Abstract

This specification prescribes the requirements for classification of carbon and low-alloy steel flux cored electrodes for flux cored arc welding and metal cored electrodes for gas metal arc welding. The requirements include chemical composition and mechanical properties of the weld metal and certain usability characteristics. Optional, supplemental designators are also included for diffusible hydrogen and to indicate conformance to special mechanical property requirements when the weld metal is deposited using low heat input, fast cooling rate and high heat input, slow cooling rate procedures. Additional requirements are included or referenced for standard sizes, marking, manufacturing, and packaging. A guide is appended to the specification as a source of information concerning the classification system employed and the intended use of carbon and low-alloy steel flux cored and metal cored electrodes.

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.
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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 It must be reviewed every five years, and if not revised, it must be either reaffirmed or withdrawn.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 required 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, 550 N.W. LeJeune Road, Miami, FL 33126.
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Foreword

This foreword is not part of AWS A5.36/A5.36M:2012, Specification for Carbon and Low-Alloy Steel Flux Cored Electrodes for Flux Cored Arc Welding and Metal Cored Electrodes for Gas Metal Arc Welding, but is included for informational purposes only.

This specification combines the two specifications previously issued by the American Welding Society for the classification of carbon and low-alloy steel flux cored electrodes (AWS A5.20/A5.20M, Specification for Carbon Steel Electrodes for Flux Cored Arc Welding, and AWS A5.29/A5.29M, Specification for Low-Alloy Steel Electrodes for Flux Cored Arc Welding). In addition, this specification includes provisions for the classification of carbon and low-alloy steel metal cored electrodes. Heretofore, carbon steel metal cored electrodes were classified under AWS A5.18/A5.18M, Specification for Carbon Steel Electrodes and Rods for Gas Shielded Arc Welding, and low-alloy steel metal cored electrodes were classified under A5.28/A5.28M, Specification for Low-Alloy Steel Electrodes and Rods for Gas Shielded Arc Welding. The user should be advised that the requirements for low-alloy metal cored electrodes classified under this specification may vary somewhat from those prescribed in AWS A5.28/A5.28M. This document uses both U.S. Customary Units and the International System of Units (SI) throughout. 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 markings, 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 new AWS A5.36/A5.36M specification utilizes two classification systems. The first of these is a “fixed classification system” which has been carried over to this specification from AWS A5.20/A5.20M or AWS A5.18/A5.18M, as applicable, for the classification of those carbon steel flux cored electrodes or carbon steel metal cored electrodes which, with the specific mechanical properties specified for them in AWS A5.20/A5.20M or AWS A5.18/A5.18M, have gained wide acceptance for single and multiple pass applications. The classification designations and requirements for these specific electrodes are unchanged from those previously specified in AWS A5.20/A5.20M or AWS A5.18/A5.18M. A listing of these electrodes with their requirements is given in Table 1.

This AWS A5.36/A5.36M specification also utilizes a new, “open classification system” which is introduced in this document for the classification of carbon and low-alloy steel flux cored and metal cored electrodes. The open classification system uses designators to indicate electrode type (Usability Designator), welding position capability, tensile strength, impact strength, shielding gas (with more options and new designations), condition of heat treatment, if any, and weld deposit composition. The change to an open classification system is being made to allow for the classification of flux cored and metal cored electrodes with classification options which (1) better define the performance capabilities of the advanced electrode designs that have been developed, and (2) reflect the application requirements of today’s marketplace. In addition, the provision has been made in this document for the classification of metal cored electrodes (usability Designator T15) and two new electrode types (Usability Designators T16 and T17) for the classification of metal cored and flux cored electrodes designed for use with AC power sources with or without modified waveforms. The EXXT-2X classification has been discontinued. Electrodes previously classified as EXXT-2X can now be classified under the new open classification system without requiring a unique “2” Usability Designator. The EXXT-13 electrode classification has been discontinued due to lack of commercial significance. For a complete listing of the affected existing electrode classifications and the corresponding equivalent classifications using the open classification system under AWS A5.36/A5.36M, refer to A9 in Annex A.

Two additional changes to note are (1) the fillet weld test, previously required under AWS A5.20/A5.20M and AWS A5.29/A5.29M (and also detailed in ISO 15792-3) is not a required test under AWS A5.36/A5.36M, and (2) the preheat
and interpass temperature requirements for the “D” optional, supplemental designator have been modified for better agreement with AWS D1.8/D1.8M, *Structural Welding Code—Seismic Supplement.*”

The A5.20/A5.20M:2005 specification being replaced is the fourth revision of the joint ASTM/AWS A5.20 document first issued in 1969. The A5.29/A5.29M:2005 specification being replaced is the third revision of AWS A5.29 that was introduced in 1980. The historical progressions of these two documents appear below:

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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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