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Australian Standard 2203—1981

CARBON STEEL ELECTRODES, CORED (FOR ARC WELDING)

[Title allocated by Defence Cataloguing Authority: ELECTRODE, WELDING (Flux-cored, Arc Welding of Carbon and Low Alloy Steels) NSC 3439]

STANDARDS ASSOCIATION OF AUSTRALIA
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THE FOLLOWING SCIENTIFIC, INDUSTRIAL AND GOVERNMENTAL ORGANIZATIONS and departments were officially represented on the committee entrusted with the preparation of this standard:

Australian Gas Association

Australian Welding Institute

Australian Welding Research Association

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

Department of Defence

Department of Productivity

Department of Industrial Relations, N.S.W.

Department of Labour and Industry, Victoria

Lloyds Register of Shipping

Metal Trades Industry Association of Australia

Metropolitan Water, Sewerage and Drainage Board, N.S.W.

Railways of Australia Committee

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PREFACE

This standard was prepared by the Association's Committee on Electrodes and Filler Rods as the second in a series of standards for continuous wire processes developed to suit Australian conditions. The classification system adopted has been designed to be compatible with AS 1858, Electrodes and Fluxes for Submerged-arc Welding of Carbon and Low Alloy Steels, and like the system in that standard has mechanical requirements complying with the ship classification societies' Unified Rules. It also takes into consideration recent documents of the International Institute of Welding and the American National Standards Institute.

To assist designers, the concept of weld metal classification which was first introduced in AS 1858 has been incorporated in the classification of cored electrodes. This concept of weld metal classification is regarded by members of the committee which prepared the standard as being of great significance.

For ease of selection, the weld metal is classified according to its tensile strength and is divided into grades related to its Charpy V-notch impact energy value. The intent here is that the designer needs only to specify on the drawing the weld metal classification which will thereby nominate the mechanical properties required for the satisfactory functioning of the welded joint. The fabricator, taking into account recommendations by the manufacturer of the consumables, can select the electrode or electrode/gas combination appropriate to the materials of construction and the conditions pertaining at the time.

The term 'Australian Standard' will be restricted to the actual sizes, types and strengths of the consumables given in the tables in this standard.

If procedure qualification is called up in the relevant application code it may be necessary for the chosen electrode to be qualified by procedure testing.

The standard incorporates the method for hydrogen determination given in ISO 3690, Welding—Determination of Hydrogen in Deposited Weld Metal Arising from the Use of Covered Electrodes for Welding Mild and Low Alloy Steels.

This standard requires reference to the following standards and documents:

AS 1050	Methods for the Analysis of Iron and Steel (Metric Units)
AS 1204	Structural Steels—Ordinary Weldable Grades
AS 1391	Methods for Tensile Testing of Metals
AS 1544	Methods for Impact Tests on Metals Part 2—Charpy V-notch
AS 1674	Fire Precautions in Cutting, Heating and Welding Operations
AS 1858	Electrodes and Fluxes for Submerged-arc Welding of Carbon and Low Alloy Steels
AS 2177	Radiography of Welded Butt Joints in Metal
AS 2205	Methods of Destructive Testing of Welds in Metal
AS K1	Methods for the Sampling and Analysis of Iron and Steel
AS Z5	Glossary of Metal Welding Terms and Definitions
BS 1384	Measurement of Photographic Transmission Density
ANSI W3.20	Specification for Mild Steel Electrodes for Flux-cored Arc Welding
ISO 2560	Covered Electrodes for Manual Arc Welding of Mild Steel and Low Alloy Steel—Code of Symbols for Identification

AWRA Technical Note 7—Health and Safety in Welding

Other Australian standards dealing with electrodes are as follows:

AS 1167	Alloy Filler Rods for Brazing
AS 1552	Classification of Covered Electrodes
AS 1553	Low Carbon Steel Covered Electrodes for Manual Metal-arc Welding
AS 1586	Low Alloy Steel Covered Electrodes for Manual Metal-arc Welding
AS 1588	Filler Rods for Welding
AS	Welding Consumables for Build-up and Wear Resistance*

*In course of preparation—see DR 80264.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
for
CARBON STEEL ELECTRODES, CORED (FOR ARC WELDING)

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard specifies requirements for cored carbon steel electrodes as defined in Clause 1.4.4, for self-shielded and gas-shielded automatic and semi-automatic arc welding. (For description of the electrodes, see Appendix B, Paragraph B3.)

It does not apply to cored electrodes for submerged-arc, electroslag or electrogas welding.

NOTE: Mechanical properties in the as-welded condition are covered in this standard. However, certain mechanical properties, e.g. impact strength, may be at quite low levels in the heat-treated condition. Therefore, attention is drawn to the need to consult with the manufacturer if post-weld heat treatment of weldments made with these consumables is envisaged.

1.2 PURPOSE. This standard is intended to facilitate selection of electrodes to provide weld metal with the optimum properties required for a particular weld application.

1.3 APPLICATION. Section 2 describes the classification system and the requirements for electrodes. Section 3 prescribes the methods of test. Appendix A provides additional information for users of this standard.

1.4 DEFINITIONS. For the purpose of this standard the following definitions, in addition to those listed in AS Z5, apply:

1.4.1 Coil—a type of filler metal package consisting of a continuous length of electrode in coil form, with or without internal support.

1.4.2 Downhand welding position—welding in the flat or horizontal-vertical position as defined in AS Z5.

1.4.3 Drum—a type of filler metal package consisting of a continuous length of electrode wound or coiled within an enclosed cylindrical container.

1.4.4 Electrode. Where the term electrode is used it shall be taken to mean either of the following:

(a) *Flux cored electrode*—a composite filler metal electrode consisting of a metal tube or other hollow configuration containing ingredients to perform such functions as the provision of shielding atmosphere, deoxidation, arc stabilization and slag formation. Alloying materials may be included in the core. External shielding may or may not be used, or

(b) *Metal cored electrode*—a composite filler metal electrode consisting of a metal tube or other hollow configuration containing powdered metallic ingredients. Minor amounts of ingredients providing such functions as arc stabilization and fluxing of oxides may be included. External shielding gas may or may not be used.

NOTE: The electrodes may or may not be copper coated.

1.4.5 Lot or batch number—a number from which the manufacturer shall be able to identify the constituents of the electrode and the date of manufacture.

1.4.6 Reel—a type of filler metal package consisting of a continuous length of electrode wound on a cylinder, flanged at both ends, with a diameter exceeding 450 mm at the flanged ends.

1.4.7 Rim—a type of filler metal package consisting of a continuous length of electrode wound on a flanged liner, of the type shown in Fig. 2.3.

1.4.8 Shall and should—the word 'shall' is to be understood as mandatory and the word 'should' as non-mandatory, advisory or recommended.

1.4.9 Spool—a type of filler metal package consisting of a continuous length of electrode wound on a cylinder, flanged at both ends, with a maximum diameter of 450 mm at the flanged ends.

1.5 CLASSIFICATION.

1.5.1 Basis of Classification. Electrodes shall be classified on the basis of their construction, recommended welding position, whether or not external shielding gas is required and weld metal properties. Multiple classification of electrodes is permitted provided that the electrodes pass the tests appropriate to each of the classifications specified.

1.5.2 Description of the Classification system. The classification system shall consist of three groups of elements, separated by a hyphen, each group comprising a letter or letters and figures. (See Clause 1.5.3 for examples of the use of the system.)

(a) *First group—construction and recommended welding position.*

E = electrode

T = tubular construction (either seamless or seamed)

D = 'downward' welding position

P = suitable for welding in any position

NOTE: Some 'downward' electrode types and some sizes may be recommended by the manufacturer as being suitable for welding in the horizontal position.

S = suitable for single run (if applicable)

(b) *Second group—shielding requirements and current type.*

N = no external shielding

C = shielding with welding grade carbon dioxide

M = shielding with mixed gas