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Australian STANDARD®

STANDARDS Australia

Telecommunication cables — Insulation, sheath and jacket

Part 2: T

AS 1049.2:2022

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Australian Digital & Telecommunications Industry Association
Australian Industry Group
Australian Information Industry Association
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Telecommunication cables — Insulation, sheath and jacket

Part 2: Test methods

Originated as AS 1049:1971.
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Second edition AS 1049.2:2022.

Preface

This Standard was prepared by the Australian members of the Joint Standards Australia/Standards New Zealand Committee CT-001, Communications Cabling, to supersede AS 1049.2—2008.

The objective of this document is to specify test methods to evaluate the properties of materials used to manufacture telecommunication cables. This document is intended for use by polymer manufacturers, communication cable manufacturers and end-users.

AS 1049 is divided in two parts, as follows:

AS 1049.1, *Telecommunication cables — Insulation, sheath and jacket, Part 1: Materials*

AS 1049.2, *Telecommunication cables — Insulation, sheath and jacket Part 2: Test methods* (this document)

Part 1 specifies the material requirements for the insulation, sheath and jacket of the finished products and some of the compounds used to manufacture telecommunication cables.

Part 2 provides a set of reference test methods for evaluating these material requirements.

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(a) Removal of Appendix C Test method 5: Softness number.

(b) Correction of the ASTM G155 weatherometer apparatus types in Appendix E.

(c) Addition of thermogravimetric analysis as per IEC 60811-605 as an alternative test method for the determination of the carbon black concentration in Appendix R.

(d) Apparatus changed from as specified in AS/NZS 2122.2 to as specified in ISO 4589-2 for the combustion test in Appendix DD.

(e) Update of reference designation from AS/NZS 1660.5.4 to AS/NZS IEC 60754.2 for the acidity of gases evolved during combustion test in Appendix EE.

(f) General update to meet the requirements of Standards Australia drafting rules, including dividing test methods into consistent subclauses (where appropriate) and the addition of the test report subclause where previously missing.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

Contents

Australian Standard®

Telecommunication cables — Insulation, sheath and jacket

Part 2: Test methods

Section 1 Scope and general

1.1 Scope

This document specifies test methods to evaluate the properties of materials used to manufacture telecommunication cables.

This document does not include the following:

(a) Cables using non-metallic semi-conductive compound.

NOTE In the context of this document, semi-conductive compound is a polymer with the addition of a conductive additive such as carbon black which increases the conductivity of the polymer.

(b)

(c) Dimensions or electrical requirements of completed cables.

(d) Cables used to conduct mains electrical power.

Table 2.1 provides a summary of the material tests that are set out in the Appendices of this document.

1.2 Application

This document is intended for use by the following:

(a) Polymer manufacturers, to form the basis of the raw material quality control procedures for the manufacture of polymer compounds.

(b) Cable manufacturers, to form the basis of the cable material quality control procedures for the manufacture of a range of insulation, sheath and jacket of different materials.

(c) Cable end users, to form the basis of the cable acceptance procedures for the completed cable.

1.3 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document.

NOTE Documents referenced for informative purposes are listed in the Bibliography.

AS 1049.1, *Telecommunication cables—Insulation, sheath and jacket, Part 1: Materials*

AS 2700, *Colour standards for general purposes*

AS 4004, *Lighting booths for visual assessment of colour and colour matching*

AS/NZS 1580.601.3, *Paints and related materials—Methods of test, Method 601.3: Colour—Methods of colour measurement*

AS/NZS 1660.2.1:1998, *Test methods for electric cables, cords and conductors, Method 2.1: Insulation, extruded semi-conductive screens and non-metallic sheaths—Methods for general application*

AS/NZS 1660.2.2, *Test methods for electric cables, cords and conductors, Method 2.2: Insulation, extruded semi-conductive screens and non-metallic sheaths—Methods specific to elastomeric, XLPE and XLPVC materials*

AS/NZS 1660.2.3:1998, *Test methods for electric cables, cords and conductors, Method 2.3: Insulation, extruded semi-conductive screens and non-metallic sheaths—Methods specific to PVC and halogen free thermoplastic materials*

AS/NZS 1660.2.4:1998, *Test methods for electric cables, cords and conductors, Method 2.4: Insulation, extruded semi-conductive screens and non-metallic sheaths—Methods specific to polyethylene and polypropylene materials*

AS/NZS 1660.3:1998, *Test methods for electric cables, cords and conductors, Method 3: Electrical tests*

AS/NZS IEC 60754.2, *Test on gases evolved during combustion of materials from cables, Part 2: Determination of acidity (by pH measurement) and conductivity*

IEC 60304, *Standard colours for insulation for low-frequency cables and wires*

IEC 60811-605, *Electric and optical fibre cables — Test methods for non-metallic materials, Part 605: Physical tests — Measurement of carbon black and/or mineral filler in polyethylene compounds*

ISO 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method*

ISO 4589-2, *Plastics — Determination of burning behaviour by oxygen index — Part 2: Ambient-temperature test*

ISO 18553, *Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds*

ASTM D1531, *Standard Test Methods for Relative Permittivity (Dielectric Constant) and Dissipation Factor by Fluid Displacement Procedures*

ASTM D3349, *Standard Test Method for Absorption Coefficient of Ethylene Polymer Material Pigmented with Carbon Black*

ASTM D4565, *Standard Test Methods for Physical and Environmental Performance Properties of Insulations and Jackets for Telecommunications Wire and Cable*

ASTM G152, *Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials*

ASTM G153, *Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials*

ASTM G155, *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials*

EIA–359, *Standard colors for color identification and coding*

GR–421–CORE, *Generic Requirements for Metallic Telecommunications Cables*

1.4 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

1.4.1
cable construction
1.4.1.1
air-core cable
cable construction where the interstices of the cable are not filled

1.4.1.2
filled cable
jelly-filled cable
cable construction that has a cable core that is filled with a jelly-like substance which prevents water from seeping or flowing along the length of the cable in the event of a rupture through the protective sheath layer

1.4.1.3
integrally bonded PE sheath and PA jacket
bonded cable construction
cable construction where the polyethylene (PE) sheath is integrally bonded to the polyamide (PA) jacket by chemical modification or by multiple processing technique, or by both

Note 1 to entry: This may be achieved using specially formulated PE or the addition of a bonding agent.

1.4.1.4
moisture-barriered cable
cable construction that has an aluminium moisture barrier tape to prevent moisture permeation into the cable core

1.4.
unb

cable construction without integrally bonded PE sheath and PA jacket

1.4.2
colour system
1.4.2.1
chroma
purity of colour or freedom from white or grey

Note 1 to entry: Refer to EIA–359 for a detailed explanation of chroma in the Munsell colour system.

1.4.2.2
hue
variety of colour

Note 1 to entry: Refer to EIA–359 for a detailed explanation of hue in the Munsell colour system.

Note 2 to entry: Red, yellow, green, blue and purple are examples of hues in the Munsell colour system.

1.4.2.3
value
lightness of colour

Note 1 to entry: Refer to EIA–359 for a detailed explanation of value in the Munsell colour system.

1.4.3
laboratory equipment
1.4.3.1
air oven
chamber with controlled temperature, air flow and air exchange used to age a specimen of material by heating

1.4.3.2
apparatus
instrument for the nominated tests

1.4.3.3
mandrel
cylinder against which test specimen is shaped or wound

1.4.3.4
Nessler cylinder
clear laboratory glass tubes used for colour comparison

1.4.3.5
weatherometer
apparatus used to simulate weather ageing effects on a specimen of material by exposure to controlled light and moisture

1.4.4
layers of cable
Note 1 to entry: Figure 1.1 shows examples of cable construction.

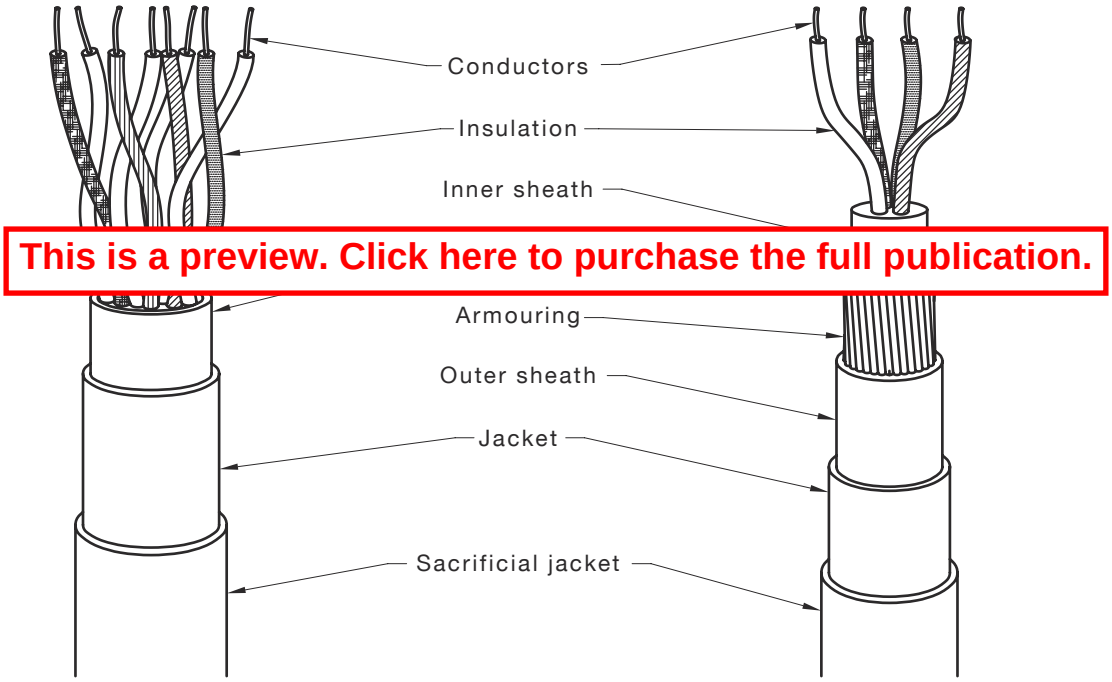

Figure 1.1 — Examples of cable construction

1.4.4.1
aluminium moisture barrier
moisture barrier
aluminium tape bonded to the inner surface of the sheath to prevent moisture permeation into the cable core

Note 1 to entry: The aluminium tape may also serve as an electrical screen.

1.4.4.2
armouring
layer over the sheath of a cable to protect the installed cable against, for example, rodents or mechanical equipment

Note 1 to entry: The armouring may be bonded to the sheath and is typically manufactured from steel tape, wire or corrugated sheet. An example is rodent resistant armouring over a PE sheath with an outer sheath of PE and a PA jacket.

1.4.4.3
cellular insulation
insulation with small air- or gas-filled cells uniformly dispersed

Note 1 to entry: Cellular insulation is manufactured by using a blowing agent compounded in the granules or by using air- or gas-blowing at the extrusion process.

1.4.4.4
core
assembly of insulated conductors, coaxial elements and optical fibre elements, or any combination of these elements

1.4.4.5
filling compound
jelly-like substance which prevents water from seeping or flowing along the length of cable

1.4.4.6
foam-skin insulation
insulation with a cellular layer covered with a solid layer

1.4.4.7
insu
conductor with insulation

1.4.4.8
insulation
single or multiple layer of the same or different dielectric material(s) over the conductors

Note 1 to entry: An example of multiple layer insulation is foam-skin insulation.

1.4.4.9
jacket
protective layer over the sheath of a cable

Note 1 to entry: Examples are a PE jacket over a metallic sheath and a PA jacket over a PE sheath.

1.4.4.10
sheath
protective layer, for example, an inner sheath over the core of a cable or an outer sheath over the armouring

1.4.4.11
solid insulation
insulation in which the dielectric material is continuous without air- or gas-filled cells

1.4.5
materials and material properties of cables
1.4.5.1
bonding agent
chemical additive used to integrally bond polyethylene to polyamide

1.4.5.2
carbon black
form of paracrystalline carbon added to polymer for UV stability

1.4.5.3
colour bleeding
migration of a colourant from the plastic it is added to, into any materials in contact with this plastic

Note 1 to entry: Factors that affect colour bleeding are an increase in temperature, compatibility with the plastic and compatibility with the contact material.