

AWS A5.34/A5.34M:2020
An American National Standard

Specification for Nickel-Alloy Flux Cored and Metal Cored Welding Electrodes



AWS A5.34/A5.34M:2020
An American National Standard

Approved by the
American National Standards Institute
June 16, 2020

Specification for

Nickel-Alloy Flux Cored and Metal

Cored Welding Electrodes

4th Edition

Revises AWS A5.34/A5.34M:2018

Prepared by the
American Welding Society (AWS) A5 Committee on Filler Metals and Allied Materials

Under the Direction of the
AWS Technical Activities Committee

Approved by the
AWS Board of Directors

Abstract

This specification prescribes requirements for the classification of flux cored and metal cored nickel-alloy electrodes. For flux cored electrodes, testing determines the chemical composition, mechanical properties, soundness of the weld metal, and the welding position usability characteristics of the electrode using the specified shielding gas. For metal cored electrodes, testing determines the chemical composition, using the chemical compositions specified in AWS A5.14/A5.14M. This specification includes those compositions in which the nickel content exceeds that of any other element, but excludes nickel-base alloy compositions intended for the joining of cast irons. This specification makes use of both U.S. customary units and the International System of Units (SI). Since these are not equivalent, each system must be used independently of the other.



ISBN Print: 978-1-64322-141-0

ISBN PDF: 978-1-64322-142-7

© 2020 by American Welding Society

All rights reserved

Printed in the United States of America

Photocopy Rights. No portion of this standard may be reproduced, stored in a retrieval system, or transmitted in any form, including mechanical, photocopying, recording, or otherwise, without the prior written permission of the copyright owner.

Authorization to photocopy items for internal, personal, or educational classroom use only or the internal, personal, or educational classroom use only of specific clients is granted by the American Welding Society provided that the appropriate fee is paid to the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923, tel: (978) 750-8400; Internet: <www.copyright.com>.

Statement on the Use of American Welding Society Standards

All standards (codes, specifications, recommended practices, methods, classifications, and guides) of the American Welding Society (AWS) are voluntary consensus standards that have been developed in accordance with the rules of the American National Standards Institute (ANSI). When AWS American National Standards are either incorporated in, or made part of, documents that are included in federal or state laws and regulations, or the regulations of other governmental bodies, their provisions carry the full legal authority of the statute. In such cases, any changes in those AWS standards must be approved by the governmental body having statutory jurisdiction before they can become a part of those laws and regulations. In all cases, these standards carry the full legal authority of the contract or other document that invokes the AWS standards. Where this contractual relationship exists, changes in or deviations from requirements of an AWS standard must be by agreement between the contracting parties.

AWS American National Standards are developed through a consensus standards development process that brings together volunteers representing varied viewpoints and interests to achieve consensus. While AWS administers the process and establishes rules to promote fairness in the development of consensus, it does not independently test, evaluate, or verify the accuracy of any information or the soundness of any judgments contained in its standards.

AWS disclaims liability for any injury to persons or to property, or other damages of any nature whatsoever, whether special, indirect, consequential, or compensatory, directly or indirectly resulting from the publication, use of, or reliance on this standard. AWS also makes no guarantee or warranty as to the accuracy or completeness of any information published herein.

In issuing and making this standard available, AWS is neither undertaking to render professional or other services for or on behalf of any person or entity, nor is AWS undertaking to perform any duty owed by any person or entity to someone else. Anyone using these documents should rely on his or her own independent judgment or, as appropriate, seek the advice of a competent professional in determining the exercise of reasonable care in any given circumstances. It is assumed that the use of this standard and its provisions is entrusted to appropriately qualified and competent personnel.

This standard may be superseded by new editions. This standard may also be corrected through publication of amendments or errata, or supplemented by publication of addenda. Information on the latest editions of AWS standards including amendments, errata, and addenda is posted on the AWS web page (www.aws.org). Users should ensure that they have the latest edition, amendments, errata, and addenda.

Publication of this standard does not authorize infringement of any patent or trade name. Users of this standard accept any and all liabilities for infringement of any patent or trade name items. AWS disclaims liability for the infringement of any patent or product trade name resulting from the use of this standard.

AWS does not monitor, police, or enforce compliance with this standard, nor does it have the power to do so.

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: Managing Director, Standards Development, 8669 NW 36 St, # 130, Miami, FL 33166 (see Annex B). 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 A5 Committee on Filler Metals and Allied Materials. 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 A5 Committee on Filler Metals and Allied Materials 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 A5 Committee on Filler Metals and Allied Materials 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.

This specification now permits the classification of metal cored electrodes. Metal cored electrodes are classified based on chemical composition, as found in AWS A5.14/A5.14M, *Specification for Nickel and Nickel-Alloy Bare Welding Electrodes and Rods*.

NOTE: The user's attention is called to the possibility that compliance with this standard may require use of an invention covered by patent rights.

By publication of this standard, no position is taken with respect to the validity of any such claim(s) or of any patent rights in connection therewith. If a patent holder has filed a statement of willingness to grant a license under these rights on reasonable and nondiscriminatory terms and conditions to applicants desiring to obtain such a license, then details may be obtained from the standards developer.

Substantive change in this edition is moving one sentence from A7.3.5 to A7.3.2 which is shown in *Italic* font.

Document Development

The evolution of this specification took place as follows:

AWS A5.34/A5.34M:2007, *Specification for Nickel-Alloy Electrodes for Flux Cored Arc Welding*

AWS A5.34/A5.34M:2013, *Specification for Nickel-Alloy Electrodes for Flux Cored Arc Welding*

AWS A5.34/A5.34M:2018, *Specification for Nickel-Alloy Flux Cored and Metal Cored Welding Electrodes*

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, A5 Committee on Filler Metals and Allied Materials, American Welding Society, 8669 NW 36 St. # 130, Miami, FL 33166.

Table of Contents

	Page No.
<i>Personnel</i>	v
<i>Foreword</i>	vii
<i>List of Tables</i>	x
<i>List of Figures</i>	x
1. Scope	1
2. Normative References	1
3. Classification	3
4. Acceptance	3
5. Certification	3
6. Rounding Procedure	3
7. Summary of Tests	5
8. Retest	5
9. Weld Test Assemblies for Flux Cored Electrodes	7
10. Chemical Analysis of the Weld Metal for Flux Cored Electrodes	13
11. Radiographic Test	13
12. Tension Test	15
13. Bend Test	15
14. Fillet Weld Test	16
15. Chemical Analysis of Metal Cored Electrodes	16
16. Method of Manufacture	16
17. Standard Sizes	17
18. Finish and Uniformity	17
19. Standard Package Forms	17
20. Winding Requirements	17
21. Filler Metal Identification	17
22. Packaging	17
23. Marking of Packages	17
<i>Annex A (Informative)—Guide to AWS Specification for Nickel-Alloy Flux Cored and Metal Cored Welding Electrodes</i>	<i>19</i>
<i>Annex B (Informative)—Requesting an Official Interpretation on an AWS Standards</i>	<i>27</i>
<i>AWS Filler Metal Specifications by Material and Welding Process</i>	<i>29</i>
<i>AWS Filler Metal Specifications and Related Documents</i>	<i>31</i>

List of Tables

Table	Page No.
1	Chemical Composition Requirements for Undiluted Weld Metal for Flux Cored Electrode Classification 4
2	Required Shielding Gas, Welding Current and Polarity, and Welding Position for Flux Cored Electrode Classification 5
3	Required Tests 6
4	Required Base Metals for Flux Cored Electrode Classification 6
5	Base Metal Specifications 7
6	Tension Test Requirements for Flux Cored Electrode Classification 15
A.1	Comparison of Classifications 22

List of Figures

Figure	Page No.
1	Pad for Chemical Analysis of Undiluted Weld Metal from Flux Cored Electrodes 8
2	Groove Weld Test Assembly for Tension and Radiographic Tests for Flux Cored Electrodes 9
3	Groove Weld Test Assembly for Longitudinal Bend Test for Flux Cored Electrodes 10
4	Fillet Weld Test Assembly for Flux Cored Electrodes 11
5	Fillet Weld Test Specimen and Dimensional Requirements for Flux Cored Electrodes 12
6	Radiographic Standards for 3/4 in [19 mm] Test Assembly in Figure 2 for Flux Cored Electrodes 14
A.1	A5.34/A5.34M Flux Cored Electrode Classification System Utilizing Portions of the ISO Format 20
A.2	A5.34/A5.34M Flux Cored and Metal Cored Electrode Classification System Utilizing the Traditional Format 20

Specification for Nickel-Alloy Flux Cored and Metal Cored Electrodes

1. Scope

1.1 This specification prescribes requirements for the classification of nickel-alloy flux cored electrodes for flux cored arc welding *and the classification of nickel-alloy metal cored electrodes which may be used with various welding processes. See AWS A3.0M/A3.0 for the definitions of both types of electrodes.* It includes alloy compositions in which the nickel content exceeds that of any other element, but excludes nickel-base alloy compositions intended for the joining of cast irons.

1.2 This specification makes use of both U.S. Customary Units and the International System of Units (SI), according to the guidelines in AWS A1.1. The measurements are not exact equivalents; therefore, each system must be used independently of the other without combining in any way when referring to material properties. SI units are shown within brackets [] or in appropriate columns in tables and figures. Standard dimensions based on either system may be used for sizing of filler metal or packaging or both under the A5.34 or A5.34M specification.

1.3 *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. Some safety and health information can be found in Annex Clauses A5 and A10.*

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 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.

2. Normative References

The documents listed below are referenced within this publication and are mandatory to the extent specified herein. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments to, or revisions of any of these publication do not apply.