AS 3607—1989

Australian Standard®

Conductors—Bare overhead, aluminium and aluminium alloy—Steel reinforced

[Title allocated by Defence Cataloguing Authority: WIRE, ELECTRICAL (Bare, Stranded, Aluminium and Aluminium Alloy, Steel-reinforced, Overhead Use) NSC 6145]

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The following interests are represented on Committee EL/10:

Australian Electrical and Electronic Manufacturer's Association

Australian Porcelain Insulators Association

Confederation of Australian Industry

Electrical and Radio Federation of Victoria

Electrical Supply Association of Australia

Railways of Australia Committee

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PREFACE

This Standard was prepared by the Standards Australia Committee on Overhead Lines to supersede all three parts of AS 1220, *Aluminium conductors steel reinforced for overhead power transmission purposes:*

Part 1: 1973 *Galvanized steel reinforced (ACSR/GZ)*

Part 2: 1973 *Aluminized steel reinforced (ACSR/AZ)*

Part 3: 1973 *Aluminium-clad steel reinforced (ACSR/AC)*

The Standard deals with composite conductors made with aluminium or aluminium alloy wires, reinforced with steel wires. Three types of steel wire are included as alternatives, i.e. zinc-coated (GZ), aluminium-coated (AZ) or aluminium-clad (AC).

In addition, the Standard provides for specific wire sizes in the range 1.60 mm to 4.75 mm, with a range of standard sizes of stranded construction conductors. Furthermore it provides for a range of new conductors containing steel and aluminium alloy wires which reflect actual usage of conductors throughout Australia.

This edition of the Standard differs from AS 1220—1973 as follows:

(a) In determining conductor sizes, a range of wire sizes has been provided similar to the range of wires specified in the 1973 edition, but facility is also provided for conductors with other dimensions to be supplied by reference to this Standard.

(b) To assist users in selecting the most suitable conductor for a particular application, the calculated equivalent aluminium area, conductor breaking load, and d.c. resistance for the standard conductors are given.

(c) Section 2: Wire sizes have been rationalized.

(d) Section 3: The number of standard sizes, especially in the alloy range has been reduced and preferred sizes are indicated.

(e) Section 4: For test purposes, requirements have been added to sequentially identify wire and conductor during production.

(f) Appendix B: Now includes the theoretical basis for the calculation of modulus of elasticity and coefficient of linear expansion.

(g) Appendix E: The code name system has been changed to permit the identification of alloy conductors by reference to existing ACSR code names.

(h) Appendix F: This new Appendix has been included which highlights items which should be specified by the purchaser or agreed between purchaser and manufacturer at the time of order.

In the preparation of this Standard, reference was made to the following Standards:

IEC 207 *Aluminium stranded conductors*

IEC 208 *Aluminium alloy stranded conductors (aluminium-magnesium-silicon)*

IEC 210 *Aluminium alloy conductors, steel reinforced*

IEC 468 *Method of measurement of resistivity of metallic materials*

ASTM B 341 *Aluminium coated (aluminized) steel core wire for aluminium conductors, steel reinforced ACSR/AZ*

ASTM B 498M *Zinc-coated (galvanized) steel core wire for aluminium conductors, steel reinforced, ACSR (Metric)*

ASTM B 502 *Aluminium-clad steel core wire for aluminium conductors, aluminium-clad steel reinforced*

SS 424 08 13 *Aluminium alloy wire for stranded conductors for overhead lines*

Acknowledgment is made of the assistance received from those sources.

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SECTION 1. SCOPE AND GENERAL

1.1 SCOPE. This Standard specifies requirements and tests for composite bare electrical conductors for overhead power transmission purposes, incorporating aluminium or aluminium alloy wires and steel wires in their construction.

1.2 NOMENCLATURE. Aluminium and aluminium alloy conductors steel reinforced covered by this Standard include the following types, with the code for each in parentheses:

(a) Aluminium 1350, zinc-coated (galvanized) steel reinforced (ACSR/GZ)[2].

(b) Aluminium 1350, aluminium-coated (aluminized) steel reinforced (ACSR/AZ)[2].

(c) Aluminium 1350, aluminium-clad steel reinforced (ACSR/AC)[2].

(d) Aluminium alloy 1120, zinc-coated (galvanized) steel reinforced (AACSR/GZ/1120).

(e) Aluminium alloy 1120, aluminium-coated (aluminized) steel reinforced (AACSR/AZ/1120).

(f) Aluminium alloy 1120, aluminium-clad steel reinforced (AACSR/AC/1120).

(g) Aluminium alloy 6201A, zinc-coated (galvanized) steel reinforced (AACSR/GZ/6201)[3].

(h) Aluminium alloy 6201A, aluminium-coated (aluminized) steel reinforced (AACSR/AZ/6201)[3].

(i) Aluminium alloy 6201A, aluminium-clad steel reinforced (AACSR/AC/6201)[3].

NOTES:

1. A list of code names which may be used to refer to a specific type and construction of conductor is given in Appendix E.
2. An additional suffix may be used, as follows: '/1350' for (a), (b) and (c).
3. The suffix 'A' has been omitted from the conductor code for (g), (h) and (i).

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

AS
1391 Methods for tensile testing of metals
1442 Carbon steels and carbon-manganese steels — Hot-rolled bars and semi-finished products
1650 Galvanized coatings
1852 International electrotechnical vocabulary
2505 Methods for bend and related testing of metals
2505.5 Part 5: Torsion and wrapping tests on wire
2848 Aluminium and aluminium alloys — Compositions and designations
2848.1 Part 1: Wrought products
2857 Timber drums for insulated electric cables and bare conductors
C365 Drums for bare stranded conductors
C365.II Part II: Metal drums

IEC
468 Methods of measurement of resistivity of metallic materials

ASTM
D 566 Dropping point of lubricating grease

1.4 DEFINITIONS. For the purpose of this Standard, the definitions in AS 1852 and those below apply.

1.4.1 Wire — A solid circular component from which stranded conductor is constructed.

1.4.2 King wire — a central core wire having a nominal diameter larger than that of the surrounding wires.

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

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

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

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

1.4.6 Lay ratio — the ratio of the axial length of a complete turn of the helix formed by an individual wire in a conductor, to the external diameter of the helix.

1.4.7 Breaking load — the maximum load obtained in a tensile test.

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

1.4.9 Ungreased conductor — a conductor which is dry and free from grease, other than a light residue of wire drawing lubricant that may be on the wires.

1.4.10 Partly greased conductor — a conductor of more than seven wires in which grease is applied only to the steel portion.

1.4.11 Fully greased conductor — a conductor in which grease is applied to all wires with the exception of the outermost layer.

1.4.12 Surface fracture — a crack on the surface of a wire visible to an observer with normal or corrected vision.

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

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