

Australian Standard® 1429—1985

POLYMERIC INSULATED CABLES FOR ELECTRICITY SUPPLY AT WORKING VOLTAGES 1.9/3.3 kV UP TO AND INCLUDING 19/33 kV

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of 1.9/3.3 kV to 19/33 kV NSC 6145)]



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Confederation of Australian Industry
Department of Aviation
Department of Defence
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AUSTRALIAN STANDARD

**POLYMERIC INSULATED
CABLES FOR ELECTRICITY
SUPPLY AT WORKING
VOLTAGES 1.9/3.3 kV UP TO
AND INCLUDING 19/33 kV**

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PREFACE

This standard was prepared by the Association's Committee on Electric Wires and Cables to supersede AS 1429, Polymeric Insulated Cables for Electricity Supply at Working Voltages 1.9/3.3 kV up to and including 19/33 kV, Part 1—1979 Cables Having Individually Screened Cores.

It should be noted that whereas the standard is essentially a revision of AS 1429, Part 1—1979, it has the designation AS 1429—1985 (since it has no Parts—see Note).

NOTE: In AS 1429, Part 1—1979, it was stated that there would be a Part 2 which would specify 1.9/3.3 kV cables without semiconductive conductor or insulation screens but protected by a metallic covering, and cables with collective metallic screens for all voltages up to and including 19/33 kV.

In the light of subsequent experience, however, it was found that such a standard would be unwieldy and in consequence AS 1429, Part 1—1979 was amended to include a limited range of collectively screened cables.

AS 1429, Part 1—1979 covered only single-core and three-core cables having individually screened cores.

This standard not only covers the foregoing but also includes the requirements for three-core cables having collectively screened cores and the option of an extruded lead sheath.

In the standard, Section 1 covers the general requirements for cables having individually and collectively screened cores, Section 2 Particular requirements for cables having individually screened cores, and Section 3 Particular requirements for three-core cables having collectively screened cores.

In the preparation of this standard, consideration was given to the following publications and acknowledgement is made of the assistance received therefrom:

IEC 229	Tests and Anti-corrosion Protective Coverings of Metallic Cable Sheaths
IEC 502	Extruded Solid Dielectric Insulated Power Cables for Rated Voltages from 1 kV up to 30 kV
IEC 540	Test Methods for Insulation and Sheaths of Electric Cables and Cords (Elastomeric and Thermoplastic Compounds)
IEC TC 20	Draft documents relating to test methods for cables
AEIC CS5	Association of Edison Illuminating Companies, Polyethylene and Crosslinked Polyethylene Insulated Shielded Power Cables rated 5 kV through 46 kV
AEIC CS6	Ethylene Propylene Rubber Insulated Shielded Power Cables Rated 5 kV to 46 kV
UL 1072	Underwriters Laboratories Inc. Revised Draft of Proposed Standard for Medium-voltage Solid-dielectric Cables
NEMA No WC7	Cross-linked-thermosetting-polyethylene-insulated Wire and Cable for the Transmission and Distribution of Electric Energy.

The nominal cross-sectional areas of the conductors specified herein are identical with the values specified in AS 1125, Conductors in Insulated Electric Cables and Flexible Cords. The dimensions for insulation and sheath thicknesses are identical with the values recommended in IEC 502.

Three insulants are specified in this standard, namely polyethylene, cross-linked polyethylene, and ethylene propylene rubber. Two sheath materials are specified, PVC and polyethylene.

This standard requires screening of all conductors, irrespective of the voltage rating of the cable. In addition, insulation screening is required on all individual cores of all cables.

The standard does not provide details of the overall dimension of cable. This dimension will vary because of the differing conductor dimensions and thickness of the metallic insulation screen.

The test requirements and methods specified or referred to herein generally follow those given in IEC 502, IEC 540 and IEC 229. The main deviations are as follows:

- (a) The values of U_0/U given in the draft are higher than those specified in IEC 502. However, as the IEC voltage ranges embrace the equivalent Australian voltage ranges, the values of the voltage selected for the high voltage tests are similar to those specified for the appropriate level in IEC 502. Attention is drawn to the Note to Clause 6 of AS C1, Standard Voltage and Frequency for A.C. Transmission and Distribution Systems.

- (b) Requirements for stripping of extruded semiconductive screens (Clause 1.9.3).
- (c) Identification of cores.
- (d) The partial discharge test is regarded as the most searching test for freedom from voids or any contaminants and the requirements are based upon the AEIC specifications, which are required by local users and are more stringent than the IEC requirements.
- (e) The values of impulse withstand test voltages are higher than the IEC values and are in line with the alternative values permitted in AS 1824, Insulation Coordination, Part 1—Basic Principles, Standard Insulation Levels and Test Procedures.
- (f) The conductor temperatures required for heating cycle test (Clause 1.20.10.1) are higher than the IEC values.
- (g) Requirements for dimensional stability, and for voids, contaminants and transluents are given. These are based on those given in AEIC specifications CS5 and CS6.

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Australian Standard

for

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SECTION 1. GENERAL REQUIREMENTS

1.1 SCOPE AND APPLICATION.

1.1.1 Scope. This standard specifies requirements for the following insulated cables for fixed installations for electricity supply.

- (a) Low density polyethylene (LDPE).
- (b) Cross-linked polyethylene (XLPE)
- (c) Ethylene propylene rubber (EPR).

1.1.2 Application. Insulated cables shall comply with the requirements of the relevant clauses of this Section and with the particular requirements of Section 2 or Section 3 as appropriate.

Section 2 applies to single-core and three-core cables having individually screened cores and Section 3 applies to three-core cables having collectively screened cores.

1.2 REFERENCED DOCUMENTS. The following standards are referred to in this standard:

- AS 1018 Recommendations for Partial Discharge Measurements
- AS 1049 Polyethylene Insulation and Sheath of Telecommunication Cables
- AS 1125 Conductors in Insulated Electric Cables and Flexible Cords
- AS 1660 Methods of Test for Electric Cables and Flexible Cords (including Conductors, Insulation and Sheath)
- AS 1931 High Voltage Testing Techniques
- AS 3147 Approval and Test Specification for PVC Insulated Electric Cables and Flexible Cables for Working Voltages of 0.6/1 kV
- AS C91 Lead and Lead Alloy Sheaths of Electric Cable
- BS 1442 Galvanized Mild Steel Wire for Armouring Cables

1.3 DEFINITIONS. For the purpose of this standard, the definitions in AS 1125 and the following definitions apply:

1.3.1 Core (of a cable)—an assembly comprising a conductor, semiconductive conductor screen, insulation and semiconductive insulation screen.

1.3.2 Core conductor screen—a layer or layers of non-metallic semiconductive material applied directly over the core conductor.

1.3.3 Insulation screen—a layer or layers of non-metallic semiconductive material applied directly over the insulation of each core.

1.3.4 Individual screen—a metallic screen applied over each core.

1.3.5 Collective screen—a metallic screen applied over the laid-up core assembly.

1.3.6 Direction of lay—the slope of the core, screen wire or armour wire, armour tape 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.

1.3.7 Maximum core conductor temperature—the maximum temperature at which the core conductor of the cable may be operated and is the temperature resulting from the combined effect of the ambient temperature and the current loading of the conductor.

1.3.8 Voltage designation—the indication of the rated voltages is expressed in the form $U_o/U (U_m)$ where—

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

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

U_m is the maximum r.m.s. power frequency voltage between any two conductors for which cables and accessories are designed. It is the highest voltage that can be sustained under normal operating conditions at any time and at any point in a system. It excludes temporary voltage variations due to fault conditions and sudden disconnection of large loads.

1.3.9 Routine tests—tests made by the manufacturer on all production lengths of finished cable to demonstrate the integrity of the cable. By agreement between the purchaser and the manufacturer, routine tests may be wholly or partly omitted on the drum lengths cut from the finished production length of cable.

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

These tests are only made if requested by the purchaser at the time of ordering.

1.3.11 Type tests—tests made by a 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