

Superseded by AS/NZS 1553.1:1995

Under Revision See DR93199

AS 1553,
Part 1

AS 1553, Part 1—1983
UDC 621.791.042.4

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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This Australian standard was prepared by Committee WD/2, Electrodes and Filler Rods. It was approved on behalf of the Council of the Standards Association of Australia on 22 March 1983 and published on 6 June 1983.

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.
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This standard was issued in draft form for comment as DR 81171.

AUSTRALIAN STANDARD

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

AS 1553, Part 1—1983

First published (as AS B28)	1931
Revised	1955
Revised	1968
Revised and issued as AS 1553	1974 ✓
Revised and issued as AS 1553, Part 1	1983



PUBLISHED BY THE STANDARDS ASSOCIATION OF AUSTRALIA
STANDARDS HOUSE, 80 ARTHUR ST, NORTH SYDNEY, N.S.W.

ISBN 0 7262 2978 4

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 follow 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.

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CONTENTS

	<i>Page</i>
SECTION 1. SCOPE AND GENERAL	
1.1 Scope....	4
1.2 Application	4
1.3 Referenced Documents	4
1.4 Definitions....	4
1.5 Classification	4
SECTION 2. PROPERTIES AND REQUIREMENTS	
2.1 General	6
2.2 Chemical Composition	7
2.3 Physical Requirements	7
2.4 Diffusible Hydrogen Content	11
2.5 Deposition Efficiency—Iron Powder Electrodes....	11
2.6 Fillet Break Requirements	11
2.7 Size of Electrodes	11
2.8 Core Wire	11
2.9 Flux Covering	11
2.10 Bared Ends	12
2.11 Identification	12
2.12 Packing	12
2.13 Marking	12
2.14 General Safety Warning	12
2.15 Storage	12
APPENDICES	
A Methods of Test	13
B Description and Intended Use of Electrodes	22
C Hydrogen Control....	25
D Health and Safety	26

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.