

Australian Standard[®]

**Conductors—Base overhead—
Hard-drawn copper**

[Title allocated by Defense Cataloguing Authority:
CONDUCTORS—BASE OVERHEAD—HARD-DRAWN COPPER
(NSC 6145)]

This Australian Standard was prepared by Committee EL/10, Overhead Lines. It was approved on behalf of the Council of Standards Australia on 16 April 1991 and published on 10 June 1991.

The following interests are represented on Committee EL/10:

- Australian Electrical and Electronic Manufacturers Association
 - Australian Porcelain Insulators Association
 - Confederation of Australian Industry
 - Electrical and Radio Federation of Victoria
 - Electricity Supply Association of Australia
 - Railways of Australia Committee
-

Review of Australian Standards. To keep abreast of progress in industry, Australian Standards are subject to periodic review and are kept up to date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.

Full details of all Australian Standards and related publications will be found in the Standards Australia Catalogue of Publications; this information is supplemented each month by the magazine 'The Australian Standard', which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.

Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.

This Standard was issued in draft form for comment as DR 90062.

Australian Standard[®]

**Conductors—Base overhead—
Hard-drawn copper**

AS 1746 first published in part as AS C41—1927.
Second edition 1950.
AS C306 first published 1950.
AS C41—1950 and AS C306—1950 revised and
redesignated AS C306—1958.
AS C306—1958 revised and redesignated in part as
AS C41—1968.
AS C306—1958 withdrawn 1972.
AS C41—1968 revised and redesignated
AS 1746—1975.
Second edition 1991.

PREFACE

This Standard was prepared by the Standards Australia Committee on Overhead Lines and supersedes AS 1746—1975, *Hard-drawn copper conductors for overhead power transmission purposes*.

The range of conductor sizes provided is similar to the range specified in AS 1746—1975, but the Standard also provides the facility for conductors of other dimensions to be supplied by reference to this Standard.

This Standard differs from the 1975 edition as follows:

- (a) Minimum ultimate tensile stress (UTS) of the larger wire sizes has been reduced slightly to reflect the changed copper purity, and processing methods. Other wire UTS values have been rationalized.
- (b) An additional wire size (3.75 mm diameter), and a new standard conductor construction (7/3.75) have been introduced.
- (c) A new appendix has been provided, which includes the coefficient of linear expansion, and the theoretical basis for the calculation of modulus of elasticity.
- (d) Another new appendix has been included which highlights items which should be specified by the purchaser or agreed between the purchaser and manufacturer at the time of order.

© Copyright — STANDARDS AUSTRALIA

Users of Standards are reminded that copyright subsists in all Standards Australia publications and software. Except where the Copyright Act allows and except where provided for below no publications or software produced by Standards Australia may be reproduced, stored in a retrieval system in any form or transmitted by any means without prior permission in writing from Standards Australia. Permission may be conditional on an appropriate royalty payment. Requests for permission and information on commercial software royalties should be directed to the head office of Standards Australia.

Standards Australia will permit up to 10 percent of the technical content pages of a Standard to be copied for use exclusively in-house by purchasers of the Standard without payment of a royalty or advice to Standards Australia.

Standards Australia will also permit the inclusion of its copyright material in computer software programs for no royalty payment provided such programs are used exclusively in-house by the creators of the programs.

Care should be taken to ensure that material used is from the current edition of the Standard and that it is updated whenever the Standard is amended or revised. The number and date of the Standard should therefore be clearly identified.

The use of material in print form or in computer software programs to be used commercially, with or without payment, or in commercial contracts is subject to the payment of a royalty. This policy may be varied by Standards Australia at any time.

CONTENTS

	<i>Page</i>
SECTION 1 SCOPE AND GENERAL	
1.1 SCOPE	4
1.2 REFERENCED DOCUMENTS	4
1.3 DEFINITIONS	4
1.4 NOMENCLATURE	4
SECTION 2 MATERIAL REQUIREMENTS AND WIRE PROPERTIES	
2.1 GENERAL	5
2.2 MATERIAL	5
2.3 WIRE PROPERTIES	5
SECTION 3 CONDUCTOR REQUIREMENTS	
3.1 CONSTRUCTION	6
3.2 JOINTS IN WIRES OF CONDUCTORS	6
3.3 LAY	6
3.4 STANDARD SIZES AND CALCULATED PROPERTIES OF CONDUCTORS ...	6
SECTION 4 TESTS	
4.1 TEST SPECIMENS	7
4.2 MECHANICAL TESTS	7
4.3 RESISTIVITY TEST	7
4.4 LAY RATIO TEST	8
4.5 PLACE OF TESTING	8
SECTION 5 PACKING AND MARKING	
5.1 PACKING	9
5.2 MARKING	9
5.3 CERTIFICATE OF COMPLIANCE	9
APPENDICES	
A CALCULATION OF CONDUCTOR PROPERTIES	10
B COEFFICIENT OF LINEAR EXPANSION AND CALCULATION OF MODULUS OF ELASTICITY	11
C PURCHASING GUIDELINES	12

STANDARDS AUSTRALIA

Australian Standard
Conductors—Bare overhead—Hard-drawn copper

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies requirements and tests for homogeneous bare electrical conductors for overhead power transmission, and constructed of hard-drawn copper wires.

NOTES:

- 1 Appendix A gives methods to calculate conductor properties.
- 2 Appendix B gives the coefficient of linear expansion and the theoretical basis for the calculation of modulus of elasticity.
- 3 Appendix C lists information which should be supplied with enquiries and orders for conductors.

1.2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

- 1279 Copper refinery shapes
 1391 Methods for tensile testing of metals
 1574 Copper and copper alloys—Wire for electrical purposes
 2505 Methods for bend and related testing of metals
 2505.5 Part 5: Torsion and wrapping tests on wires
 2857 Timber drums for insulated electric cables and bare conductors
 C365 Drums for bare stranded conductors
 C365.2 Part 2: Metal drums

IEC

- 468 Method of measurement of resistivity of metallic material.

1.3 DEFINITIONS For the purpose of this Standard the following definitions apply:

1.3.1 Wire — a filament of drawn metal having a constant circular cross-section.

1.3.2 Conductor — a finished circular stranded assembly consisting of seven or more wires laid up together.

1.3.3 Diameter — the mean of two measurements at right angles taken at any one cross-section.

1.3.4 Direction of lay — the direction of lay is defined as right-hand or left-hand, as follows:

- (a) Right-hand lay—when the slope of the wires is in the direction of the central part of the letter Z when the conductor is held vertically.
- (b) Left-hand lay—when the slope of the wires is in the direction of the central part of the letter S when the conductor is held vertically.

1.3.5 Lay length — the axial length of one complete turn of the helix formed by an individual wire in a stranded conductor.

1.3.6 Lay ratio — the ratio of the lay length to the nominal external diameter of the corresponding layer of wire in the stranded conductor.

1.3.7 Breaking load of a wire — the maximum load obtained in a tensile test of that wire.

1.3.8 Ultimate tensile stress — the breaking load divided by the original cross-sectional area of the test wire.

1.3.9 Spool — a container of wire which is to be installed on a stranding machine to manufacture the conductor.

1.3.10 Informative appendix — an appendix giving additional information, recommendations, guidelines or other non-mandatory statements.

1.4 NOMENCLATURE Hard-drawn copper conductors covered by this Standard shall have the code HDCu.