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Metals file

Australian Standard 1553, Part 1—1983

COVERED ELECTRODES FOR WELDING

Part 1—LOW CARBON STEEL ELECTRODES FOR MANUAL METAL-ARC WELDING OF CARBON STEELS AND CARBON-MANGANESE STEELS

STANDARDS ASSOCIATION OF AUSTRALIA
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The following interests are represented on Committee WD/2:

Australian Gas Association

Australian Institute of Petroleum Limited

Australian Welding Institute

Australian Welding Research Association

Bureau of Steel Manufacturers of Australia

Confederation of Australian Industry

Department of Defence

Department of Industrial Relations, N.S.W.

Department of Industry and Commerce

Department of Labour and Industry, Vic.

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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AUSTRALIAN STANDARD

COVERED ELECTRODES FOR WELDING

Part 1
LOW CARBON STEEL ELECTRODES FOR MANUAL METAL-ARC WELDING OF CARBON STEELS AND CARBON-MANGANESE STEELS

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PREFACE

This standard was prepared by the Association's Committee on Electrodes and Filler Rods as a revision of AS 1553—1974, Low Carbon Steel Covered Electrodes for Manual Metal-arc Welding, and incorporating relevant material from AS 1552—1973, Classification of Covered Electrodes. Electrodes specified in this standard are suitable for the welding of carbon and carbon-manganese steels and may also be used for the welding of some specified low-alloy steels.

Other Australian standards covering electrodes are as follows:

AS 1586	Low Alloy Steel Covered Electrodes for Manual Metal-arc Welding
AS 1588	Filler Rods for Welding
AS 1858	Electrodes and Fluxes for Submerged-arc Welding of Carbon and Low Alloy Steels
AS 2203	Carbon Steel Electrodes, Cored (for Arc Welding)
AS 2576	Welding Consumables for Build-up and Wear Resistance—Classification System
AS	Electrodes, Welding—Gas Metal-arc*

It has been suggested that this standard should eventually be extended to include electrodes covered by AS 1586, possibly as AS 1553, Part 2. Such future development will be influenced by proposed changes in American and International (ISO) standards.

The committee believes that the present Australian system of classification, based on the American system of classification, should be maintained. In this system, metric values replace imperial units in the numerical portion of the classification system. The first two digits of the 4-digit classification number represent approximately one-tenth of the minimum tensile strength of the deposited metal in megapascals.

Provision has been made in this standard for metal-enriched electrodes and hydrogen-controlled electrodes as well as the indication of additional characteristics by classification where appropriate.

Account has been taken of the work of the International Organization for Standardization in relation to electrode diameters and lengths and the term 'hydrogen-controlled electrodes' as used in ISO standards replaces the former term 'low hydrogen electrodes'.

In addition, this 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. The efficiency of hydrogen recovery by this method is significantly higher than that by the paraffin method used in the former AS 1553. As a result of this, the hydrogen level referred to in this standard is numerically higher than that of that standard.

This standard does not allow the ISO standard in the break-up of hydrogen controlled electrodes into three levels of hydrogen control together with high hydrogen electrodes although Appendix C, Table C1, gives the numerical values of the different hydrogen levels in the ISO standard.

The committee understands that ISO 3690 is due to be revised. When this occurs, this Australian standard will be reviewed.

A fillet break test has been introduced into this standard in place of the hot cracking test in AS 1553. Electrodes previously qualified by the hot cracking test in AS 1553 shall not be required to be requalified to this standard by the fillet break test.

*In course of preparation.

CONTENTS

STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard for COVERED ELECTRODES FOR WELDING

PART 1—LOW CARBON STEEL ELECTRODES FOR MANUAL METAL-ARC WELDING OF CARBON STEELS AND CARBON-MANGANESE STEELS

SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This standard specifies requirements for unalloyed low carbon steel covered electrodes for the manual metal-arc welding of carbon steels and carbon-manganese steels. The electrodes may also be used for the welding of certain low alloy steels.

1.2 APPLICATION. This standard defines a classification system for the electrodes and specifies the physical properties of the electrodes and the weld metal deposited by the electrodes. It also specifies requirements for testing, packaging, marking and storage of the electrodes.

Section 1 describes the classification system while Section 2 specifies the general requirements for the electrodes and prescribes the properties and requirements of the deposited weld metal in varying tensile strengths. Section 2 also contains provisions for hydrogen-controlled* and metal-enriched electrodes and for the grading of electrodes according to the impact strength of the deposited weld metal at specified temperatures. This grading does not, however, form part of the classification system.

Appendix A describes the various methods of test to be applied to the electrodes while Appendix B contains information for users of electrodes. Appendix C gives the approximate relationship between different systems for measuring hydrogen and the moisture in electrode flux coating. Appendix D gives some advice on health and safety.

1.3 REFERENCED DOCUMENTS. The following documents are referred to in this standard:

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 2177 Radiographic Examination of Welded Butt Joints in Metal
Part 1—Methods of Test

AS 2205 Methods of Destructive Testing of Welds in Metal
2205.2.2— Part 2—Tensile Tests—All-weld-metal Tensile Test
2205.3.1— Part 3—Bend Tests—Transverse Guided Bend Test
2205.4.2— Part 4—Break Tests—Fillet Break Test
2205.7.1— Part 7—Fracture Toughness Tests—Charpy V-notch Impact Test

AS 2409 Interchangeable Conical Ground Glass Joints

AS K1 Methods for the Sampling and Analysis of Iron and Steel

ISO 3690 Welding—Determination of Hydrogen in Deposited Weld Metal Arising from the Use of Covered Electrodes for Welding Mild and Low Alloy Steels

BS 639 Covered Electrodes for the Manual Metal-arc Welding of Carbon and Carbon Manganese Steels

IIW Doc. 1-698-74 The Relation Between Hydrogen Contents by IIW and JIS Methods

JIS Z 3113 Method for Measurement of Hydrogen Evolved from Deposited Metal

1.4 DEFINITIONS. For the purpose of this standard, the definitions given in AS Z5 and the following apply:

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

1.4.2 Horizontal fillet weld (H-fillet weld)—a fillet weld that has one leg on the upper side of an approximately horizontal surface and the other leg on an abutting approximately vertical surface.

1.5 CLASSIFICATION.

1.5.1 Basis of Classification. Electrodes shall be classified on the basis of the tensile properties of the deposited weld metal and the operational characteristics of the electrodes. An electrode classified under one classification shall not be classified under any other classification.

1.5.2 Description of Classification System. The classification system is illustrated in Fig. 1.1 and shall consist of the following:

(a) The number of this standard, i.e. AS 1553.1.

*In this standard, the term 'hydrogen-controlled' electrodes replaces the former term 'low hydrogen' electrodes.