

# SMPTE STANDARD

## Television — Broadcast Cameras — Hybrid Electrical and Fiber-Optic Connector



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## Foreword

SMPTE (the Society of Motion Picture and Television Engineers) is an internationally-recognized standards developing organization. Headquartered and incorporated in the United States of America, SMPTE has members in over 80 countries on six continents. SMPTE's Engineering Documents, including Standards, Recommended Practices and Engineering Guidelines, are prepared by SMPTE's Technology Committees. Participation in these Committees is open to all with a bona fide interest in their work. SMPTE cooperates closely with other standards-developing organizations, including ISO, IEC and ITU.

SMPTE Engineering Documents are drafted in accordance with the rules given in Part XIII of its Administrative Practices.

SMPTE Standard 304 was prepared by Technology Committees S22 and 32NF.

## Intellectual Property

At the time of publication no notice had been received by SMPTE claiming patent rights essential to the implementation of this Standard. However, attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. SMPTE shall not be held responsible for identifying any or all such patent rights.

## Introduction

This section is entirely informative and does not form an integral part of this Engineering Document.

The product described within this updated version of the standard is fully backward compatible with all products that complied with previous versions of the Standard.

## 1 Scope

This standard defines a connector primarily intended for use in television broadcasting and video equipment, such as camera head to camera control-unit connections. It defines hybrid connectors, which contain a combination of electrical contacts and fiber-optic contacts for single-mode fibers. It also contains dimensional tolerances which ensure nondestructive mating of the electrical and optical interfaces, and functional operability of the electrical interface. Functional operability of the optical interface is dependent upon fiber preparation and termination and is, therefore, not guaranteed by this standard.

The connector described in this standard is intended for use primarily with the hybrid fiber optic camera cable described in SMPTE 311; however, this connector may be used independently to meet other requirements.

## 2 Conformance Notation

Normative text is text that describes elements of the design that are indispensable or contains the conformance language keywords: "shall", "should", or "may". Informative text is text that is potentially helpful to the user, but not indispensable, and can be removed, changed, or added editorially without affecting interoperability. Informative text does not contain any conformance keywords.

All text in this document is, by default, normative, except: the Introduction, any section explicitly labeled as "Informative" or individual paragraphs that start with "Note:"

The keywords "shall" and "shall not" indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

The keywords, "should" and "should not" indicate that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain possibility or course of action is deprecated but not prohibited.

The keywords "may" and "need not" indicate courses of action permissible within the limits of the document.

The keyword "reserved" indicates a provision that is not defined at this time, shall not be used, and may be defined in the future. The keyword "forbidden" indicates "reserved" and in addition indicates that the provision will never be defined in the future.

A conformant implementation according to this document is one that includes all mandatory provisions ("shall") and, if implemented, all recommended provisions ("should") as described. A conformant implementation need not implement optional provisions ("may") and need not implement them as described.

## 3 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below.

SMPTE 311-2009, Television — Hybrid Electrical and Fiber-Optic Camera Cable

IEC 60950-1 (2005-12), Information Technology Equipment — Safety — Part 1: General Requirements

## 4 Connector Specifications

### 4.1 Structural Requirements

The connector system shall consist of a plug-and-jack arrangement. It shall feature a push-pull quick connect/disconnect coupling mechanism. The plug shall be identified by a color-code marking.

Each connector shall contain two keyed fiber-optic contacts, with cylindrical spherical butting ferrules. The ferrules shall be ceramic and the optical alignment mechanism shall be a ceramic split sleeve contained in the contacts on the plug. Appropriate dust caps for all connector configurations shall be used as protection against contamination during unmated situations.

### 4.2 Contact Requirements

The connectors shall house two fiber-optic contacts, two auxiliary electrical contacts, and two low-voltage contacts.

### 4.3 Classifications

Connectors covered by this part shall be classified as:

- Name: Hybrid connectors
- Coupling: Push pull
- Configurations:
  - o Cable plug (to mate with connector on camera) color coded for identification;
  - o Cable jack (to mate with base station);
  - o Jack, panel mount (installed on camera);
  - o Plug, panel mount (installed on base station).
  - o Cable Jack, panel mount( installed on patch panels )
  - o Cable plug , panel mount ( installed on studio wall boxes / OB vans)

Note: Other styles of connector with other back-end mounting arrangements are available and are fully intermateable with the variants above.

### 4.4 Field Serviceability

The connectors shall be designed to permit field termination, replacement, and repair by trained personnel, using assembly instructions supplied by the connector manufacturer, and with the appropriate tooling.

## 5 Mechanical Interface Dimensions

### 5.1 Mating Interface Dimensions

The mating interface dimensions for each connector configuration (plug and jack) shall be in accordance with Figures 1 and 2 and Tables 1 and 2. All dimensions are metric.

### 5.2 Shell Keying and Color Coding

The connectors shall have polarization keys in accordance with Figures 3 and 4 and Tables 3 and 4. The shells shall have a red color coding.

### 5.3 Contact Arrangements

The contacts shall be located in accordance with Figure 7.

## 6 Performance

The connectors shall meet the following minimum requirements:

– Optical:

- Wavelength: 1250 nm – 1625nm
- Insertion loss: 0.5 dB maximum
- Return loss: Better than – 45 dB

Note: Prior versions of this standard specified wavelengths down to 1100nm.

– Electrical:

– Auxiliary electrical contacts:

- Voltage: 600 V ac
- Current: 10 A

– Low-voltage contacts:

- Voltage: 42 V ac or 60 V dc
- Current: 1 A

– Environmental:

- Temperature: –40°C to +75°C
- Humidity: 0 % to 95% RH (at +40°C)

Note: The degree of waterproofing is left for manufacturing implementation.

## 7 Safety

The design of the connectors shall meet the requirements of IEC-60950-1, 2nd edition, Information Technology Equipment — Safety — Part 1: General Requirements.