AS 1178—1979
UDC 621.315.212.4:678.742.2

Australian Standard 1178—1979

CONCENTRIC WIRE NEUTRAL XLPE INSULATED CABLES FOR ELECTRICITY SUPPLY FOR WORKING VOLTAGES OF 0.6/1 kV

[Title allocated by Defence Cataloguing Authority:
CABLE, POWER, ELECTRICAL (CONCENTRIC NEUTRAL, XLPE INSULATED, 0.6/1 kV)]

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-British Trade Association

Australian Electrical and Electronic Manufacturers Association

Confederation of Australian Industry

Defence Standardization Committee

Department of Construction

Department of Transport

Electrical Approvals Authorities

Electrical Contractors Associations of Australia

Electrical Testing Laboratories

Electricity Supply Association of Australia

Metals Industry Organizations

Railways of Australia Committee

Representative of SAA Committee EL/2

Telecom Australia

This standard, prepared by Committee EL/3, Electric Wires and Cables, was approved on behalf of the Council of the Standards Association of Australia on 6 February 1979, and was published on 1 October 1979.

This standard was issued in draft form for public review as DR 77119.

January 1980

STANDARDS ASSOCIATION OF AUSTRALIA

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CORRIGENDA
to
AS 1178—1979
CONCENTRIC WIRE NEUTRAL XLPE INSULATED CABLES FOR ELECTRICITY SUPPLY FOR WORKING VOLTAGES OF 0.6/1 kV

SUMMARY: The following sections of the standard are covered by this corrigendum: Preface; Contents; Clauses 2.4, 9.3; Tables 1, 2; Clauses 12.1, 12.3; Tables 3, 4, 5; Appendix A; Appendix B; Appendix C; Appendix F.

Published on 1 February 1980.

AUSTRALIAN STANDARD

CONCENTRIC WIRE NEUTRAL XLPE INSULATED CABLES FOR ELECTRICITY SUPPLY FOR WORKING VOLTAGES OF 0.6/1 kV

AS 1178—1979

First published 1979

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

ISBN 0 7262 1658 5

PREFACE

This standard was prepared by the Association's Committee on Electric Wire and Cables. The cables specified herein are primarily intended for use by electricity supply authorities.

During the preparation of this standard, consideration was given to ESI* standard 09-9, Polymeric Insulated, Combined Neutral/Earth (CNE) Cables with Solid Aluminium Phase Conductors and Concentric Aluminium Wire Waveform Neutral/Earth Conductor, issued by the EB/BEAMA/BSI Standards Policy Steering Committee† and acknowledgement is made of the assistance received therefrom.

The nominal cross-sectional areas of phase conductors specified herein are taken from AS 1125, Conductors in Insulated Electric Cables and Flexible Cords, and are identical with values recommended in IEC 228, Nominal Cross-sectional Areas and Composition of Conductors of Insulated Cables.

This standard differs from ESI 09-9 in that copper and copper-clad aluminium wires are specified in addition to aluminium for the concentric neutral conductor.

XLPE compound insulation is specified for the phase conductors and the thicknesses of insulation are in accordance with IEC recommendations. V-90 PVC compound has been specified for the cable oversheath and the thickness of the oversheath is in accordance with IEC recommendations.

This standard may require reference to the following standards:

SEE AMENDMENT Corr. Jan. 1980

AS 1125	Conductors in Insulated Electric Cables and Flexible Cords (Metric Units)
AS 1660	Methods of Test for Electric Cables and Flexible Cords (Including Conductors, Insulation and Sheath) Part 1—Test Methods for Conductors Part 2—Test Methods for Insulation, Sheath and Braid Part 3—Test Methods for Complete Cable
AS 3147	Approval and Test Specification for PVC Insulated Electric Cables and Flexible Cables for Working Voltages of 0.6/1 kV
AS 3198	Approval and Test Specification for XLPE Insulated Electric Cables for Working Voltages of 0.6/1 kV
BS 2627	Wrought Aluminium for Electrical Purposes—Wire

*Electricity Supply Industry (of the United Kingdom).

†ESI standards are issued by the EB/BEAMA/BSI Standards Policy Committee under the authority and support of the Electricity Council, BEAMA and the Executive Board of the British Standards Institution. The various organizations comprising the ESI Standards Policy Steering Committee are:

EB, Electricity Board (British).
BEAMA, is the main federation of trade associations mentioned in the standardization of plant and equipment used by ESI.
BSI, British Standards Institution.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

for

CONCENTRIC WIRE NEUTRAL XLPE INSULATED CABLES FOR ELECTRICITY SUPPLY FOR WORKING VOLTAGES OF 0.6/1 kV

1 SCOPE. This standard specifies the construction, dimensions and tests for concentric wire neutral cross-linked polyethylene (XLPE) insulated cables having two conductors (single core)or four conductors (3-core) and an insulating sheath, primarily for use by electricity supply authorities, at working voltages up to and including 0.6/1 kV.

NOTE: Cables covered by this standard should not be used in electrical installations unless approval has been obtained from the appropriate Regulatory or Statutory Authority.

2 DEFINITIONS. For the purpose of this standard the definitions in AS 1125 and the following definitions apply.

2.1 Concentric wire neutral cable—a cable with one or three cores, together with a concentric wire conductor which is used as a neutral or neutral/earth.

2.2 Core of a cable—a phase conductor and its own insulation (dielectric) but not including any protective covering.

2.3 Direction of lay—the direction of slope of a core or the like, when the cable is held vertically.

It is right hand when the slope is in the direction of the central part of the letter Z, and left hand when the slope is in the direction of the central part of the letter S.

2.4 Wavelength—the axial distance between successive crests of the ~~waveform~~ wave of the wave-lay concentric neutral conductor. SEE AMENDMENT corr Jan 1980

2.5 Maximum conductor temperature—the maximum temperature at which the conductor of the cable may be operated under normal loading conditions, and is the temperature resulting from the combined effect of the ambient temperature and the current loading of the conductor.

2.6 Voltage designation—the rated voltages U_o and U expressed in the form U_o/U, where—

(a) U_o is the r.m.s. power frequency voltage to earth of the supply system for which the cable is designed;

(b) U is the r.m.s. power frequency voltage between phases of the supply system for which the cable is designed.

2.7 Routine tests—tests made by the manufacturer on all finished cable lengths to demonstrate the integrity of the cable.

2.8 Special tests—tests made by the manufacturer on samples of completed cables, at a specified frequency, so as to verify that the finished product meets the design specification.

2.9 Type tests—tests made by the manufacturer before supplying on a general commercial basis a type of cable covered by this standard, in order to demonstrate satisfactory performance characteristics to meet the intended application. These tests are of such a nature that, after they have been made, they need not be repeated, unless changes are made in the cable materials or design which might change its performance characteristics.

3 VOLTAGE DESIGNATION. The rated voltage U_o/U recognized for the purposes of this standard is 0.6/1 kV.

4 MAXIMUM CONDUCTOR TEMPERATURE. The maximum conductor temperature of cables shall be 90°C.

NOTES:

1. The value of 90°C is based on the intrinsic properties of the insulating materials (including sheath) and is only valid if the installation conditions, cable connectors and other accessories are compatible with this temperature.
2. For cables buried in the ground, it may be necessary to limit the maximum conductor temperature to a value considerably less than 90°C unless the thermal condition of the soil in the dry condition is known and is used in the calculation of the current rating.

This limitation is recommended because of the risk of the drying out of the surrounding soil, causing an increase in thermal resistivity, which in turn would lead to the cable temperature rising to a higher temperature than anticipated.

5 CONDUCTORS.

5.1 Phase Conductors. Phase conductors shall be of aluminium in accordance with Section 3 of AS 1125 and shall comply with the following requirements, as appropriate:

(a) Conductors of nominal cross-sectional areas 25 mm², 35 mm² and 50 mm² shall be circular, solid aluminium.

(b) Conductors of nominal cross-sectional areas 70 mm² to 300 mm² shall be shaped, solid aluminium.

5.2 Concentric Neutral Conductor.

5.2.1 *Material.* The concentric neutral conductor shall be of annealed copper, aluminium or copper-clad aluminium wires in accordance with AS 1125. Aluminium wires shall be of G1E material in the O condition, in accordance with BS 2627.

5.2.2 *Formation.* The number and diameter of wires in the concentric neutral conductor shall conform to the requirements of Table 1 or 2, as applicable. The wires shall be applied concentrically with a helical or waveform lay. The gap between wires shall not exceed 4 mm. Aluminium wires shall be evenly spaced and shall have a gap between adjacent wires.

The wavelength of the waveform lay shall be as follows:

(a) for 2-conductor cables shall be within ± 10 percent of the values given in Table 1, or a sub-multiple, at the manufacturer's discretion; and