

INTERNATIONAL STANDARD

**Connectors for electrical and electronic equipment –
Part 1: Detail specification for 2-way, shielded or unshielded, free and fixed
connectors – Mechanical mating information, pin assignment and additional
requirements for Type 1 (copper LC style)**





THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2024 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.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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.

About IEC publications

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

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 It also gives information on projects, replaced and withdrawn publications.

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 once a month by email.

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

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

INTERNATIONAL STANDARD

**Connectors for electrical and electronic equipment –
Part 1: Detail specification for 2-way, shielded or unshielded, free and fixed
connectors – Mechanical mating information, pin assignment and additional
requirements for Type 1 (copper LC style)**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.220.10

ISBN 978-2-8322-8217-5

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

CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	9
2 Normative references	9
3 Terms and definitions	9
4 Common features and typical connector pair	10
4.1 Mating information	10
4.1.1 General	10
4.1.2 Interoperability.....	10
4.1.3 Contacts – Mating conditions.....	11
4.1.4 Fixed connector.....	11
4.1.5 Free connector	15
5 Characteristics	16
5.1 General.....	16
5.2 Pin assignment	16
5.3 Classification into climatic category	16
5.4 Electrical characteristics	17
5.4.1 Creepage and clearance distances	17
5.4.2 Voltage proof.....	17
5.4.3 Current-temperature derating.....	17
5.4.4 Initial contact resistance – interface only	17
5.4.5 Input to output DC resistance	17
5.4.6 Input to output DC resistance unbalanced.....	17
5.4.7 Initial insulation resistance	17
5.5 Transmission characteristics	17
5.5.1 General	17
5.5.2 Insertion loss (IL).....	17
5.5.3 Return loss (RL)	18
5.5.4 Propagation delay.....	18
5.5.5 Transverse conversion loss (TCL)	18
5.5.6 Transverse conversion transfer loss (TCTL)	18
5.5.7 Transfer impedance (shielded only).....	18
5.5.8 Coupling attenuation.....	18
5.5.9 Power sum alien (exogenous) NEXT.....	18
5.5.10 Power sum alien (exogenous) FEXT	18
5.6 Mechanical characteristics	18
5.6.1 Mechanical operation.....	18
5.6.2 Effectiveness of connector coupling devices	18
5.6.3 Insertion and withdrawal forces	18
5.6.4 Polarizing method.....	18
5.6.5 Dynamic stress	18
6 Tests and test schedule.....	19
6.1 General.....	19
6.2 Example of arrangement for input to output contact resistance measurement	19
6.3 Example of arrangement for contact resistance measurement.....	19
6.4 Arrangement for vibration test (test phase DP).....	19

6.5 Test procedures and measuring methods..... 19

6.6 Preconditioning..... 20

6.7 Test schedules..... 20

 6.7.1 General 20

 6.7.2 Basic (minimum) test schedule 20

 6.7.3 Full test schedule 20

Bibliography..... 21

Figure 1 – Relationships between the IEC 63171 series and its related references 7

Figure 2 – Connector overview 8

Figure 3 – Mated fixed and free Type 1 connectors..... 11

Figure 4 – Fixed Type 1 connector 12

Figure 5 – Fixed Type 1 connector pin detail (detail A from Figure 4c) section D-D)..... 14

Figure 6 – Free Type 1 connector 15

Figure 7 – Arrangement for vibration test 19

Table 1 – Dimensions for Figure 4a), Figure 4b) and Figure 4c)..... 13

Table 2 – Dimensions for Figure 5 14

Table 3 – Dimensions for Figure 6a) and Figure 6b)..... 16

Table 4 – Creepage and clearance distances..... 17

INTERNATIONAL ELECTROTECHNICAL COMMISSION

CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT –**Part 1: Detail specification for 2-way, shielded or unshielded, free and fixed connectors – Mechanical mating information, pin assignment and additional requirements for Type 1 (copper LC style)**

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63171-1 has been prepared by subcommittee 48B: Electrical connectors, of IEC technical committee 48: Electrical connectors and mechanical structures for electrical and electronic equipment. It is an International Standard.

This second edition cancels and replaces the first edition published in 2020. This edition constitutes a technical revision.

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

- a) Information on obtaining a license agreement was updated.
- b) Connector characteristics and test requirements were aligned with IEC 63171:2021 where applicable.

- c) Added requirements for Polarizing method (5.6.4) and Dynamic stress (5.6.5) to align with IEC 63171:2021.
- d) Added test group BP – Moisture (6.7.3.4) to align with IEC 63171:2021.

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

Draft	Report on voting
48B/3062/FDIS	48B/3083/RVD

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

The language used for the development of this International Standard is English.

A list of all parts in the IEC 63171 series, published under the general title *Connectors for electrical and electronic equipment*, can be found on the IEC website.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

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

- reconfirmed,
- withdrawn, or
- revised.

INTRODUCTION

The IEC 63171 series is a set of International Standards covering shielded or unshielded free and fixed connectors for balanced single-pair data transmission with current carrying capacity.

IEC 63171 is the general requirements and tests part (general specifications) of the whole series.

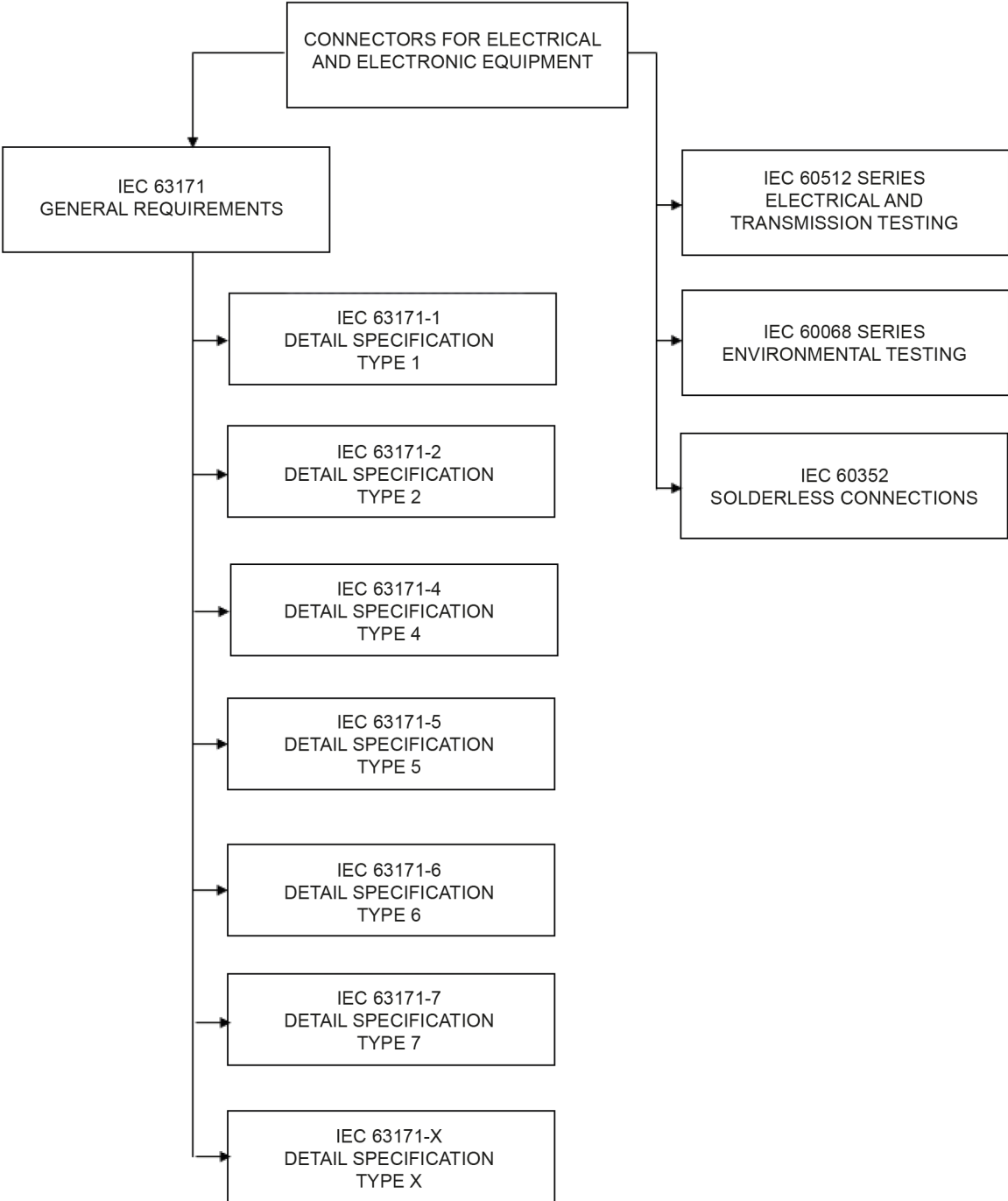
Subsequent parts, such as this Part 1, identified as IEC 63171 followed by a dash and a progressive number starting with 1, are the product detail specifications of this series and do not duplicate information given in this document, but list only additional requirements.

Each subsequent part is identified by a type of connector covered with the same number identifying the part. Some parts can describe more embodiments, with different connectors geometries (rectangular, circular), sharing the core element and the relevant features.

For the complete specifications regarding a connector of this series, both the general specification and the relevant detail specification are therefore required.

For the qualification of a connector of this series, both the general specification and the relevant detail specification shall be met.

Figure 1 shows the interrelation of the standards.



IEC

Figure 1 – Relationships between the IEC 63171 series and its related references

NOTE The project for Type 3 connectors detail specification was cancelled.

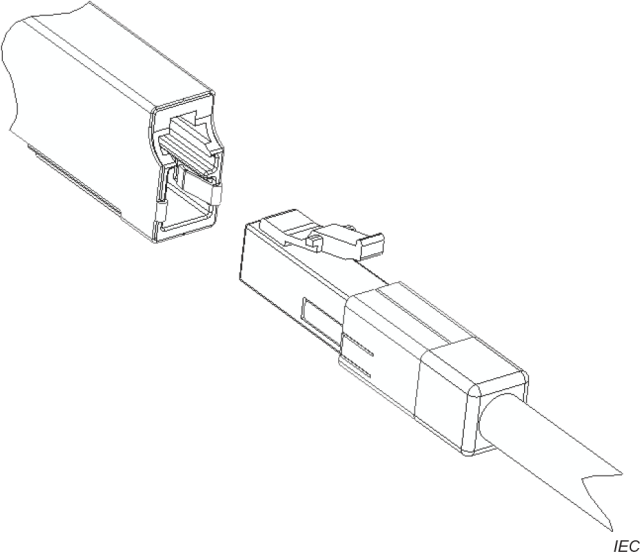
International Electrotechnical Commission	IEC 63171-1 Ed2
Subcommittee 48B: Electrical connectors	
 <p data-bbox="199 902 699 927">View showing typical fixed and free connectors</p> <p data-bbox="826 869 858 887">IEC</p>	<p data-bbox="1018 322 1390 472">Two-way, free and fixed connectors for balanced single-pair data transmission with frequencies up to 600 MHz and with current carrying capacity up to 2,0 A at 60 °C.</p> <p data-bbox="1018 488 1390 584">Fixed connectors are mounted on printed circuit board or bulkhead, the free connector is terminated on shielded or unshielded wire.</p>

Figure 2 – Connector overview

CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT –

Part 1: Detail specification for 2-way, shielded or unshielded, free and fixed connectors – Mechanical mating information, pin assignment and additional requirements for Type 1 (copper LC style)

1 Scope

This part of IEC 63171 covers two-way, shielded or unshielded, free and fixed connectors known as Type 1, for balanced single-pair data transmission with frequencies up to 600 MHz and with current carrying capacity up to 2,0 A at 60 °C.

It specifies the common dimensions, and provides the mechanical, electrical, signal integrity, and environmental characteristics, the reliability specifications and corresponding tests for these connectors.

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 60050-581:2008, *International Electrotechnical Vocabulary (IEV) – Part 581: Electromechanical components for electronic equipment*

IEC 60068-1:2013, *Environmental testing – Part 1: General and guidance*

IEC 60512-1:2018, *Connectors for electrical and electronic equipment – Tests and measurements – Part 1: Generic specification*

IEC 61754-20:2012, *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces – Part 20: Type LC connector family*
IEC 61754-20:2012/AMD1:2022

IEC 63171:2021, *Connectors for electrical and electronic equipment – Shielded or unshielded free and fixed connectors for balanced single-pair data transmission with current-carrying capacity – General requirements and tests*

ISO/IEC 11801-1:2017, *Information technology – Generic cabling for customer premises – Part 1: General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-581, IEC 60512-1 and IEC 63171 apply, as well as the following.

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

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