Specification for Fabrication of Metal Components using Additive Manufacturing
Abstract

This specification provides the general requirements for fabrication of metal components using additive manufacturing. It provides guidance for the interaction between the Engineer and the Contractor. It includes the design, qualification, fabrication, inspection, and acceptance of additively manufactured components. A commentary for the specification is included.
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Official interpretations of any of the technical requirements of this standard may only be obtained by sending a request, in writing, to the appropriate technical committee. Such requests should be addressed to the American Welding Society, Attention: Director, Standards Development, 8669 NW 36 St, # 130, Miami, FL 33166 (see Annex F). With regard to technical inquiries made concerning AWS standards, oral opinions on AWS standards may be rendered. These opinions are offered solely as a convenience to users of this standard, and they do not constitute professional advice. Such opinions represent only the personal opinions of the particular individuals giving them. These individuals do not speak on behalf of AWS, nor do these oral opinions constitute official or unofficial opinions or interpretations of AWS. In addition, oral opinions are informal and should not be used as a substitute for an official interpretation.

This standard is subject to revision at any time by the AWS D20 Committee on Additive Manufacturing. It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn. Comments (recommendations, additions, or deletions) and any pertinent data that may be of use in improving this standard are requested and should be addressed to AWS Headquarters. Such comments will receive careful consideration by the AWS D20 Committee on Additive Manufacturing and the author of the comments will be informed of the Committee’s response to the comments. Guests are invited to attend all meetings of the AWS D20 Committee on Additive Manufacturing to express their comments verbally. Procedures for appeal of an adverse decision concerning all such comments are provided in the Rules of Operation of the Technical Activities Committee. A copy of these Rules can be obtained from the American Welding Society, 8669 NW 36 St, # 130, Miami, FL 33166.
Foreword

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

The predecessors to additive manufacturing started in the early 1900’s, but control systems that allowed its use for main-
stream manufacturing have only become prevalent in recent years. This qualification and certification standard provides
a structure for manufacturers and their customers to specify high quality components across many industries. Metal addi-
tive manufacturing (AM) systems first started as very small pieces of equipment using lasers and electron beams to make
fine features using expensive to fabricate materials to produce difficult components. More recently, the equipment has
become quite large with the capability to make large structures and has now incorporated the use of many arc welding
processes and common structural materials. The growth in this segment of the welding industry has been fast due to its
ability to make quick changes in designs and its ability to support just-in-time manufacturing methods.

The information contained in this standard was compiled by the American Welding Society’s D20 Committee on Additive
Manufacturing and has been carefully reviewed by a number of experts in the field. It must be noted that any operating
parameters given in this standard will not be the only possible parameter combinations that can be employed for success-
fully processing the materials shown. Changes in material composition, dimensional tolerances, and machine calibration
will cause changes in the resulting products. This is the first revision of the AWS D20.1/D20.1M standard.

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS
D20 Committee on Additive Manufacturing, American Welding Society, 8669 NW 36th St., # 130, Doral, FL 33166.
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Specification for Fabrication of Metal Components using Additive Manufacturing

1. General Requirements

1.1 Scope. This standard contains the requirements for fabricating metal components by use of additive manufacturing (AM) processes. Annex E provides flowcharts, for information, to assist the user of this standard in following the process for producing AM components in accordance with this document. When this standard is stipulated in contract documents, conformance with all provisions of the standard shall be required, except those provisions that the Engineer (see 1.5.1) or contract documents specifically modify or exempt. Additive manufacturing processes covered include those listed in Table 1.1, using either powder or wire feedstock, as applicable.

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The following is a summary of the standard clauses:

Clause 1. General Requirements: Basic information on the scope and requirements of this standard.

Clause 2. Normative References: A listing of the documents that are required for the application of this standard.

Clause 3. Terms and Definitions: A list of technical terms and definitions required for the application of this standard.

Clause 4. Design of Additively Manufactured Components: Requirements for the design of additively manufactured components.


Clause 7. Fabrication: Requirements for fabricating additively manufactured components.

Clause 8. Inspection: Requirements for the qualification of inspection personnel. Nondestructive and destructive examination requirements and acceptance criteria for qualification and production builds.