

STANDARD FOR
CATEGORY 3, 5, & 5e INDIVIDUALLY UNSHIELDED TWISTED PAIR
INDOOR CABLES (WITH OR WITHOUT AN OVERALL SHIELD) FOR USE IN
GENERAL PURPOSE AND LAN COMMUNICATION WIRING SYSTEMS
TECHNICAL REQUIREMENTS

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The user of this Standard is cautioned to observe any applicable health or safety regulations and rules relative to the manufacture and use of cable made in conformity with this Standard. This Standard hereafter assumes that manufacture, testing, installation, and maintenance of cables defined by this Standard will be performed only by properly trained personnel using suitable equipment and employing appropriate safety precautions.

Questions of interpretation of ICEA Standards can only be accepted in writing, and the reply shall be provided in writing. Suggestions for improvements in this Standard are welcome. Questions and suggestions shall be sent to:

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ACRONYMS, ABBREVIATIONS AND SYMBOLS

ACR	attenuation-to-crosstalk ratio
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ASQC	American Society for Quality Control
AWG	American Wire Gauge
CM	UL Listing designation for General Purpose Communication Cable
CMG	UL Listing designation for General Purpose Communication Cable
CMR	UL Listing designation for Riser Communication Cable
CMP	UL Listing designation for Plenum Communication Cable
CMX	UL Listing designation for Communication Cable, Limited Use
DOD	diameter over the dielectric, overall diameter of the insulated conductor
ELFEXT	equal level far-end crosstalk
FEXT	far-end crosstalk
FTP	overall shielded twisted pairs
F	constant representing a specific frequency
ICEA	Insulated Cable Engineers Association
IO FEXT	input/output far-end crosstalk
LAN	local area network
LS	limited smoke
NEC	National Electrical Code
NEXT	near-end crosstalk
NFPA	National Fire Protection Association
P-P ACR	pair-to-pair attenuation-to-crosstalk ratio
P-P ELFEXT	pair-to-pair equal level far-end crosstalk
P-P NEXT	pair-to-pair near-end crosstalk
PS ACR	power sum attenuation-to-crosstalk ratio
PS ELFEXT	power sum equal level far-end crosstalk
PS NEXT	power sum near-end crosstalk
RL	return loss
SI	International System of Units
SRL	structural return loss
UL	Underwriters Laboratories
UTP	unshielded twisted pairs
α	attenuation

CATEGORY 3, 5, & 5e INDIVIDUALLY UNSHIELDED TWISTED PAIR INDOOR CABLES (WITH OR WITHOUT AN OVERALL SHIELD) FOR USE IN GENERAL PURPOSE AND LAN COMMUNICATION WIRING SYSTEMS TECHNICAL REQUIREMENTS

SECTION 1 GENERAL

- 1.1 **PURPOSE:** This Standard establishes generic technical requirements that may be referenced by individual telecommunications cable specifications covering products intended for normal indoor premises use in the wiring systems of communications users. The parameters covered provide material, construction, and performance requirements.

Because this Standard does not cover all details of individual cable design, it cannot be used as a single document for procurement of product. This Standard is intended for use in conjunction with an individual product specification that provides complete design details for the specific cable type and designates the applicable performance requirements. Such individual cable specifications may be prepared either by the user or the manufacturer. The specification designated for procurement is at the option of the user.

- 1.2 **SCOPE:** This Standard covers mechanical, electrical and flammability requirements for thermoplastic insulated and jacketed, copper conductor, individually unshielded twisted pair indoor cables, with or without an overall shield, intended primarily for use as horizontal cables, backbone cables, or patch cordage. Depending upon the application and system requirements, this Standard provides choices for materials, transmission characteristics and flammability ratings.

This Standard covers the minimum transmission performance requirements for the following three Categories of cable based on existing system requirements and projected application needs. Multi-pair cables, conforming to the generic designation, ARxM, are not covered by this specification. See instead, ICEA S-103-701.

Category 3: Intended for voice, text, data, video and image transmission with transmission characteristics specified for frequencies up to 16 MHz.

Category 5: Intended for voice, text, data, video and image transmission:

- i: Category 5: transmission characteristics specified for frequencies up to 100 MHz.

- ii: Category 5e: enhanced transmission characteristics specified for frequencies up to 100 MHz.

1.3 DEFINITION OF CABLE TYPES:

Horizontal cables are normally used in that portion of the telecommunications cabling system between the telecommunications room and the work area telecommunications outlet.

Backbone cables are normally used in that portion of the telecommunications cabling system between telecommunications closets, equipment rooms, and entrance facilities within a building.

Patch cordage is a length of cable used in the manufacture of patch cords where it is combined with connectors on one or both ends to join telecommunication circuits/links at the cross-connect and to connect work stations to the wall outlet. The conductors are typically stranded.

1.4 OPTIONS AND INFORMATION: For those characteristics where no differentiation is made, the performance requirements are applicable to all cable categories. Selection of the applicable category shall be at the discretion of the user and shall be designated in the product specification.

This Standard is arranged in Sections covering specific areas of cable requirements and may be referenced as complete Sections or as individual paragraphs.

Paragraphs of this Standard where the user may specify a particular option are listed below:

2.1, 2.2	Conductors
3.1.1, 3.1.2	Insulation Material
3.4.3	Color Code for Patch Cordage
4.4	Ripcord
5.2	Shielding Designs
6.1.1, 6.1.2	Jacket Material
6.4	Jacket Color
7.1	Transmission Classifications
8.6	Cable Flammability
8.7	Limited Smoke
9.1.2	Length Marking
9.3	Packaging

To assist the user in selection of options and to avoid possible misunderstandings between the manufacturer and user, it is suggested that a check-off sheet similar to that shown in Informative Annex A be utilized.

1.5 UNITS AND TOLERANCES: SI units are specified throughout this Standard except for conductor size following guidelines of NIST SP-811. Approximate US (inch-pound) equivalents and Fahrenheit temperatures are provided for information only. Unless otherwise specified, the rounding-off method of ASTM E 29 shall be used for determining conformance to this Standard.

1.6 REFERENCES: All documents referenced herein are listed in Table I with issues and/or dates as indicated.

1.7 QUALITY ASSURANCE: It is the responsibility of the manufacturer to establish a quality assurance system consistent with ISO Q9001 or an alternate system acceptable to the user. When the user requires a specific quality assurance program and/or special testing procedures, agreement between the user and the manufacturer should be reached before the order is placed.

Requirements shall be met on every length of completed cable as assured by quality control methods. The term “completed cable” refers to a continuous length of finished cable resulting from the last jacketing operation.

Properties that shall be tested on every length of completed cable prior to shipment are listed below by paragraph number.

- 7.17 Conductor - To - Conductor DC Proof Test
- 7.18 Core - To - Shield DC Proof Test
- 7.20 Continuity of Metallic Cable Elements

As an exception to these requirements for products packaged in-line, the above tests may be performed at the last assembly operation prior to jacketing.

1.8 SAFETY CONSIDERATIONS: Materials in the cable shall present no dermal, environmental, or other safety hazards as defined by current industry standards or applicable federal, state, or local laws and regulations.

The user of this Standard is cautioned to observe any applicable health or safety regulations and rules relative to the manufacture and use of cable made in conformity with this Standard. This Standard hereafter assumes that manufacture, test, installation, and maintenance of cables, defined by this Standard, will be performed only by properly trained personnel using suitable equipment and employing appropriate safety precautions.

1.9 INSTALLATION PRECAUTIONS: As with all transmission media, if recommended cabling precautions and installation methods are not observed, specified transmission capabilities may not be achieved. Contact the cable manufacturer for installation guidelines.