



ANSI/ICEA S-120-742-2021

Standard for Hybrid Optical Fiber
and Power Cable for use in
Limited Power Circuits

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STANDARD FOR HYBRID OPTICAL FIBER AND POWER CABLE FOR USE IN LIMITED POWER CIRCUITS

Approved 9/14/2020 by

INSULATED CABLE ENGINEERS ASSOCIATION, Inc.

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FOREWORD

ICEA Standards are adopted in the public interest and are designed to eliminate misunderstanding between the manufacturer and user and to assist the user in selecting and obtaining proper products for his particular need. Existence of an ICEA Standard does not in any respect preclude the manufacture or use of products not conforming to the Standard.

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 only properly trained personnel using suitable equipment will perform manufacture, testing, installation and maintenance of cables defined by this Standard.

Requests for interpretation of this ICEA Standard must be submitted in writing (hard copy or email) to the Secretary of the Insulated Cable Engineers Association. The mailing address of ICEA Headquarters and a *Contact* link are shown on the ICEA web site - www.icea.net. An official written interpretation will be provided.

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This issue replaces the previous issue, ANSI/ICEA S-120-742-2016, *Standard for Hybrid Optical Fiber and Power Cable for use in Limited Power Circuits*. Major changes in this revision include the following:

- Updated text on hazardous substances requirements.
- Updated general fiber out reference previously contained in 2.1 with specific fiber requirements.
- Addition of new fiber types and reformatting of the fiber out-references.
- Addition of OM5 multimode fiber.
- Addition of 200 micron fiber.
- Addition of descriptive text on easily-strippable semi-tight buffer.
- Addition of 6.2 for general length marking accuracy requirements.
- Partially bonded ribbons have been accommodated in the ribbon requirements.
- Annex C, the listing of ICEA Standards, is deleted. Refer to the ICEA web site for a current listing.
- Modification of NEC reference to Article 805 to reflect changes to NEC 2020.
- Addition of Annex D for Terms, Definitions, Acronyms.

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PART 1

INTRODUCTION

1.1 SCOPE

This Standard covers performance requirements for limited power hybrid copper and fiber communications cables intended for use in the buildings, or for short distances external to the building of communications users. The optical fiber is intended for communications use while the copper conductors are intended for limited power applications in accordance with Articles 725 and 805 of the National Electric Code (NEC) ANSI/NFPA 70. Typically, these cables utilize conductor sizes that range from 10 AWG to 24 AWG. Generally, these cables are limited to a maximum of 100 VA. However, refer to NEC document for detailed requirements. Materials, constructions, and performance requirements are included in the Standard, together with applicable test procedures.

Products covered by this standard are intended only for operation under conditions normally found in communication systems. Typically, these products are installed both in exposed areas (surface mounted to walls or building baseboards or in non-stationary configurations) and in concealed areas (within walls, attics, etc.), with or without external protection (such as conduit), depending upon product type and specific use. These products normally convey communications signals (voice, video, data, etc.) from place to place within a building. Products covered by this Standard may be factory terminated with connectors or splicing modules.

This standard is intended to serve as a reference to the most recent appropriate standards: ICEA S-83-596 for optical fiber communications cables intended for indoor use, ICEA S-104-696 for optical fiber communications cables intended for indoor-outdoor use and UL13 for Power Limited Circuit Cables with the addition of any additional requirements to ensure a functional cable design.

This standard is written from the application perspective of a Distributed Antenna System (DAS); however, other use cases that involve hybrid fiber/copper in a Limited Power application as defined by the National Electric Code, are considered to apply.

The normal temperature ranges for cables covered by this Standard are listed in Table 1-1:

**Table 1-1
Temperature Ranges**

	Riser and General Purpose		Plenum	
	°C	°F	°C	°F
<u>Indoor</u>				
Operation	-20 to +70	-4 to 158	0 to +70	32 to 158
Storage and Shipping	-40 to +70	-40 to 158	-40 to +70	-40 to 158
Installation	-10 to 60	14 to 140	0 to 60	32 to 140
<u>Indoor-Outdoor</u>				
Operation	-40 to +70	-40 to 158	-40 to +70	-40 to 158
Storage and Shipping	-40 to +70	-40 to 158	-40 to +70	-40 to 158
Installation	-10 to 60	14 to 140	0 to 60	32 to 140

The standard installation tensile rating for cables is specified in Table 7-2.

Standard Minimum Bend Diameter

Unloaded Condition (Installed): 20 x Cable OD
Loaded Condition (During Installation): 40 x Cable OD

For very small cables, manufacturers may specify a fixed cable minimum bend diameter (e.g., 300 mm) that is independent of the cable outer diameter (OD).

For cables not having a circular cross-section, bend diameter requirements are to be determined using the thickness (minor axis) as the cable diameter and bending in the direction of the preferential bend.

Products covered by this Standard shall comply with the pertinent Fire Resistance Code(s) described in 1.9.

1.2 GENERAL

This publication is arranged so that cables may be selected from numerous constructions covering a broad range of installation and service conditions.

Parts 2 and 3 designate the materials, material characteristics, dimensions, and tests applicable to the particular component.

Part 4 covers assembly, cabling, and identification of the individual optical fiber.

Part 5 includes cable coverings.

Part 6 provides other pertinent requirements not otherwise addressed by Parts 1 through 5 or by Parts 7 and 8 of this Standard.

Part 7 describes the test methods and performance requirements applicable to the component materials and completed cables manufactured under this Standard. If there is a conflict between Parts 1 through 6 and Part 7, the provisions of Part 7 apply.

Part 8 contains routinely specified optical performance, test methods, and requirements for finished cables.

Part 9 contains cross-references to other standards and publications.

Annex A Informative Ordering Information

Annex B Normative 1625 nm Single-mode Cabled Fiber Performance Requirements

Annex C Normative Maximum Tension on Cable Conductors

Annex D Informative Terms, Definitions, Acronyms

1.3 UNITS

In this Standard, metric (SI) units are used. Where approximate equivalents in alternate systems are included, they are provided for information only, and in most cases are rounded off for measurement convenience. Unless otherwise specified, the Rounding Method of ASTM E 29 shall be used. Rounding of U.S. customary units may be adjusted for measurement convenience. ICEA P-57-653 is a useful guide for metric units used in this publication.

1.4 DEFINITIONS

1.4.1 Cable Classification

Products covered in this Standard shall be classified according to their level of mechanical and thermal robustness, as declared by the manufacturer. The classification of a particular cable design, along with its fire rating (see 1.4.2), determines the appropriate testing and acceptance requirements. Cable classifications are defined below.

1.4.1.1 Backbone Cables

Cables which consist of a plurality of optical fibers in designs having a higher degree of robustness as compared to interconnect cables. Backbone cables are suitable for connections between telecommunications rooms, equipment rooms and entrance facilities. Backbone cables, typically, are sufficiently robust for placement in riser shafts, cable racks, or cable trays. Backbone cables are further classified according to their fire rating (see 1.4.2).