

INTERNATIONAL STANDARD

IEC
60874-19-2

QC 910005XX0002

First edition
1999-09

Connectors for optical fibres and cables –

Part 19-2: Fibre optic adaptor (duplex) type SC for single-mode fibre connectors – Detail specification

Connecteurs pour fibres et câbles optiques –

*Partie 19-2:
Adaptateur pour fibres optiques (duplex) de type SC,
pour connecteurs pour fibres optiques monomodales –
Spécification particulière*



Reference number
IEC 60874-19-2:1999(E)

Numbering

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For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to publications IEC 60027: *Letter symbols to be used in electrical technology*, IEC 60417: *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets* and IEC 60617: *Graphical symbols for diagrams*.

* See web site address on title page.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

CONNECTORS FOR OPTICAL FIBRES AND CABLES –

Part 19-2: Fibre optic adaptor (duplex) type SC for single-mode fibre connectors – Detail specification

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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International Standard IEC 60874-19-2 has been prepared by subcommittee 86B: Fibre optic interconnecting devices and passive components, of IEC technical committee 86: Fibre optics.

The text of this standard is based on the following documents:

FDIS	Report on voting
86B/1221/FDIS	86B/1257/RVD

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

This publication has not been drafted in complete accordance with the ISO/IEC Directives, Part 3.

The QC number that appears on the front cover of this publication is the specification number in the IEC Quality Assessment System for Electronic Components (IECQ).

The references to clauses or subclauses of IEC 60874-1 indicated in this part apply to the third edition of IEC 60874-1.

The committee has decided that the contents of this publication will remain unchanged until 2012. At this date, the publication will be

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

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

CONNECTORS FOR OPTICAL FIBRES AND CABLES

Part 19-2: Fibre optic adaptor (duplex) type SC for single-mode fibre connectors – Detail specification

NATIONAL STANDARDS

ORGANIZATION:

.....

Date

DETAIL SPECIFICATION IEC QC 910005XX0002

FIBRE OPTIC COMPONENT OF ASSESSED QUALITY IN ACCORDANCE WITH

- GENERIC SPECIFICATION: QC 910000 (IEC 60874-1)
- BLANK DETAIL SPECIFICATION: QC 910004 (IEC 60874-1-1)

FIBRE OPTIC ADAPTOR

CLASSIFICATION:

Type: Name: SC-duplex for single-mode connectors

For use in datacom applications as specified in ISO/IEC International Standard 11801:

Generic cabling for customer premises

Configuration: plug-adaptor-plug

Coupling: push-pull

Control dimensions:

– Adaptor: see figures 1, 2 and 3

– Gauge: figures 4 and 5

Variants: see page 10

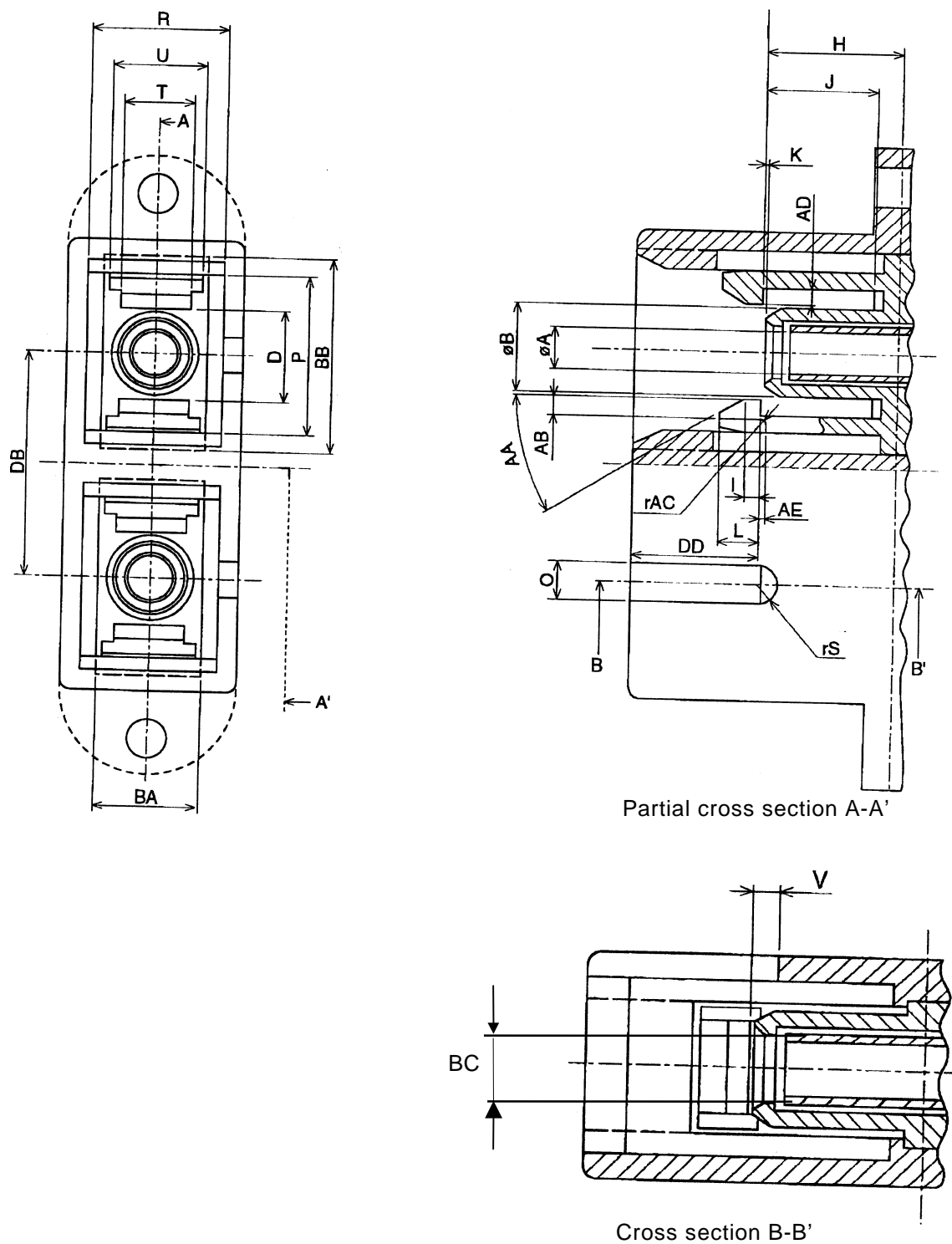
Climatic category: 10/60/4

Environmental category: 4

Assessment level: A

QUALIFICATION PROCEDURE: Fixed sample procedure

SAFETY WARNING: Take care when handling small diameter optical fibre to prevent puncturing the skin, especially in the eye area. Direct viewing of the end of an optical fibre when it is propagating energy is not recommended unless prior assurance is obtained as to the safe energy output level.

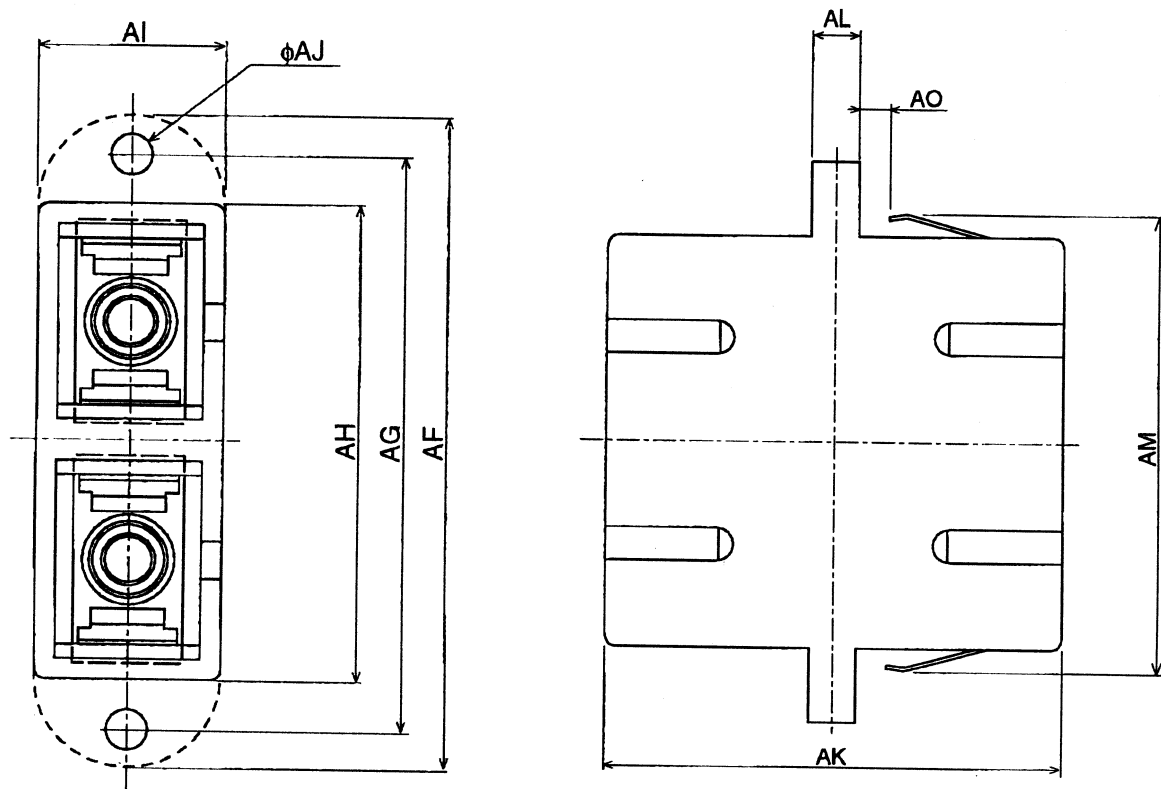


NOTE – The dotted lines are for information only and represent the outer shape of the fixture of the adaptor.

Figure 1 – Adaptor mating face dimensions

Reference	Dimensions		Notes
	Minimum	Maximum	
A	—	—	Diameter, 1 Diameter
B	4,59 mm	4,79 mm	
D	4,90 mm	5,50 mm	
H	6,90 mm	7,10 mm	
I	0,40 mm	0,80 mm	2 Radius
J	5,51 mm	5,90 mm	
K	0,06 mm	1,00 mm	
L	1,90 mm	2,10 mm	
O	2,00 mm	2,20 mm	
P	9,00 mm	9,10 mm	
R	7,40 mm	7,50 mm	
rS	1,00 mm	1,10 mm	
T	3,80 mm	4,04 mm	
U	5,00 mm	5,30 mm	
V	0,60 mm	1,60 mm	
AA	27°	33°	
AB	0,80 mm	0,90 mm	
AC	0,40 mm	0,60 mm	
AD	0,70 mm	0,80 mm	
AE	0,40 mm	0,60 mm	
BA	5,40 mm	5,60 mm	Diameter
BB	10,80 mm	11,20 mm	
BC	2,70 mm	2,80 mm	
DB	12,65 mm	12,75 mm	
DD	5,60 mm	6,99 mm	
NOTES			
1 The connector alignment feature is a resilient alignment sleeve. The gauge retention force shall be measured with two gauge pins, each inserted to the middle of the alignment feature. The gauge retention force shall be from 2,0 N to 5,9 N for PC and from 2,9 N to 5,9 N for APC.			
2 For the angled PC variants No. 1005 and 1006, the two slots "O" shall be symmetric within ±0,03 mm.			
3 Where a tolerance of form is not specified, the limits of the dimensions for a feature control the form as well as the size.			
4 Where interrelated features of size (features shown with a common axis or centre plane) have no geometric tolerance of location or run-out specified, the limits of the dimensions for a feature control the location tolerance as well as the size.			
5 Where perpendicular features (features shown at right angles) have no geometric tolerance of orientation or run-out specified, the limits of the dimensions for a feature control the orientation tolerance as well as the size.			

Figure 1 – Adaptor mating face dimensions (continued)



IEC 1026/99

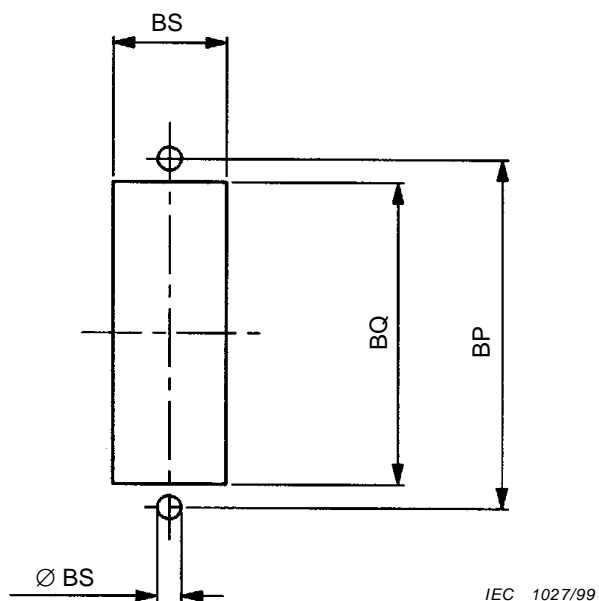
Reference	Dimension mm		Notes
	Minimum	Maximum	
AF	34,50	35,20	1
AG	30,20	31,20	
AH	25,20	25,90	
AJ	2,20	2,40	
AI	9,20	9,40	1
AK	27,00	27,80	
AL	2,70	2,80	
AM	27,50	29,50	
AO	1,70	2,20	2

NOTES

1 The dotted lines are illustrative only; the flange may be radiused or have square corners.

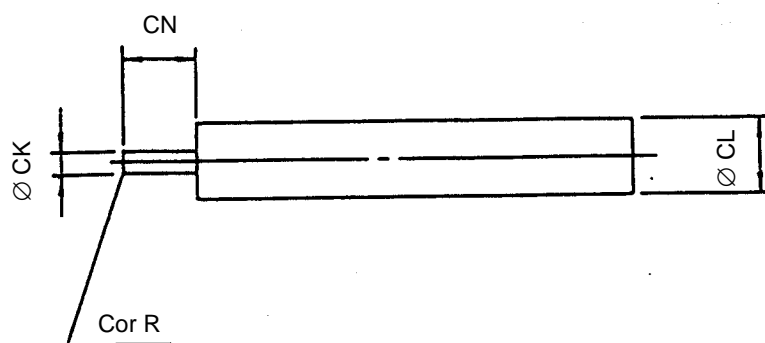
2 The maximum thickness of the panel shall be 1,6 mm when the adaptor is mounted using the spring hook.

Figure 2 – Adaptor dimensions



Reference	Dimensions mm		Notes
	Minimum	Maximum	
BP	30,60	31,20	1
BQ	26,20	26,40	
BR	2,40	2,60	
BS	9,50	10,00	
NOTE – If the adaptor is mounted using bolts only, this hole shall be threaded M2.			

Figure 3 – Panel piercing and mounting detail



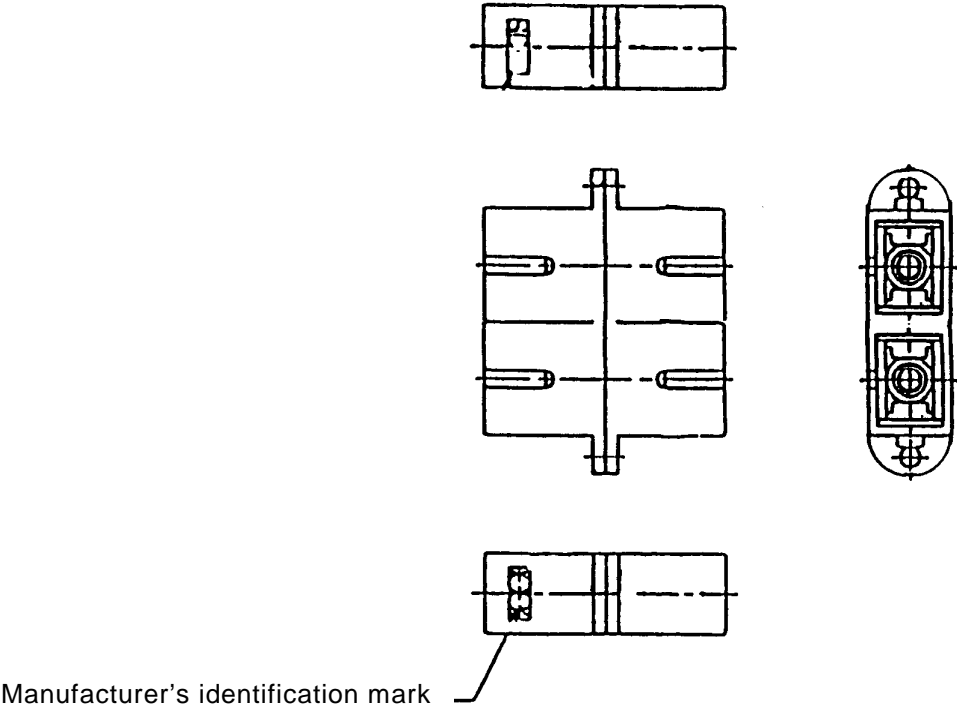
IEC 1028/99

Reference	Dimensions mm		Notes
	Minimum	Maximum	
CK	2,4985	2,4995	1
CL	2,80	4,80	
CN	7,00	–	
NOTE – Surface roughness grade N4 (0,2 μm Ra).			

Figure 4 – Dimension of a pin gauge for an adaptor

VARIANT IDENTIFICATION NUMBERS				
NUMBER: XXXXXXXXXXXXXXXXX				
ZZZZ	Component name	Variant feature		
		Housing part material	Sleeve material	Preferred housing colour/indicator
1001	Adaptor SMF	Plastic	Zirconia	Blue
1002	Adaptor SMF	Plastic	Phosphor bronze	Blue
1003	Adaptor SMF	Metal	Zirconia	Blue
1004	Adaptor SMF	Metal	Phosphor bronze	Blue
1005	Adaptor APC	Plastic	Zirconia	Green
1006	Adaptor APC	Metal	Zirconia	Green

SUPPLEMENTARY INFORMATION	
Colour:	
For SMF:	blue according to RAL 5015
For APC:	green according to RAL 6029
Component marking:	
The name and/or manufacturer's identification mark may be permanently identified. Figure 5 shows an example of the location of component marking.	



IEC 1029/99

Figure 5 – Example of component marking

TABLE 1
FIXED SAMPLE TEST SCHEDULE FOR QUALIFICATION APPROVAL

Test sequence	Reference IEC 60874-1 (IEC QC 910000) (IEC 61300)	<i>n</i>
Group 0 – Visual examination – Dimensions – Gauge retention force	4.4.1 (3-1) 4.4.2 (3-1) (3-33)	20
Group 1 – Attenuation	4.4.7 (3-4)	20
Group 2 – Cold – Dry heat – Damp heat (steady state)	4.5.17 (2-17) 4.5.18 (2-18) 4.5.19 (2-19)	6
Group 3 – Engagement and separation force – Mechanical endurance	4.4.5 (3-11) 4.5.32 (2-2)	6
Group 4 – Vibration – Change of temperature (test Nb)	4.5.1 (2-1) 4.5.22 (2-22)	4
Group 5 – Strength of coupling mechanism	4.5.6 (2-6)	4

NOTES

1 *n* = sample size (number of adaptors).

2 To satisfy the qualification approval requirements of the detail specification, there shall be no failures of any in the sample groups for any test parameter. If a failure does occur, this shall be investigated and the cause of failure identified and corrected. The test which is affected shall then be repeated using the minimum sample size stated in this detail specification.

A fully documented test report and supporting data shall be prepared and made available for inspection. Failures and the corrective action taken to eliminate failures shall be documented and evidence presented to show that the corrective action will have no detrimental effect on the performance in any of the other tests. Design changes, as opposed to improvements in quality control, will necessitate a repeat of the full qualification programme.

3 Unless otherwise indicated, the test details, measurements and performance requirements are given in table 4.

4 Only group 1 tests shall be carried out using a reference connector. All other tests shall be carried out using samples selected randomly from production.

TABLE 2 LOT-BY-LOT QUALITY CONFORMANCE INSPECTION SCHEDULE GROUPS A AND B			
Test sequence	Reference IEC 60874-1 (IEC QC 910000) (IEC 61300)	Assessment level A	
		IL	AQL
Group A			
– Visual examination	4.4.1 (3-1)	II	4 %
Group B			
– Attenuation	4.4.7 (3-4)	II	4 %
NOTES 1 Unless otherwise indicated, the details, measurements and performance requirements are given in table 4. 2 IL = Inspection level; AQL = Acceptable quality level. 3 Only attenuation tests shall be carried out using a reference connector. All other tests shall be carried out using products selected randomly from production.			

TABLE 3
PERIODIC QUALITY CONFORMANCE INSPECTION SCHEDULE
GROUPS C AND D

Test sequence	Reference IEC 60874-1 (IEC QC 910000) (IEC 61300)	Assessment level A	
		<i>n</i>	<i>p</i>
Group C0			
– Visual examination	4.4.1 (3-1)	18	24
– Dimensions	4.4.2 (3-1)		
– Gauge retention force	(3-33)		
Group C1			
– Attenuation	4.4.7 (3-4)	18	24
Group C2			
– Cold	4.5.17 (2-17)	6	24
– Dry heat	4.5.18 (2-18)		
– Damp heat (steady state)	4.5.19 (2-19)		
Group D0			
– Visual examination	4.4.1 (3-1)	20	48
– Dimensions	4.4.2 (3-1)		
– Gauge retention force	(3-33)		
Group D1			
– Attenuation	4.4.7 (3-4)	20	48
Group D2			
– Cold	4.5.17 (2-17)	6	48
– Dry heat	4.5.18 (2-18)		
– Damp heat (steady state)	4.5.19 (2-19)		
Group D3			
– Engagement and separation force	4.4.5 (3-11)	6	48
– Mechanical endurance	4.5.2 (2-2)		
Group D4			
– Vibration	4.5.1 (2-1)	4	48
– Change of temperature (test Nb)	4.5.22 (2-22)		
Group D5			
– Strength of coupling mechanism	4.5.6 (2-6)	4	48

NOTES

1 *n* = sample size (number of plugs); *p* = periodicity in months.

2 To satisfy the conformance inspection requirements of the detail specification, there shall be no failures in the sample groups for any test parameter. If a failure does occur, this shall be investigated and the cause of failure identified and corrected. The test which is affected shall then be repeated using the minimum sample size stated in this detail specification.

A fully documented test report and supporting data shall be prepared and made available for inspection. Failures and the corrective action taken to eliminate failures shall be documented and evidence presented to show that the corrective action will have no detrimental effect on the performance in any of the other tests. Design changes, as opposed to improvements in quality control, will necessitate a repeat of the full qualification programme.

3 Unless otherwise indicated, the details, measurements and performance requirements are given in table 4.

4 Only group C1 and D1 tests shall be carried out using a reference connector. All other tests shall be carried out using the samples selected randomly from the relevant group.

<p style="text-align: center;">TABLE 4 DETAILS, MEASUREMENTS AND PERFORMANCE REQUIREMENTS</p>
<p>Visual examination 4.4.1 (61300-3-1)</p> <p>Requirements:</p> <ul style="list-style-type: none"> – Marking shall be clear
<p>Dimensions 4.4.2 (61300-3-1)</p> <p>Gauge retention force (61300-3-33)</p> <p>Requirements:</p> <ul style="list-style-type: none"> – All size dimensions shall be in accordance with this specification
<p>Attenuation 4.4.7 (61300-3-4)</p> <p>Details:</p> <ul style="list-style-type: none"> – Method No. 8 – Definitions of reference components are as follows: – Number of measurements to be averaged: 5 – Source: LD – Peak wavelength: 1,3 μm – Preconditioning procedure: the ferrule end-face and the inside of alignment sleeve of the reference plug shall be cleaned using lint-free cloth – Length L1: 2 m – Length L2: 2 m <p>Definition of reference components are as follows:</p> <p>Reference plug:</p> <p>Reference plug shall be in accordance with:</p> <ul style="list-style-type: none"> IEC 60874-14-5 (SC-PC untuned) for the variants 1001 to 1004 IEC 60874-14-6 (SC-APC untuned 9°) or IEC 60874-14-10 (SC-APC untuned 8°) for the variants 1005 and 1006. <p>Reference adaptor:</p> <p>The reference adaptor is selected low-loss adaptor. The selection criterion that shall be met is as follows: using two reference plugs and the adaptor, 10 repeated measurements of attenuation with direction insertion of the plugs alternated between measurements will give a maximum attenuation of less than 0,1 dB.</p> <p>Requirements:</p> <p>Allowable attenuation: less than 0,2 dB against two reference plugs.</p>

TABLE 4 (continued)
DETAILS, MEASUREMENTS AND PERFORMANCE REQUIREMENTS

Cold 4.5.17 (61300-2-17)

Details:

- Temperature: –10 °C
- Duration: 96 h
- Specimen optically functioning
- Conditioning procedure: specimen lowered to test temperature and returned to room temperature at a rate not to exceed 1 °C/min.
- Deviations: none
- Preconditioning procedure: clean ferrule endface and inside of alignment sleeve using lint-free cloth
- Recovery procedure: after testing, specimens shall be maintained in room temperature conditions for 2 h
- Clean ferrule endface and inside of alignment sleeve using lint-free cloth before final measurement
- Plugs shall be in accordance with: IEC 60874-14-5 (SC-PC)
IEC 60874-14-6 (SC-APC)

Requirements:

- Change in attenuation during test: less than 0,2 dB

Initial measurements and performance requirements:

- Attenuation: less than 0,75 dB (see relevant plug detail specification)

Final measurements and performance requirements:

- Attenuation: less than 0,75 dB (see relevant plug detail specification)

Dry heat 4.5.18 (61300-2-18)

Details:

- Temperature: 60 °C
- Duration: 96 h
- Specimen optically functioning
- Conditioning procedure: specimen raised to test temperature and returned to room temperature at a rate not to exceed 1 °C/min
- Deviations: none
- Preconditioning procedure: clean ferrule endface and inside of alignment sleeve using lint-free cloth
- Recovery procedure: After testing, specimens shall be maintained in room temperature conditions for 2 h
- Clean ferrule endface and inside of alignment sleeve using lint-free cloth before final measurement
- Plugs shall be in accordance with : IEC 60874-14-5 (SC-PC)
IEC 60874-14-6 (SC-APC)

Requirements:

- Change in attenuation during test: less than 0,2 dB

Initial measurements and performance requirements:

- Attenuation: less than 0,75 dB (see relevant plug detail specification)

Final measurements and performance requirements:

- Attenuation: less than 0,75 dB (see relevant plug detail specification)

TABLE 4 (continued)
DETAILS, MEASUREMENTS AND PERFORMANCE REQUIREMENTS

Damp heat (steady state) 4.5.19 (61300-2-19)

Details:

- Temperature: 40 °C
- Relative humidity: 90 % – 95 %
- Duration: 4 days
- Precautions regarding surface moisture removal: none
- Specimen optically functioning
- Conditioning procedure: specimen raised to test temperature and returned to room temperature at a rate not to exceed 1 °C/min
- Deviations: none
- Preconditioning procedure: clean ferrule endface and inside of alignment sleeve using lint-free cloth
- Recovery procedure: after testing, specimens shall be maintained in room temperature conditions for 2 h
- Clean ferrule endface and inside of alignment sleeve using lint-free cloth before final measurement
- Plugs shall be in accordance with: IEC 60874-14-5 (SC-PC)
IEC 60874-14-6 (SC-APC)

Requirements

- Change in attenuation during test: less than 0,2 dB

Initial measurements and performance requirements:

- Attenuation: less than 0,75 dB (see relevant plug detail specification)

Final measurements and performance requirements:

- Attenuation: less than 0,75 dB (see relevant plug detail specification)

Strength of coupling mechanism 4.5.6 (61300-2-6)

Details:

- Magnitude: 68,6 N
- Rate of application of the tensile load: 50 N/min < load rate < 250 N/min
- Point of application of the tensile load: 22 cm – 28 cm from connector
- Specimen optically non-functioning
- Preconditioning procedure: clean ferrule endface and inside of alignment sleeve using lint-free cloth
- Recovery procedure: clean ferrule endface and inside of alignment sleeve using lint-free cloth before final measurement
- Deviations: none
- Simplex plugs shall be in accordance with: IEC 60874-14-5 (SC-PC)
IEC 60874-14-6 (SC-APC)
- Both sides of the adaptor shall be tested

Initial measurements and performance requirements:

- Attenuation: less than 0,75 dB (see relevant plug detail specification)

Final measurements and performance requirements:

- Attenuation: less than 0,75 dB (see relevant plug detail specification)
- Change in attenuation: less than 0,2 dB
- The specimen has no mechanical damage

TABLE 4 (continued)
DETAILS, MEASUREMENTS AND PERFORMANCE REQUIREMENTS

Mechanical endurance 4.5.32 (61300-2-2)

Details:

- Cycles: 500
- Specimen optically functioning
- Preconditioning procedure: clean ferrule endface and inside of alignment sleeve using lint-free cloth
- Recovery procedure: clean as necessary, but no more than 25 times during the cause of the test
- Deviations: none
- Plugs shall be in accordance with : IEC 60874-14-5 (SC-PC)
 IEC 60874-14-6 (SC-APC)

Requirements:

- Change in attenuation during test: less than 0,2 dB

Initial measurements and performance requirements:

- Attenuation: less than 0,75 dB

Final measurements and performance requirements:

- Attenuation: less than 0,75 dB

Engagement and separation force 4.5.4 (61300-3-11)

Details:

- Preconditioning procedure: none
- Deviation: as necessary
- Simplex plugs shall be in accordance with : IEC 60874-14-5 (SC-PC)
 IEC 60874-14-6 (SC-APC)
- Both sides of the adaptor shall be measured

Requirements:

- Allowable engagement force: max. 19,6 N
- Allowable separation force: max. 19,6 N

TABLE 4 (concluded)
DETAILS, MEASUREMENTS AND PERFORMANCE REQUIREMENTS

Change of temperature (test Nb) 4.5.22 (61300-2-22)

Details:

- Test method: Nb
- High temperature: 60 °C
- Low temperature: –10 °C
- Duration of extreme temperature: 30 min
- Number of cycles: 5
- Specimen optically functioning
- Preconditioning procedure: clean ferrule endface and inside of alignment sleeve using lint-free cloth
- Recovery procedure: after test, specimens shall be maintained in room temperature condition for 2 h. Clean ferrule endface and inside of alignment sleeve using lint-free cloth before final measurement
- Deviation: none
- Plugs shall be in accordance with : IEC 60874-14-5 (SC-PC)
IEC 60874-14-6 (SC-APC)

Initial measurements and performance requirements:

- Attenuation: less than 0,75 dB

Measurements and performance requirements during test

- Change in attenuation: less than 0,2 dB (see relevant plug detail specification)

Final measurements and performance requirements:

- Attenuation: less than 0,75 dB (see relevant plug detail specification)

Vibration 4.5.1 (61300-2-1)

Details:

- Frequency range: 10 Hz – 55 Hz
- Vibration amplitude: 0,75 mm constant displacement
- Sweep time: 1 octave/min
- Endurance duration per axis: 30 min
- Method of mounting: an adapter shall be mounted rigidly to the mounting fixture
- Specimen optically non-functioning
- Preconditioning procedure: clean ferrule endface and inside of alignment sleeve using lint-free cloth
- Recovery procedure: Clean ferrule endface and inside of alignment sleeve using lint-free cloth before final measurement
- Deviation: none
- Plugs shall be in accordance with: IEC 60874-14-5 (SC-PC)
IEC 60874-14-6 (SC-APC)

Initial measurements and performance requirements:

- Attenuation: less than 0,75 dB

Final measurements and performance requirements:

- Attenuation: less than 0,75 dB.
- Change in attenuation: less than 0,2 dB



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 I made the wrong choice ☐
 other

Q7 Please assess the standard in the following categories, using the numbers:

- (1) unacceptable,
 (2) below average,
 (3) average,
 (4) above average,
 (5) exceptional,
 (6) not applicable

- timeliness.....
 quality of writing.....
 technical contents.....
 logic of arrangement of contents
 tables, charts, graphs, figures.....
 other

Q8 I read/use the: (tick one)

- French text only ☐
 English text only ☐
 both English and French texts ☐

Q9 Please share any comment on any aspect of the IEC that you would like us to know:

.....



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