



**STANDARD FOR OPTICAL FIBER  
OUTSIDE PLANT COMMUNICATION CABLE**

**ANSI/ICEA S-87-640-2016-RL**

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**ANSI/ICEA S-87-640-2016**

**STANDARD FOR OPTICAL FIBER**

**OUTSIDE PLANT COMMUNICATIONS CABLE**

August 25, 2016

Sixth Edition

Published By

**Insulated Cable Engineers Association, Inc. (ICEA)**

[www.icea.net](http://www.icea.net)

| Approved [December 8, 2015](#), by  
INSULATED CABLE ENGINEERS ASSOCIATION, Inc.

| Approved [August 25, 2016](#), by ANSI ASC C-8  
AMERICAN NATIONAL STANDARDS INSTITUTE

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## FOREWORD

(This Foreword is not part of this Standard.)

This Standard provides information on specifying optical fiber cables for outdoor use in telecommunications applications.

The first edition of this Standard was approved by ICEA on March 4, 1992, and the second revision on September 15, 1999. A third revision was approved by ICEA on June 8, 2005. It was published by ICEA, but was not published as an ANSI-approved Standard. Revision 4 of this Standard, approved by ICEA on September 13, 2006, was a republication of revision 3. It was approved by The American National Standards Institute (ANSI) on December 8, 2006 and adopted by the Telecommunications Industry Association (TIA) as TIA-472D000-B in April 2007. The fifth revision was approved by ICEA on June 7, 2011 and by ANSI on January 17, 2012. The members of the ICEA Communications Cable Division Working Group who participated in the sixth edition of this standard were:

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This issue replaces the previous issue of ANSI/ICEA S-87-640-2011, *Standard for Optical Fiber Outside Plant Communications Cable*. Major changes in this revision include the following:

- Addition of new fiber types
- Added 200  $\mu\text{m}$  fiber coating option
- Redefined hybrid and composite cable
- Added additional ribbon types
- No fiber splices allowed in cable
- Clarified the residual fiber strain for greater than 100 to 200 kpsi fiber is a maximum of 17 % or proof test load
- Figure 8 galloping test now references IEC 60794-1-21 Method E26 standard
- Added jacket fungus resistance test.

This Standard contains eight annexes. Annexes C, D, and F are normative and are considered part of this Standard. Annex E is normative and considered part of this Standard when required by the customer. Annexes A, B, G, and H are informative and are not considered part of this Standard.

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 a particular need. The existence of an ICEA Standard does not in any respect preclude the manufacture or use of products not conforming to this 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 manufacture, test, install, and/or perform maintenance on 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](http://www.icea.net). An official written interpretation will be provided.

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## PART 1

### INTRODUCTION

#### 1.1 Scope

##### 1.1.1 Products

This Standard covers optical fiber communications cable intended for outdoor use and normally installed aerially, directly buried, or placed in underground ducts. Additional requirements are included in Annex D for “figure-8” aerial self-supporting cables and in Annex F for all-dielectric self-support cables, as appropriate. Materials, constructions, and performance requirements are included in the Standard, together with applicable test procedures. Refer to other published ICEA ~~(i.e. TIA)~~ cable product standards for information on optical fiber cable requirements for other applications:

- S-83-596: Indoor optical fiber cable ~~(TIA-472C000-C)~~
- S-104-696: Indoor-outdoor optical fiber cable ~~(ANSI/TIA-472E000)~~
- S-110-717: Standard for optical fiber drop cable ~~(ANSI/TIA-472F000)~~
- S-112-718: Optical fiber cable for placement in sewer environments ~~(TIA-472G000)~~
- S-115-730: Optical fiber cables intended for Multiple Dwelling Unit (MDU) applications
- S-119-741: Fiber to the antenna (FTTA) optical fiber cable.
- S-120-742: Hybrid optical fiber cables intended for use in limited power circuits.
- S-121-744: Optical fiber outside plant microduct cables.

##### 1.1.2 Applications Space

Products covered by this Standard are intended for operation only under conditions normally found in communications systems. These products normally convey communications signals (voice, video, and data) from point-to-point or point-to-multi-point, external to buildings. Products covered by this Standard may be factory terminated with connectors or splicing modules.

When a ~~composite~~-hybrid cable is required, the applicable metallic conductor requirements shall be as established by agreement between the end user and the cable manufacturer. The requirements of ANSI/ICEA S-84-608 should be considered when determining appropriate requirements.

### 1.1.3 Temperature Ranges

The normal temperature ranges for cables covered by this Standard are given in Table 1.1

For the purposes of this standard, very-low temperature applications are defined as -50 °C (-58 °F) per 1.4.1.6 and are addressed in Annex C ~~(Normative)~~, which contains requirements for lower operating and storage temperatures than listed in Table 1.1.

**Table 1.1 - Cable normal temperature ranges**

	°C	(°F)
Operation	-40 to +70	(-40 to +158)
Storage and Shipping	-40 to +70	(-40 to +158)
Installation	-30 to +60	(-22 to +140)

### 1.1.4 Tensile Rating

The standard installation tensile rating for cables covered by this Standard is 2670 N (600 lbf). Higher tensile ratings are also acceptable. For applications where a lower tensile rating is appropriate, the standard lower tensile rating is 1330 N (300 lbf). In all cases, the residual load is defined as a load equal to 30 % of the installation tensile rating.

For self-supporting aerial applications there are additional considerations that need to be addressed to ensure that the cable design is appropriate for the self-supporting distance and environmental loading conditions. See 7.30 and Annex D for information on figure-8 self-supporting aerial cable requirements and considerations. Also, see Annex F for information on all-dielectric self-supporting cable requirements and considerations.

For aerial applications in which the optical cable is lashed to a separate messenger wire, the use of a cable designed for a standard tensile rating for installation by direct burial, trenching, or pulling into duct may be adequate.

### 1.1.5 Minimum Bend Diameter

The standard minimum bend diameters for cables covered by this Standard are:

Residual (Installed): 20 x Cable OD or 30 x Cable OD  
for ribbon cables greater than or equal to 216 fibers

Loaded Condition (During Installation): 40 x Cable OD

For very small cables (e.g., such as those installed in microducts), 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.

## 1.2 GENERAL

This Standard is so arranged that cables may be selected from numerous constructions covering a broad range of installation and service conditions. Parts 2 to 5 cover the major components and assembly of the cables:

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 fibers and conductors.

Part 5 describes coverings, such as binders, wraps, metallic coverings, and jacketing of the optical cable.

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

Part 7 contains the test methods and requirements applicable to completed cables and component parts. 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, requirements, and test methods for finished cables.

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

Annex A (Informative) contains information for users on ordering the types of cable products covered by this Standard.

Annex B (Informative) contains information on metallic shield and tape materials used in some outside plant cable constructions.

Annex C (Normative) contains information and requirements for cables used in "very low temperature" applications (-50 °C).

Annex D (Normative) contains additional information and requirements on aerial self-supporting figure-8 cable designs with integrated metallic messenger wire.

Annex E (Normative) contains requirements for 1625 nm performance requirements for outside plant cables when required by the customer.

Annex F (Normative) contains requirements for all-dielectric self support requirements.