

Edition 1.0 2019-01

### INTERNATIONAL STANDARD

Twinax cables for digital communications PREVIEW Part 1: Generic specification (standards.iteh.ai)

IEC 62783-1:2019 https://standards.iteh.ai/catalog/standards/sist/df24ac21-60b4-472c-9c1f-2972ae706e51/iec-62783-1-2019





### THIS PUBLICATION IS COPYRIGHT PROTECTED Copyright © 2019 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Tel.: +41 22 919 02 11

**IEC Central Office** 3, rue de Varembé CH-1211 Geneva 20

info@iec.ch www.iec.ch

Switzerland

#### About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

### IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and

### IEC publications search - webstore. iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications. standard

### IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also 83 If you wish to give us your feedback on this publication or need once a month by email. https://standards.itch.ai/catalog/standardurtherd assistance@bplease.contact the Customer Service

### Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 21 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online

### IEC Glossary - std.iec.ch/glossary

67 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

### IEC Customer Service Centre - webstore.iec.ch/csc

2972ae706e51/iec-Centre\_sales@iec.ch.



Edition 1.0 2019-01

### INTERNATIONAL STANDARD

# Twinax cables for digital communications PREVIEW Part 1: Generic specification tandards.iteh.ai)

IEC 62783-1:2019 https://standards.iteh.ai/catalog/standards/sist/df24ac21-60b4-472c-9c1f-2972ae706e51/iec-62783-1-2019

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 33.120.20 ISBN 978-2-8322-6249-8

Warning! Make sure that you obtained this publication from an authorized distributor.

### CONTENTS

Г	JKEWOKD.		4
IN	TRODUCTI	ON	6
1	Scope		7
2	Normativ	ve references	7
3	Terms ar	nd definitions	9
4	Requiren	nents for cables construction	9
•	•	neral remarks	
		ble construction	
	4.2.1	General	
	4.2.2	Conductor	
	4.2.3	Insulation	
	4.2.4	Colour code	
	4.2.5	Drain wire	10
	4.2.6	Screening of cable assembly element	
	4.2.7	Cable make-up	10
	4.2.8	Screening of the cable core	
	4.2.9	Sheath	10
	4.2.10	Colour of sheath	11
	4.2.11	Colour of sheath TANDARD PREVIEW  Identification	11
	4.2.12	Finished cable(standards.iteh.ai)	11
5	Requiren	nents and test methods	
	5.1 Ge	neral <u>IEC 62783-12019</u>	11
	5.2 Ele	https://standards.iteh.ai/catalog/standards/sist/df24ac21-60b4-472c-9c1f-	40
	5.2.1	Conductor resistance 2972ae706e51/iec-62783-1-2019	12
	5.2.2	Resistance unbalance	12
	5.2.3	Dielectric strength	12
	5.2.4	Insulation resistance	12
	5.2.5	Mutual capacitance	12
	5.2.6	Surface transfer impedance	12
	5.3 Tra	Insmission requirements and tests	12
	5.3.1	General	12
	5.3.2	Characteristic impedance	13
	5.3.3	Return loss	13
	5.3.4	Attenuation	13
	5.3.5	Propagation delay, inter-element delay skew, and intra-element delay skew	14
	5.3.6	Near-end crosstalk (NEXT)	14
	5.3.7	Attenuation to crosstalk ratio far-end (ACR-F)	15
	5.3.8	Transverse conversion loss (TCL)	15
	5.3.9	Equal level transverse conversion transfer loss (ELTCTL)	15
	5.3.10	Screening attenuation	15
	5.3.11	Coupling attenuation	15
	5.4 Me	chanical and dimensional requirements and test methods	15
	5.4.1	General	15
	5.4.2	Measurement of dimensions	15
	5.4.3	Elongation at break of the conductor	16
	5.4.4	Tensile strength of the insulation	16

5.4.5	Elongation at break of the sheath	16
5.4.6	Tensile strength of the sheath	16
5.4.7	Crush test of the cable	16
5.4.8	Impact test of the cable	16
5.4.9	Repeated bending of the cable	16
5.4.10	Tensile performance of the cable	16
5.5 Env	rironmental tests	16
5.5.1	Shrinkage of the insulation	16
5.5.2	Wrapping test of the insulation after thermal ageing	16
5.5.3	Bending test of the insulation at low temperature	16
5.5.4	Tensile strength and elongation of the sheath after ageing	16
5.5.5	Sheath pressure test at high temperature	16
5.5.6	Cold bend test of the cable	17
5.5.7	Heat shock test	17
5.5.8	Flame propagation characteristics of a single cable	17
5.5.9	Flame propagation characteristics of bunched cables	
5.5.10	Smoke generation	17
5.5.11	Combined flame and smoke test for cables in environmental air	
	handling spaces	
Bibliography		18
	iTeh STANDARD PREVIEW	
Table 1 – Non	ninal attenuation values, dB/10 m(Standards.iteh.ai)	13

2972ae706e51/iec-62783-1-2019

### INTERNATIONAL ELECTROTECHNICAL COMMISSION

### TWINAX CABLES FOR DIGITAL COMMUNICATIONS -

### Part 1: Generic specification

### **FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter
- https://standards.iteh.ai/catalog/standards/sist/df24ac21-60b4-472c-9c1f
  5) IEC itself does not provide any attestation of conformity, Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62783-1 has been prepared by subcommittee 46C: Wires and symmetric cables, of IEC technical committee 46: Cables, wires, waveguides, RF connectors, RF and microwave passive components and accessories.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
46C/1107/FDIS	46C/1113/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62783 series, published under the general title *Twinax cables for digital communications*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- · replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

IEC 62783-1:2019 https://standards.iteh.ai/catalog/standards/sist/df24ac21-60b4-472c-9c1f-2972ae706e51/iec-62783-1-2019

### INTRODUCTION

This International Standard specifies the generic characteristics of twinax cables, which use multiple twinax cable elements for transmission of digital signals.

These cables are intended for use in high-performance information technology systems and data interface interconnection systems. Twinax cables are generally used in short-reach data communication links, which reach about 1 m to 10 m. Information technology interconnection standards that use twinax cables include Ethernet, Fibre channel, SAS, SATA, and others.

IEC 62783 (all parts) includes separate family specifications, which are provided for each information technology interconnection standard's specific twinax cable requirements.

## iTeh STANDARD PREVIEW (standards.iteh.ai)

IEC 62783-1:2019 https://standards.iteh.ai/catalog/standards/sist/df24ac21-60b4-472c-9c1f-2972ae706e51/iec-62783-1-2019

### TWINAX CABLES FOR DIGITAL COMMUNICATIONS -

### Part 1: Generic specification

### 1 Scope

This part of IEC 62783 specifies definitions and requirements of twinax cables used in digital communication systems. These cables are intended to be used in indoor applications. This generic specification details the requirements and transmission characteristics for single twinax elements as well as multiple twinax elements within the same sheath, i.e. "twinax cable".

This generic specification is supplemented with family specifications that give additional requirements based on the specific application, e.g. the maximum specified frequency of the cables.

### 2 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. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60028, International standard of resistance for copper

IEC 60068 (all parts), Environmental testing 1/iec-62783-1-2019

IEC 60189-1, Low-frequency cables and wires with PVC insulation and PVC sheath – Part 1: General test and measuring methods

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

IEC 60332-1-2, Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW premixed flame

IEC 60332-2-2, Tests on electric and optical fibre cables under fire conditions – Part 2-2: Test for vertical flame propagation for a single small insulated wire or cable – Procedure for diffusion flame

IEC 60332-3-10, Tests on electric and optical fibre cables under fire conditions – Part 3-10: Test for vertical flame spread of vertically-mounted bunched wires or cables – Apparatus

IEC TR 60344, Calculation of d.c. resistance of plain and coated copper conductors of low-frequency cables and wires – Application guide

IEC 60708, Low-frequency cables with polyolefin insulation and moisture barrier polyolefin sheath

IEC 60794-1-2, Optical fibre cables – Part 1-2: Generic specification – Basic optical cable test procedures – General guidance

- IEC 60811-201, Electric and optical fibre cables Test methods for non-metallic materials Part 201: General tests Measurement of insulation thickness
- IEC 60811-203, Electric and optical fibre cables Test methods for non-metallic materials Part 203: General tests Measurement of overall dimensions
- IEC 60811-401, Electric and optical fibre cables Test methods for non-metallic materials Part 401: Miscellaneous tests Thermal ageing methods Ageing in an air oven
- IEC 60811-406, Electric and optical fibre cables Test methods for non-metallic materials Part 406: Miscellaneous tests Resistance to stress cracking of polyethylene and polypropylene compounds
- IEC 60811-501, Electric and optical fibre cables Test methods for non-metallic materials Part 501: Mechanical tests Tests for determining the mechanical properties of insulating and sheathing compounds
- IEC 60811-502, Electric and optical fibre cables Test methods for non-metallic materials Part 502: Mechanical tests Shrinkage test for insulations
- IEC 60811-504, Electric and optical fibre cables Test methods for non-metallic materials Part 504: Mechanical tests Bending tests at low temperature for insulation and sheaths
- IEC 60811-506, Electric and optical fibre cables Test methods for non-metallic materials Part 506: Mechanical tests Impact test at low temperature for insulations and sheaths
- IEC 60811-508, Electric and optical fibre cables Test methods for non-metallic materials Part 508: Mechanical tests Pressure test at high temperature for insulation and sheaths

https://standards.iteh.ai/catalog/standards/sist/df24ac21-60b4-472c-9c1f-

- IEC 60811-509, Electric and optical fibre cables Test methods for non-metallic materials Part 509: Mechanical tests Test for resistance of insulations and sheaths to cracking (heat shock test)
- IEC 60811-510, Electric and optical fibre cables Test methods for non-metallic materials Part 510: Mechanical tests Methods specific to polyethylene and polypropylene compounds Wrapping test after thermal ageing in air
- IEC 61034 (all parts), Measurement of smoke density of electric cables burning under defined conditions
- IEC 61156-1, Multicore and symmetrical pair/quad cables for digital communications Part 1: Generic specification
- IEC TR 61156-1-2, Multicore and symmetrical pair/quad cables for digital communications Part 1-2: Electrical transmission characteristics and test methods of symmetrical pair/quad cables
- IEC 62153-4-3, Metallic communication cable test methods Part 4-3: Electromagnetic compatibility (EMC) Surface transfer impedance Triaxial method
- IEC 62153-4 (all parts), Metallic communication cable test methods Part 4: Electromagnetic compatibility (EMC)
- IEC 62153-4-4, Metallic communication cable test methods Part 4-4: Electromagnetic compatibility (EMC) Test method for measuring of the screening attenuation as up to and above 3 GHz, triaxial method

IEC 62153-4-9, Metallic communication cable test methods – Part 4-9: Electromagnetic compatibility (EMC) – Coupling attenuation of screened balanced cables, triaxial method

### 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

### 3.1

### twinax element

pair of insulated conductors that are laid parallel, side-by-side, enclosed in a metal foil shield with drain wire (known also as twin-axial or twin-coaxial)

### 3.2

### twinax cable

cable composed of multiple twinax elements

#### 3.3

### twinax cable assembly eh STANDARD PREVIEW twinax cable terminated on both ends with a connector (standards.iteh.ai)

### 4 Requirements for cables construction

https://standards.iteh.ai/catalog/standards/sist/df24ac21-60b4-472c-9c1f-

### 4.1 General remarks

2972ae706e51/iec-62783-1-2019

The nominal twinax characteristic impedance is  $100 \Omega$ . Normal twinax cable configurations range from 2 to 32 elements, with a conductor size range from 0,2 mm to 0,6 mm (original designs used 32 AWG to 22 AWG), or other sizes as specified in the family.

The choice of materials and cable construction shall be suitable for the intended application and installation of the cable. Particular care shall be taken to meet any special requirements for fire performance (such as burning properties, smoke generation, evolution of acid gas, etc.).

### 4.2 Cable construction

### 4.2.1 General

The cable construction shall be in accordance with the details and dimensions given in the relevant family specification.

### 4.2.2 Conductor

The conductor shall consist of annealed copper in accordance with IEC 60028, shall be solid or stranded and circular in cross-section, and shall be silver-coated, tin-coated, bare copper, plated copper or copper alloy.

The conductor DC resistance and resistance unbalance, when specified, shall meet the values indicated in the relevant family specification. The maximum conductor DC resistance shall be calculated in accordance with IEC TR 60344.