

AWS A5.21/A5.21M:2011
An American National Standard



Specification for Bare Electrodes and Rods for Surfacing



American Welding Society



**AWS A5.21/A5.21M:2011
An American National Standard**

**Approved by the
American National Standards Institute
December 23, 2010**

Specification for Bare Electrodes and Rods for Surfacing

5th Edition

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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 the requirements for classification of bare electrodes and rods for surfacing. Solid surfacing electrodes and rods are classified on the basis of the composition of the material as manufactured. Metal cored and flux cored composite (tubular) surfacing electrodes and rods are classified on the basis of the chemical composition of the deposited weld metal. Tubular tungsten carbide bare rods are classified on the basis of the mesh range, quantity, and composition of the tungsten carbide granules. A guide is appended to the specification as a source of information concerning the characteristics and applications of the classified electrodes.



American Welding Society

550 N.W. LeJeune Road, Miami, FL 33126

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Advisor to the AWS A5G Subcommittee on Hardfacing Filler Metals

J. B. Wu	<i>Deloro Stellite Group</i>
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Foreword

This foreword is not part of AWS A5.21/A5.21M:2011, *Specification for Bare Electrodes and Rods for Surfacing*, but is included for informational purposes only.

The method of manufacture of the core wire was the prime consideration for earlier revisions of AWS A5.21. All electrodes and rods included composite (tubular) cores. Both bare and covered electrodes were included in the same specification.

The previous revision of A5.21:2001, like that of A5.13: 2000, departed from the earlier format by eliminating the method of manufacture of the core wire as a factor for classification. All electrodes and rods now classified in accordance with A5.21:2001 are uncoated. Covered electrodes previously included, were then classified in accordance with the revision of A5.13:2000. Some solid bare electrodes and rods previously classified in accordance with A5.13-80 had been incorporated into the previously revised A5.21:2001.

This document is the first of the A5.21 specifications which makes use of both U.S. Customary Units and the International System of Units (SI). The measurements are not exact equivalents; therefore each system must be used independently of the other, without combining values in any way. In selecting rational metric units, AWS A1.1, *Metric Practice Guide for the Welding Industry*, and ISO 544 *Welding consumables — Technical delivery conditions for welding filler materials — Type of product, dimensions, tolerances and marking*, are used where suitable. Tables and figures make use of both U.S. Customary and SI Units, which, with the application of the specified tolerances, provides for interchangeability of products in both the U.S. Customary and SI Units.

This newly metricated edition has a new “Rounding-off Procedure.” AWS F3.2, Ventilation Guide for Weld Fume, has been referenced in A5.2. Detailed safety information in the annex has been replaced by reference to the AWS Safety and Health Fact Sheets. Detailed information about standard sizes and packaging has been replaced with reference to AWS A5.02/A5.02M. Added subclause 2(d) in A2.5 regarding requesting of new classifications. Significant changes such as these are shown in Italic font.

Historical background for the document is as follows:

ANSI/AWS A5.21-70 *Specification for Composite Surfacing Welding Rods and Electrodes*
ANSI W3.21-73

ANSI/AWS A5.21-80 *Specification for Composite Surfacing Welding Rods and Electrodes*

AWS A5.21:2001 *Specification for Bare Electrodes and Rods for Surfacing*

Comments and suggestions for the improvement of this standard are welcome. They should be sent to the Secretary, AWS A5 Committee on Filler Metals and Allied Materials, American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

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Specification for Bare Electrodes and Rods for Surfacing

1. Scope

1.1 This specification prescribes the requirements for the classification of bare electrodes and rods for surfacing. The specification does not provide for classification of electrode-flux combinations for submerged arc welding.

1.2 Safety and health issues and concerns are beyond the scope of this standard and, therefore, are not fully addressed herein. Some safety and health information can be found in the nonmandatory annex Clauses A5 and A10. Safety and health information is available from other sources, including, but not limited to, ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*,¹ and applicable federal and state regulations.

1.3 *This specification makes use of both U.S. Customary Units and the International System of Units (SI). 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. The specification with the designation A5.21 uses U.S. Customary Units. The specification A5.21M uses SI Units. The latter 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 A5.21 or A5.21M specifications.*

2. Referenced Documents

The following documents are referenced within this publication. For undated references, the latest edition of the referenced standard shall apply. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply.

2.1 AWS Standards²

AWS A3.0M/A3.0, *Standard Welding Terms and Definitions*

AWS A5.01M/A5.01 (ISO 14344), *Procurement Guidelines for Consumables—Welding and Allied Processes—Flux and Gas Shielded Electrical Welding Processes*

AWS A5.02/A5.02M, *Specification for Filler Metal Standard Sizes, Packaging, and Physical Attributes*

AWS F3.2, *Ventilation Guide for Weld Fume*

2.2 ANSI Standards

ANSI Z49.1, *Safety in Welding, Cutting, and Allied Processes*

2.3 ASTM Standards³

ASTM E 29, *Standard Practice of Using Significant Digits in Test Data to Determine Conformance with Specifications*

¹ ANSI Z49.1 is published by American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

² AWS standards are published by American Welding Society, 550 N.W. LeJeune Road, Miami, FL 33126.

³ ASTM standards are published by ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.