



SLOVENSKI STANDARD SIST EN 186000-1:1999

01-julij-1999

Generic Specification: Connector sets for optical fibres and cables - Part 1: Requirements, test methods and qualification approval procedures

Generic Specification: Connector sets for optical fibres and cables -- Part 1:
Requirements, test methods and qualification approval procedures

Fachgrundspezifikation: Steckverbinderstze fr Lichtwellenleiter und Lichtwellenleiterkabel
-- Teil 1: Anforderungen, Prfverfahren und Bauartzulassungsverfahren

Spécification gnérique: Jeux de connecteurs pour fibres et cbles optiques -- Partie 1:
Exigences, mthodes d'essais et procdures d'homologation

<https://standards.iteh.ai/catalog/standards/sist/17a11d49-558f-4754-9f04-fcc984adacdd/sist-en-186000-1-1999>

Ta slovenski standard je istoveten z: **EN 186000-1:1993**

ICS:

33.180.20 Ú[ç^: [çæ) ^Á æ | æ^Á æ Fibre optic interconnecting devices
[] cã } æçæ } æ

SIST EN 186000-1:1999

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 186000-1:1999

<https://standards.iteh.ai/catalog/standards/sist/17a11d49-558f-4754-9f04-fcc984adacdd/sist-en-186000-1-1999>

Descriptors: Quality, electronic components, connector sets, optical fibres, optical cables

English version

Generic Specification:
Connector sets for optical fibres and câbles
Part 1: Requirements, test methods and qualification
approval procedures

Spécification Générique:
Jeux de connecteurs pour fibres et câbles
optiques
Partie 1: Exigences, méthodes d'essais et
procédures d'homologation

Fachgrundspezifikation:
Steckverbindersätze für Lichtwellenleiter und
Lichtwellenleiterkabel
Teil 1: Anforderungen, Prüfverfahren und
Bauartzulassungsverfahren

This European Standard was approved by the CENELEC Electronic Components Committee (CECC) on 26 March 1993. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom. The membership of the CECC is identical, with the exception of the national electrotechnical committees of Greece, Iceland and Luxembourg.

[SIST EN 186000-1:1999](https://standards.iteh.ai/catalog/standards/sist/17a11d49-558f-4754-9f04-fcc984adacdd/sist-en-186000-1-1999)

<https://standards.iteh.ai/catalog/standards/sist/17a11d49-558f-4754-9f04-fcc984adacdd/sist-en-186000-1-1999>

CECC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

Foreword

The CENELEC Electronic Components Committee (CECC) is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognized Mark, or Certificate, of Conformity. The components produced under the System are thereby acceptable in all member countries without further testing.

This European Standard was prepared by CECC WG 26, Fibre Optic Connectors.

The text of the draft based on document CECC 86000-1 Issue 1:1992 was submitted to the formal vote for conversion to a European Standard; together with the voting report, circulated as document CECC (Secretariat) 3306 it was approved by CECC as EN 186000-1 on 26 March 1993.

The following dates were fixed:

- latest date of announcement of the EN at national level (doa) 1993-08-08
- latest date of publication of an identical national standard^a (dop) 1994-02-08
- latest date of withdrawal of conflicting national standards^a (dow) 1995-02-08

^a National standard (excluding national implementation of IECQ specifications).

Contents

	Page
Foreword	2
Foreword	5
Preface	5
CECC specification system	6
Section 1. General	
1 General	7
1.1 Scope	7
1.2 Related documents	7
1.3 Definitions	8
Section 2. Requirements	
2 Requirements	10
2.1 Classification	10
2.1.1 Type	11
2.1.2 Arrangement	11
2.1.3 Style	11
2.1.4 Variant	11
2.1.5 Climatic category	12
2.1.6 Environmental category	12
2.1.7 Assessment level	16
2.2 Documentation	17
2.2.1 Symbols	17
2.2.2 Specification system	
Sectional specifications	
Blank detail specifications	
Detail specifications	17
2.2.3 Drawings	
Projection system	
Dimensional system	
Intermateability (in preparation)	18
2.2.4 Measurements	
Measurement method	
Reference components	
Gauges	18
2.2.5 Test data sheets	18
2.2.6 Instructions for use	19
2.3 Design and construction	19
2.3.1 Materials	
Corrosion resistance	
Non-flammable materials	19
2.3.2 Workmanship	19
2.4 Quality	19
2.5 Performance	19
2.6 Identification and marking	19
2.6.1 Variant identification number	19
2.6.2 Component marking	20

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 186000-1:1993

<https://standards.iteh.ai/catalog/standards/sist/186000-1-1993/fcc984adacdd/sist-186000-1-1993>

	Page		Page
2.6.3	20	4.4.8	39
2.7	20	4.4.9	41
Section 3. Quality assessment procedures		4.4.10	43
3	21	4.4.11	47
3.1	21	4.4.12	49
3.2	21	4.5	53
3.3	21	4.5.1	54
3.3.1	21	4.5.2	55
3.3.2	21	4.5.3	56
3.3.3	22	4.5.4	57
3.3.4	22	4.5.5	57
3.3.5	22	4.5.6	58
3.3.6	22	4.5.7	59
3.3.7	22	4.5.8	60
3.3.8	22	4.5.9	60
3.3.9	22	4.5.10	61
3.4	23	4.5.11	62
3.4.1		4.5.12	63
Lot-by-lot inspection		4.5.13	65
Formation of inspection lots		4.5.14	66
Rejected lots	23	4.5.15	67
3.4.2		4.5.16	68
Periodic inspection		4.5.17	70
Sample size		4.5.18	70
Preparation of specimens		4.5.19	71
Periodic inspection		4.5.20	72
Periodic inspection failures		4.5.21	75
Periodic inspection report	23	4.5.22	75
3.5	24	4.5.23	77
3.6	24	4.5.24	77
3.7	24	4.5.25	78
3.8	24	4.5.26	79
3.9	24	4.5.27	80
Section 4. Measurement and environmental test procedures		4.5.28	82
4	25	4.5.29	82
4.1	25	4.5.30	83
4.2	25	4.5.31	84
4.3	25	4.5.32	84
4.4	25	4.5.33	85
4.4.1	25	4.5.34	86
4.4.2	26	4.5.35	87
4.4.3	26		
4.4.4	27		
4.4.5	27		
4.4.6	28		
4.4.7	29		

	Page		Page
Annex A (informative) Size measurements	90	Figure 39	88
Annex B (informative) Summary of definitions from IEC publications	91	Table 1 — Test sequences for environmental category I	13
Figure 1 — Example of a typical connector set classification	10	Table 2 — Test sequences for environmental category II	14
Figure 2 — Insertion loss measurement methods	30	Table 3 — Test sequences for environmental category III	15
Figure 3	32	Table 4 — Four level CECC specification structure	16
Figure 4	33	Table 5 — List of measurement procedures	25
Figure 5	33	Table 6 — List of environmental test procedures	54
Figure 6	33		
Figure 7	34		
Figure 8	34		
Figure 9	34		
Figure 10	35		
Figure 11	35		
Figure 12	35		
Figure 13	36		
Figure 14	36		
Figure 15	36		
Figure 16	37		
Figure 17	37		
Figure 18	37		
Figure 19	38		
Figure 20	40		
Figure 21 — Cable without connector	42		
Figure 22 — Cable with connector set	42		
Figure 23	44		
Figure 24	45		
Figure 25	46		
Figure 26	46		
Figure 27	48		
Figure 28	49		
Figure 29	50		
Figure 30	51		
Figure 31	51		
Figure 32	52		
Figure 33	52		
Figure 34	52		
Figure 35	53		
Figure 36	64		
Figure 37	67		
Figure 38	81		

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 186000-1:1999
<https://standards.iteh.ai/catalog/standards/sist/17a11d49-558f-4754-9f04-fcc984adac05/sist-en-186000-1-1999>

Foreword

The CENELEC Electronic Components Committee (CECC) is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognized Mark, or Certificate, of Conformity. The components produced under the System are thereby acceptable in all member countries without further testing.

This specification has been formally approved by the CECC, and has been prepared for those countries taking part in the System who wish to issue national harmonized specifications for CONNECTOR SETS FOR OPTICAL FIBRES AND CABLES. It should be read in conjunction with the current regulations for the CECC System.

At the date of printing of this specification, the member countries of the CECC are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom, and copies of it can be obtained from the addresses shown on the blue fly sheet.

Preface

This specification was prepared by CECC WG 26.

It is based, wherever possible, on the Publications of the International Electrotechnical Commission, and in particular on IEC 874-1.

The text of this specification was circulated to the CECC for voting in the document listed below and was ratified by the President of the CECC for printing as a CECC Specification.

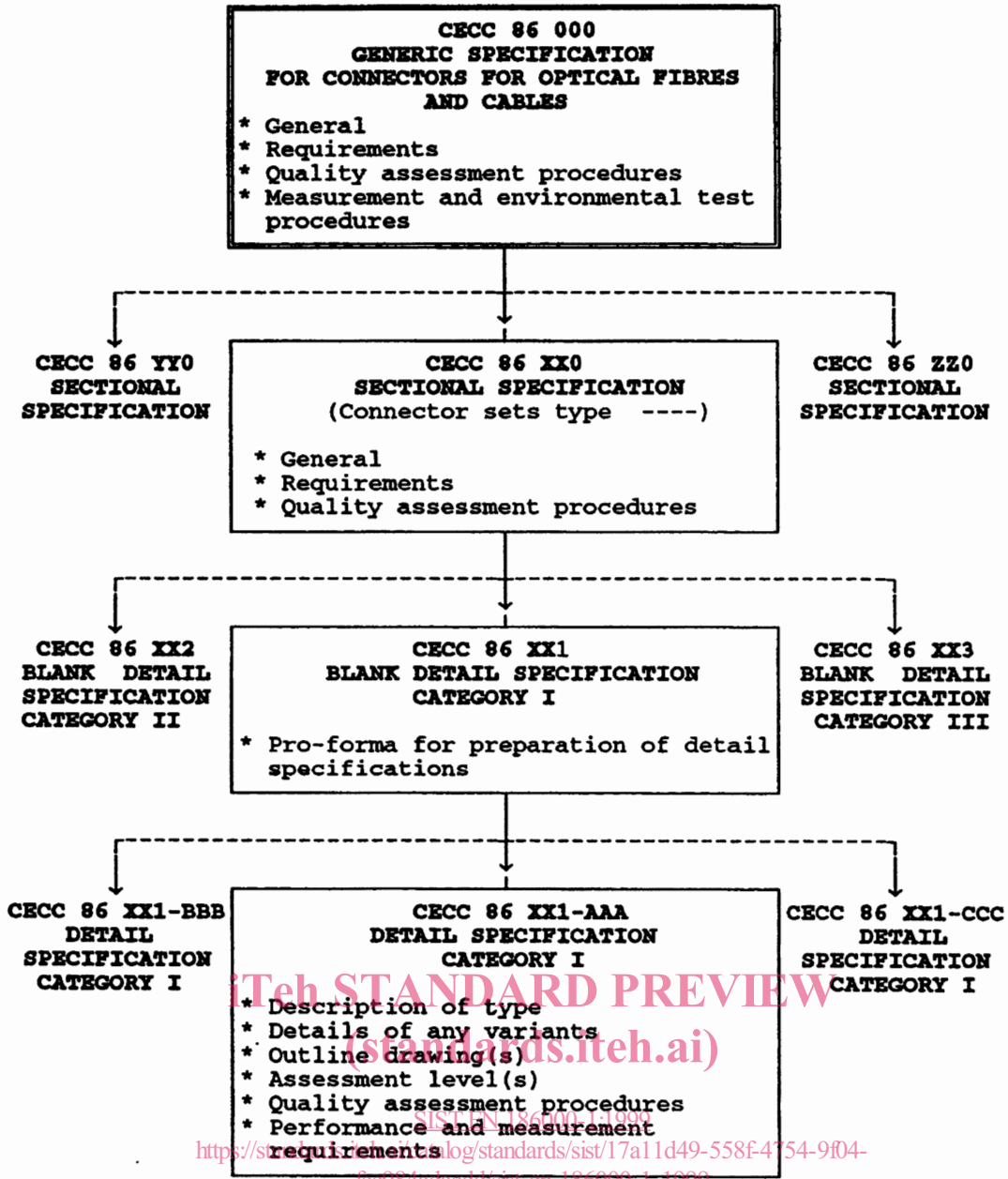
<u>Document</u>	<u>Date of Voting</u>	<u>Report on the Voting</u>
CECC (Secretariat) 2518	May 1990	CECC (Secretariat) 2663

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 186000-1:1999

<https://standards.iteh.ai/catalog/standards/sist/17a11d49-558f-4754-9f04-fcc984adacdd/sist-en-186000-1-1999>

CECC SPECIFICATION SYSTEM



NOTE A detail specification is a "completed" blank detail specification.

Section 1. General

1 General

1.1 Scope

This specification applies to fibre optic connector sets for optical fibres and cables. It includes

- connector set requirements
- measurement and test procedures for quality assessment of both connector sets and their individual components, such as adaptors, plugs and sockets.

1.2 Related documents

The following standards contain provisions which, through reference in this text, constitute provisions of this specification. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this specification are encouraged to apply the most recent editions of the referenced standards. Members of CECC, IEC and ISO maintain registers of currently valid international standards.

References made to a specific clause or sub-clause of a standard include all sub-clauses to the reference unless otherwise specified.

CECC 00 114-I, RP14-I:1990, *Approval of manufacturers and other organizations.*

CECC 00 114-II, RP14-II:1991, *Qualification approval of electronic components.*

IEC 27:1971, *Letter symbols to be used in electrical technology.*

IEC 68-1:1982, *Basic environmental testing procedures — Part 1: General and guidance.*

IEC 68-2-1:1974, *Tests A: Cold.*

IEC 68-2-2:1974, *Tests B: Dry heat.*

IEC 68-2-3:1969, *Test Ca: Damp heat, steady state.*

IEC 68-2-5:1975, *Test Sa: Simulated solar radiation at ground level.*

IEC 68-2-6:1982, *Test Fc and guidance: Vibration (sinusoidal).*

IEC 68-2-7:1983, *Test Ga and guidance: Acceleration, steady state.*

IEC 68-2-9:1975, *Guidance for solar radiation testing.*

IEC 68-2-10:1984, *Test J: Mould growth.*

IEC 68-2-11:1981, *Test Ka: Salt mist.*

IEC 68-2-13:1983, *Test M: Low air pressure.*

IEC 68-2-14:1984, *Test N: Change of temperature.*

IEC 68-2-17:1978, *Test Q: Sealing.*

IEC 68-2-27:1972, *Test Ea: Shock.*

IEC 68-2-29:1968, *Test Eb: Bump.*

IEC 68-2-30:1980, *Test Db and guidance: Damp heat, cyclic (12 + 12 hours).*

IEC 410:1973, *Sampling plans and procedures for inspection by attributes.*

IEC 617, *Graphical symbols for diagrams.*

IEC 695-2-2:1980, *Fire hazard tests — Part 2: Test methods — needle-flame test.*

IEC 793-1:1987, *Optical fibres — Part 1: Generic specification.*

IEC 875-1:1986, *Fibre optic branching devices — Part 1: Generic specification.*

IEV 50 (731):1987, *International Electrotechnical Vocabulary, chapter 731: Optical Fibre Communication.*

ISO Standard 129, *Technical drawings — dimensioning — general principles, definitions, methods of execution and special indications.*

ISO/R 286, *ISO system of limits and fits — Part 1: General, tolerances and deviations.*

ISO Standard 1101, *Technical drawings — geometrical tolerancing — tolerancing of form, orientation, location and run-out — generalities, definitions, symbols, indications on drawings.*

ISO Standard 2015:1976, *Numbering of weeks.*

1.3 Definitions

The definitions given in IEV 73, with the following definitions, apply to this specification. They also apply to all sectional and detail specifications written to this specification. See also Annex B.

fully intermateable connector set

connector sets from different sources are considered fully intermateable when connector parts from one source will mate with complimentary parts from other sources without mechanical damage and with optical properties maintained within specified limits

mechanically intermateable connector set

connector sets from different sources are considered mechanically intermateable when connector components from one source will mate with complimentary components from other sources without mechanical damage but without regard to optical properties

fibre optic connector set

all the connector components required to provide for coupling and uncoupling between two or more optical fibre cables

connector set component

that part of a connector set which can be individually specified and qualified. Examples are, plug connector, adaptor connector, socket connector and socket receptacle

counterpart component

a qualified connector set component required to complete a connector set for qualification testing of a connector set component

reference connector set

a precisely made or selected connector set of a particular type used for measurement purposes. Such a connector set may be in the form of a precision jig incorporated in the test equipment. The performance or selection criterion shall be given in the relevant specification

reference connector set component

a precisely made or selected connector set component which is used for measuring purposes (e.g. plug, adaptor, etc.). The component may be in the form of a precision jig incorporated in the test equipment

plug-adaptor-plug configuration

two plug connectors which mate through an adapter. The mechanical coupling takes place between plug connectors and the adapter. A connector set consists of two plugs and one adapter

plug-socket configuration

a connector set consisting of one plug and one socket. The mechanical coupling mechanism and optical alignment mechanism are self-contained in the two connector halves

mating face dimensions

the dimensions of the features which determine the mating fit between components of an optical connector set

connector set kit (fibre optics)

a connector set which is terminated

connector kit (fibre optics)

an unterminated component of a connector set (a plug or an adaptor)

pigtailed connector (fibre optics)

an assembly with a plug or socket connector terminated to a length of optical fibre or cable

pigtailed connector set (fibre optics)

two pigtailed connectors with the means of coupling them together

patchcord (fibre optics)

an assembly where the cable or fibre is terminated at each end with either a plug or socket connector

patchcord connector set (fibre optics)

a patch cord and any additional connector set component necessary for measurement purposes

variant

a variation of details for a particular connector set component. Different cable entry sizes or different mounting dimensions are examples of variant

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 186000-1:1999](https://standards.iteh.ai/catalog/standards/sist/17a11d49-558f-4754-9f04-fcc984adacdd/sist-en-186000-1-1999)

<https://standards.iteh.ai/catalog/standards/sist/17a11d49-558f-4754-9f04-fcc984adacdd/sist-en-186000-1-1999>

Section 2. Requirements

2 Requirements

The requirements for connector sets covered by this specification are specified herein and in the relevant specification.

2.1 Classification

Fibre optic connector sets shall be classified by the following categories:

- type
- arrangement
- style
- variant
- climatic category
- environmental category
- assessment level.

See Figure 1 for an example of a complete connector set classification.

Example of a typical connector set classification
<p>Type — name: type F-SMA</p> <ul style="list-style-type: none"> — configuration: plug-adaptor-plug — coupling: screw thread — mating face dimensions: <ul style="list-style-type: none"> — plug: see Figure 2* — adapter: see Figure 4* <p>Arrangement — kit</p> <p>Style — fibre category: IEC category A1</p> <ul style="list-style-type: none"> — fibre retention: adhesive — cable retention: crimp — optical coupling: non-butting ferrules — alignment: resilient busing <p>Variants — twelve plug permutations of:</p> <ul style="list-style-type: none"> — fibre core sizes <ul style="list-style-type: none"> — 50 μm — 62,5 μm — 85 μm — cable types and sizes <ul style="list-style-type: none"> — tight structure, 3 mm O.D. — loose structure, 3,8 mm O.D. — coupling nut styles: <ul style="list-style-type: none"> — knurl — hex <p>two adaptor variants:</p> <ul style="list-style-type: none"> — non-mountable (free hanging) — four hole flange mount <p>Climatic category — 55/125/21</p> <p>Environmental category — II +</p> <p>Assessment level: A, B, C & X</p>

Note: *indicates figures in a hypothetical detail specification.

Figure 1 — Example of a typical connector set classification

2.1.1 Type

Connector set types shall be defined by four elements — the type name, the configuration, the coupling mechanism and the mating face dimensions.

Examples of type names:

- type F-SMA
- type BAM.

Examples of configurations:

- plug-adaptor-plug configuration
- plug-socket configuration.

Examples of coupling mechanisms:

- screw thread
- bayonet
- push-pull.

2.1.2 Arrangement

The connector set arrangement shall define the delivered connector set form.

Examples of connector set arrangements:

- kit arrangement
- pigtail arrangement
- patch-cord arrangement.

2.1.3 Style

The connector set style shall be defined by four elements, the fibre retention technology, the cable retention technology, the optical coupling technology and the alignment technology.

Examples of fibre retention technologies:

- adhesive fibre retention
- crimp fibre retention.

Examples of cable retention technologies:

- adhesive cable retention
- crimp cable retention.

Examples of optical coupling technologies:

- non-butting ferrules
- butting ferrules
- expanded beam techniques

Examples of alignment technologies :

- clearance fit alignment
- resilient bushing alignment
- resilient tip alignment
- spherical alignment.

2.1.4 Variant

The connector set variant defines the variety of structurally similar components (see 3.2).

Examples of feature variables which create variants :

- fibre type (core, cladding)
- cable types and sizes
- mounting schemes
- coupling nut designs (hex, knurl, etc.).

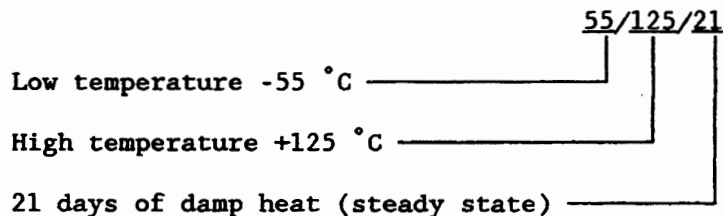
2.1.5 Climatic category

Connector sets shall be classified by climatic category. This category defines, in a generalized way, the climatic conditions of cold temperatures, hot temperatures and damp heat for which a component is suited. The components shall be subjected to, as a minimum, the environmental tests of Cold (see 4.5.17), Dry heat (see 4.5.18) and Damp heat steady state (see 4.5.19).

Climatic category shall be expressed by a series of three numbers separated by oblique strokes corresponding respectively to the temperatures, low and high, and the number of days of exposure to damp heat (steady state) to which the connector set components are assessed.

- First number: two digits denoting the minimum ambient temperature (– °C)
- Second number: three digits denoting the maximum ambient temperature (+ °C). Two digit values shall be prefixed by the digit “0”
- Third number: two digits denoting the number of days of damp heat (steady state). One (1) digit values shall be prefixed by the digit “0”

Example:



The following are preferred values which may be specified.

Low temperature (°C)	High temperature (°C)	Damp heat duration (days)
- 5	+ 30	4
- 10	+ 40	10
- 25	+ 55	21
- 40	+ 70	56
- 55	+ 85	
- 65	+ 100	
	+ 125	
	+ 155	
	+ 175	
	+ 200	

2.1.6 Environmental category

The connector set environmental category defines the test sequences used for quality assessment. Sectional specifications shall specify one or more categories.

Three preferred categories appear in Table 1, Table 2 and Table 3 as examples.

<https://standards.iteh.ai/catalog/standards/sist/17a11d49-5581-4754-9f04-fcc984adacdd/sist-en-186000-1-1999>
 (standards.iteh.ai)

Table 1 — Test sequences for environmental category I

FIXED SAMPLE QUALIFICATION	LOT-BY-LOT INSPECTION
<p><u>Group 0</u> — (initialize all specimens)</p> <ul style="list-style-type: none"> — Visual inspection (see 4.4.1) — Dimensions (see 4.4.2) <p><u>Group 1</u> — (initial optical performance)</p> <ul style="list-style-type: none"> — Insertion loss (see 4.4.7) <p><u>Group 2</u> — (climatic category)</p> <ul style="list-style-type: none"> — Cold (see 4.5.17) — Dry heat (see 4.5.18) — Damp heat (steady state) (see 4.5.19) <p><u>Group 3</u> — (evaluate construction)</p> <ul style="list-style-type: none"> — Cable pulling (see 4.5.4) — Axial compression (see 4.5.11) — Cable torsion (see 4.5.5) <p><u>Group 4</u> — (evaluate coupling mechanism)</p> <ul style="list-style-type: none"> — Strength of coupling mechanism (fastening mechanism only, see 4.5.6) — Mechanical endurance (see 4.5.32) 	<p><u>Group A</u></p> <ul style="list-style-type: none"> — Visual inspection (see 4.4.1) — Dimensions (see 4.4.2) <p><u>Group B</u></p> <p>No tests specified</p>
	PERIODIC INSPECTION
	<p><u>Group C0</u></p> <p>Same as “Group 0” of the fixed sample sequence</p> <p><u>Group C1</u></p> <p>Same as “Group 1” of the fixed sample sequence</p> <p><u>Group C2</u></p> <p>Same as “Group 2” of the fixed sample sequence</p> <p><u>Group D</u></p> <p>Repeat all of the fixed sample sequences</p>

Environmental category I is the mildest category. It suggests a protected environment consisting of controlled temperature and humidity conditions and complete protection from the elements. Examples of such environments are offices and buildings with climatically controlled conditions.

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 186000-1:1999

<https://standards.iteh.ai/catalog/standards/sist/17a11d49-558f-4754-9f04-fcc984adacdd/sist-en-186000-1-1999>