PD IEC TR 62572-4:2020

BSI Standards Publication

Fibre optic active components and devices — Reliability standards

Part 4: Guidelines for optical connector end-face cleaning methods for receptacle style optical transceivers

Documents
Document Sharing Hub

Full document details: PD IEC TR 62572-4:2020

National foreword

This Published Document is the UK implementation of IEC TR 62572-4:2020. It supersedes PD IEC/TR 62572-4:2013, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee GEL/86/3, Fibre optic systems and active devices.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2020
Published by BSI Standards Limited 2020

ISBN 978 0 539 11998 5

ICS 33.180.01

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 September 2020.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: PD IEC TR 62572-4:2020

IEC TR 62572-4

Edition 2.0 2020-09

TECHNICAL REPORT

colour inside

Fibre optic active components and devices – Reliability standards – Part 4: Guidelines for optical connector end-face cleaning methods for receptacle style optical transceivers

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.180.01

ISBN 978-2-8322-8780-4

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

® Registered trademark of the International Electrotechnical Commission

Documents
Document Sharing Hub

Full document details: PD IEC TR 62572-4:2020

CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms and definitions 7
4 Application of receptacle style optical transceivers and influence of contamination on optical connector end-face 9
4.1 Application of receptacle style optical transceivers 9
4.2 Influence of contamination on optical connector plugs 9
4.3 Transferring of contamination 9
4.4 Influence of contamination of optical connector for optical transceivers 9
5 Care in handling of receptacle style optical transceivers 9
5.1 General 9
5.2 Storage of receptacle style optical transceivers 9
5.3 Installation of receptacle style optical transceivers 10
5.4 Connection of optical connector plugs to receptacle style optical transceivers 10
5.5 Removing of receptacle style optical transceivers 10
5.6 Action in case of abnormality 10
6 Cleaning tools and machines 10
6.1 General 10
6.2 Cleaning tools and machines for optical receptacles 11
7 Internal structure of receptacle style optical transceivers and their applicable cleaning tools and machines 11
7.1 General 11
7.2 Single-fibre optical connector interface type 11
7.3 Multifibre optical connector interface type 12
Annex A (informative) Detail information of optical connector end-face cleaning tools and machines 14
A.1 Reel type cleaner 14
A.2 Stick type cleaner 14
A.3 Pen type cleaner 14
A.4 Gas and vacuum cleaning machine 15
A.5 Air duster 16
A.6 Wet clean 16
Annex B (informative) Detailed information on the internal structure of receptacle style optical transceivers and their applicable cleaning tools and machines 17
B.1 Internal structure of receptacle style optical transceivers 17
B.2 Example of the method to distinguish internal structure of receptacle style optical transceivers 17
B.3 Applicable cleaning tools and machines according to internal structure of receptacle style optical transceivers 18
B.3.1 General 18
B.3.2 Characteristics of stub type optical transceivers 18
B.3.3 Characteristics of lens type optical transceivers 18
B.3.4 Characteristics of plate contact type optical transceivers 19
Annex C (informative) Cleaning procedure of optical connector end-face of receptacle style optical transceivers 20

AVA Documents
Document Sharing Hub

C.1 Basic cleaning procedure 20
C.2 Cleaning procedure of stick type cleaner 20
C.3 Cleaning procedure of pen type cleaner 21
C.4 Cleaning procedure of gas and vacuum type cleaning machine 21
C.5 Cleaning procedure of air duster 21
C.6 Other important points 21
Annex D (informative) Examples of inspection instruments for an optical connector receptacle end-face 23
Bibliography 24

Figure A.1 – Example of a reel type cleaner 14
Figure A.2 – Examples of stick type cleaners 14
Figure A.3 – Example of a single-fibre interface pen type cleaner 15
Figure A.4 – Examples of a multifibre interface pen type cleaner 15
Figure A.5 – Example of gas and vacuum cleaning machine 15
Figure A.6 – Example of air duster 16
Figure B.1 – Internal structures for connecting to optical connector plugs 17
Figure C.1 – Cleaning an optical transceiver receptacle end-face by a stick type cleaner 20
Figure C.2 – Cleaning optical transceiver receptacle end-face using a pen type cleaner 21
Figure D.1 – Examples of optical connector end-face visual inspection equipment 23

Table 1 – Typical optical connector receptacle cleaning tools and machines 11
Table 2 – Applicable cleaning tools and machines depending on the internal structure of single-fibre optical connector interface type optical transceivers 12
Table 3 – Applicable cleaning tools and machines depending on the internal structure of multifibre connector interface optical transceivers 13

Documents
Document Sharing Hub

Full document details: PD IEC TR 62572-4:2020

INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIBRE OPTIC ACTIVE COMPONENTS AND DEVICES – RELIABILITY STANDARDS –

Part 4: Guidelines for optical connector end-face cleaning methods for receptacle style optical transceivers

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.
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.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a Technical Report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 62572-4, which is a Technical Report, has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition published in 2013. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) addition of terms and definitions on multifibre connector interface optical transceivers;
b) addition of cleaning methods for multifibre connector interface type optical transceivers;

AVA Documents
Document Sharing Hub

c) updating URLs for reference websites.

The text of this Technical Report is based on the following documents:

Draft TR	Report on voting
86C/1661/DTR	86C/1681/RVDTR

Full information on the voting for the approval of this technical report 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 62752 series, under the general title *Fibre optic active components and devices – Reliability standards*, 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

Documents
Document Sharing Hub

Full document details: PD IEC TR 62572-4:2020

INTRODUCTION

High speed internet communication systems and subscriber systems have spread rapidly owing to the increased capacity of data communication. In these systems, receptacle style optical transceivers such as SFP (small form factor pluggable) and XFP (10-Gbit/s small form factor pluggable), which can be mounted and removed during transmission systems operation, are widely used. Optical receptacles of optical transceivers are connected to optical connector plugs of optical patch cords, and optical signals are transmitted and received through these optical receptacles. Pluggable optical transceivers are typically of small size and low cost, and their designs are often simplified. Therefore, the internal structure, especially the receptacle structure, tends to vary between optical transceiver manufacturers.

Generally, to maintain high reliability of optical connections, the optical connector end-face needs to be cleaned. The Technical Report on cleaning of optical connector plugs and optical adaptors, IEC TR 62627-01 [1][1], proposed by Japan, was published in August 2010 and revised in January 2016.

There are, however, no standard cleaning methods for the optical receptacles of optical transceivers. It is a concern that the failure of optical transceivers due to damage and contamination of the optical receptacle end-face can lead to failure in optical network systems.

Multifibre connectors, like the multi-fibre push-on (MPO) connector – see IEC 61754-7 (all parts) [2] – have been widely used in data centres as fibre-to-fibre connections since the early 2010's. They are now also used as optical interfaces in optical transceivers, such as QSFP (quad small form factor pluggable) and CFP (C form factor pluggable) transceivers.

The physical structure of the optical interfaces in transceivers with MPO connectors is significantly different from that of transceivers with single fibre connectors, such as SC connectors (see IEC 61754-4 [3]) and LC connectors (see IEC 61754-20 [4]). Therefore, it was decided to revise this document by adding information on cleaning methods for MPO interface receptacle style optical transceivers.

IEC 62572-4:2013 was based on OITDA TP12/TP-2012, and this edition is based on OITDA TP12/AD-2019 [5].

[1] Numbers in square brackets refer to the Bibliography.

Documents
Document Sharing Hub

Full document details: PD IEC TR 62572-4:2020

FIBRE OPTIC ACTIVE COMPONENTS AND DEVICES – RELIABILITY STANDARDS –

Part 4: Guidelines for optical connector end-face cleaning methods for receptacle style optical transceivers

1 Scope

This part of IEC 62572, which is a Technical Report, provides guidelines for optical connector end-face cleaning methods for receptacle style optical transceivers. It includes details about handling receptacle style optical transceivers, internal structures of optical transceivers, information on cleaning tools and machines, applicable cleaning methods, and cleaning procedures.

Receptacle style optical transceivers as well as optical fibre patch cords are handled by operators and maintenance staff of optical network systems. This document can be used as a guideline to prepare instruction manuals for the operators and maintenance staff of optical network systems.

2 Normative references

There are no normative references in this document.

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
stub
polished short ferrule, including optical fibre inside, mounted in a receptacle style optical transceiver

Note 1 to entry: The stub is connected to an optical connector plug of an optical patch cord.

3.2
stub type optical transceiver
receptacle style optical transceiver with a stub

3.3
lens type optical transceiver
receptacle style optical transceiver without a stub, optically coupling an optical semiconductor device to an optical connector plug of an optical patch cord with converging optical beams by a lens or lenses

Documents
Document Sharing Hub

Full document details: PD IEC TR 62572-4:2020