedure qualification, performance qualification, workmanship and quality requirements as well as inspection requirements and repair requirements.

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Foreword

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

This specification reflects the welding processes and practices employed by manufacturers within the industry and it incorporates various methods which have been proven successful by individual manufacturers. No restrictions are placed on the use of any welding process or procedure, provided the weld produced meets the qualification requirements of this specification. No attempt is made to limit or restrict technological progress in the welding of hydraulic cylinders, nor should any such limitation be inferred.

This is the second edition of AWS D14.9/D14.9M, *Specification for the Welding of Hydraulic Cylinders*. This second edition has added a revision of the scope, procedure qualifications, and stud welding.

All errata to a standard shall be published in the *Welding Journal* and posted on the AWS website.

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

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Specification for the Welding of Hydraulic Cylinders

1. General Requirements

1.1 Scope. This specification provides requirements for the design and manufacture of welded joints of hydraulic cylinders. When specified in the contract documents, compliance with all the requirements shall be required. This specification does not apply to the manufacture of welded tubing used for hydraulic cylinders which is covered under ASTM and other recognized specifications. This specification does not specify load determination, design assumptions, safety factors, or calculation methods for non-weld related areas of the hydraulic cylinder.

1.1.1 Responsibilities

1.1.1.1 The Manufacturer's adherence to this specification shall include responsibility for the following:

(1) welding, as defined in 1.1, in accordance with this specification;

(2) producing welds as designated on drawings by appropriate symbols and notes, with sufficient detail to show joint preparation compatible with applied processes;

(3) providing written welding procedure specifications (WPSs);

(4) recording and maintaining results of all welding procedure and welder performance qualification tests;

(5) controlling use of designated base metals and welding consumables;

(6) inspecting the welds to the requirements of this specification;

(7) having a welding quality program in place. The requirements of AWS B5.17, *Specification for the Qualification of Welding Fabricators* may be used as a guide in establishing this welding quality program. Accreditation of quality systems of welding fabricators may be obtained through the AWS Certified Welding Fabricator (CWF) or equivalent programs.

(8) determining the responsible technical authority when the term "Engineer" is used. If the Owner wants to assume engineering responsibility, it shall be specified in the contract documents.

1.1.1.2 The 'Engineer' in this document shall have specific technical expertise, such as, but not limited to, welding engineering or design engineering.

1.1.1.3 Welding Engineer. The Manufacturer's technical authority typically responsible for developing welding procedure specifications (WPS), procedure qualification records (PQR) and performance qualification test record (PQTR). The Welding Engineer may also have expertise in welding process selection; weld metallurgy and weld filler metal selection; weld joint design and weld sizing; weld fixture design and weld robot programing; weld inspection and weld defect/failure root cause analysis. Qualifications for a welding engineer shall meet one of the following criteria:

(1) An AWS Certified Welding Engineer in conformance with the provisions of AWS B5.16, *Specification for the Qualification of Welding Engineers*,

(2) IIW International Welding Engineer (IWE),

(3) Professional Engineer – Welding, or

(4) An individual who by degree, training, or experience is qualified in welding engineering disciplines.

1.1.1.4 Design Engineer. The technical authority typically responsible for developing equipment configuration; analyzing stress levels (such as but not limited to finite element analysis (FEA) and strain gage data); choosing material