

# INTERNATIONAL STANDARD

**Connectors for electrical and electronic equipment –  
Part 2: Detail specification for 2-way, shielded or unshielded, free and fixed  
connectors: mechanical mating information, pin assignment and additional  
requirements for type 2**

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# INTERNATIONAL STANDARD

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INTERNATIONAL  
ELECTROTECHNICAL  
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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT –****Part 2: Detail specification for 2-way, shielded or unshielded,  
free and fixed connectors: mechanical mating information,  
pin assignment and additional requirements for type 2**

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IEC 63171-2 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.

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

| FDIS          | Report on voting |
|---------------|------------------|
| 48B/2875/FDIS | 48B/2886/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.

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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/standardsdev/publications](http://www.iec.ch/standardsdev/publications).

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.

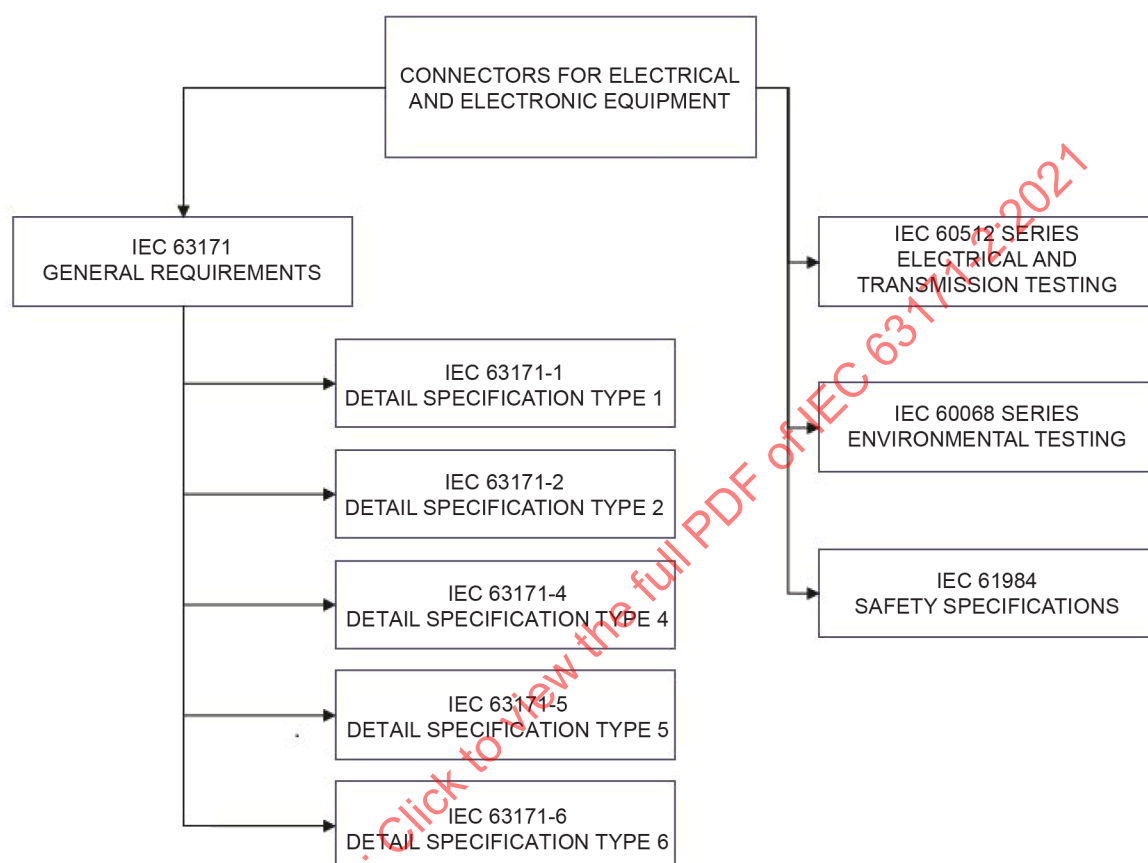
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- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
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## INTRODUCTION

IEC 63171 is the base specification of the whole series. Subsequent specifications do not duplicate information given in the base document, but list only additional requirements. For complete specification regarding a component of a higher number document, all lower numbered documents must be considered as well. Figure 1 shows the interrelation of the documents:

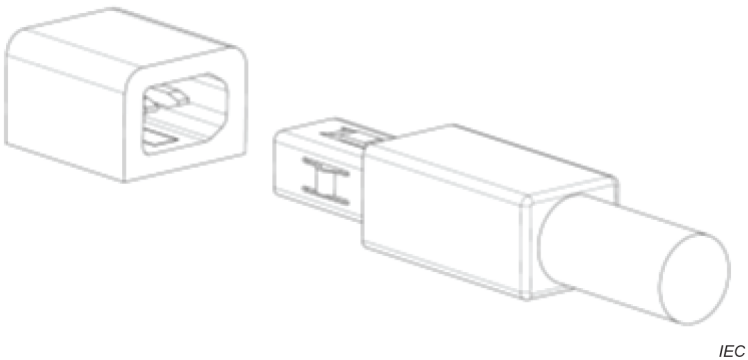
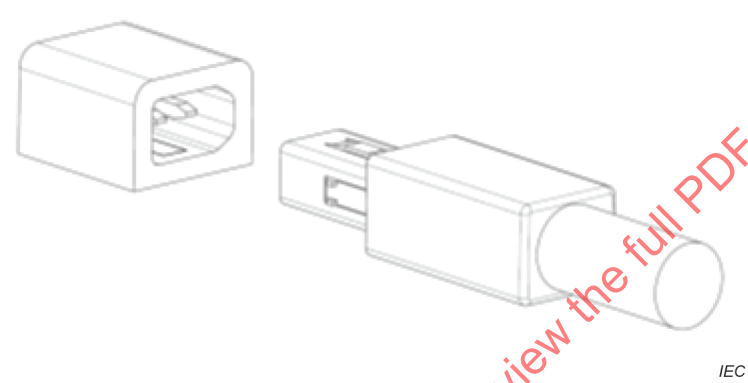
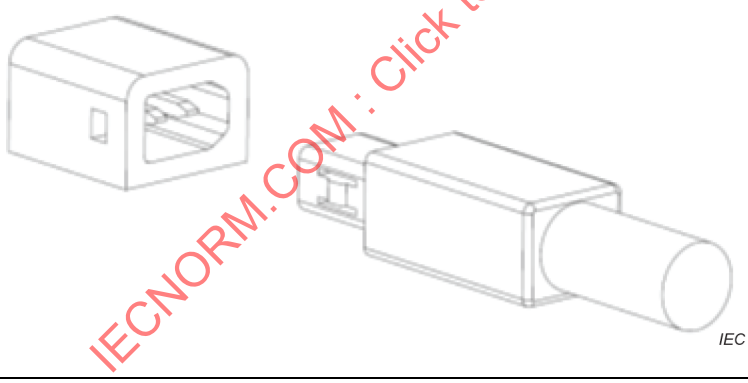
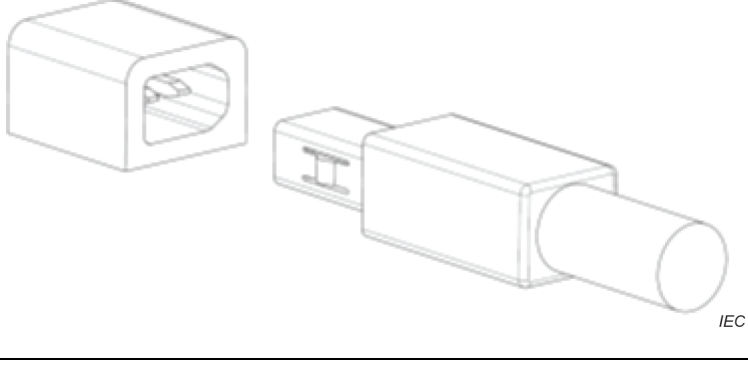


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**Figure 1 – Relationships between the IEC 63171 series and their related references**

NOTE IEC 63171-1 and IEC 63171-6 contain duplicate information, which is either equal to or better than the minimum requirements of IEC 63171; such duplicate information is due to be removed in later editions.

This document refers to International Standards for test and measurement, environmental testing as well as solderless connections.

|                                                                                                                                                                 |                                                    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|
| <p>IEC SC 48B – Electrical connectors</p> <p>Specification available from:<br/>IEC General secretariat<br/>or from the addresses shown on the inside cover.</p> | <p>IEC 63171-2 Ed. 1</p>                           |
|                                                                                | <p>Shielded connector with snap-in mechanism</p>   |
|                                                                               | <p>Shielded connector with locking device</p>      |
|                                                                              | <p>Unshielded connector with snap-in mechanism</p> |
|                                                                              | <p>Unshielded connector with locking device</p>    |

## CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT –

### Part 2: Detail specification for 2-way, shielded or unshielded, free and fixed connectors: mechanical mating information, pin assignment and additional requirements for type 2

#### 1 Scope

This part of IEC 63171 covers 2-way, shielded or unshielded, free and fixed connectors for data transmission up to 600 MHz, with current-carrying capacity, known as Type 2. It specifies the common dimensions, mechanical, electrical and transmission characteristics and environmental requirements as well as test specifications respectively.

The form factor of these connectors allows their use for cable sharing with already installed TO's for structured cabling.

NOTE The overall performance of the transmission channel in such case has to be evaluated.

Intermateable and interoperable versions for circular connector for sealed applications including this connector are described in IEC 63171-5.

The shielded and unshielded connectors are interoperable for their internal transmission performance and can be exchanged. The shielded version has improved alien crosstalk and coupling attenuation properties.

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

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

IEC 60512-28-100, *Connectors for electrical and electronic equipment – Tests and measurements – Part 28-100: Signal integrity tests up to 2 000 MHz – Tests 28a to 28g*

IEC 60664-1, *Insulation coordination for equipment within low-voltage supply systems – Part 1: Principles, requirements and tests*

IEC TR 63040, *Guidance on clearances and creepage distances in particular for distances equal to or less than 2 mm – Test results of research on influencing parameters*

IEC 63171, *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*<sup>1</sup>

IEC 63171-5, *Connectors for electrical and electronic equipment – Part 5: Detail specification for 2-way, shielded or unshielded, free and fixed connectors: mechanical mating information, pin assignment and additional requirements for type 5*<sup>2</sup>

ISO/IEC 11801-1, *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 63171, IEC 60050-581, and IEC 60512-1 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>

### 4 Common features and typical connector pair

#### 4.1 Mating information

##### 4.1.1 General

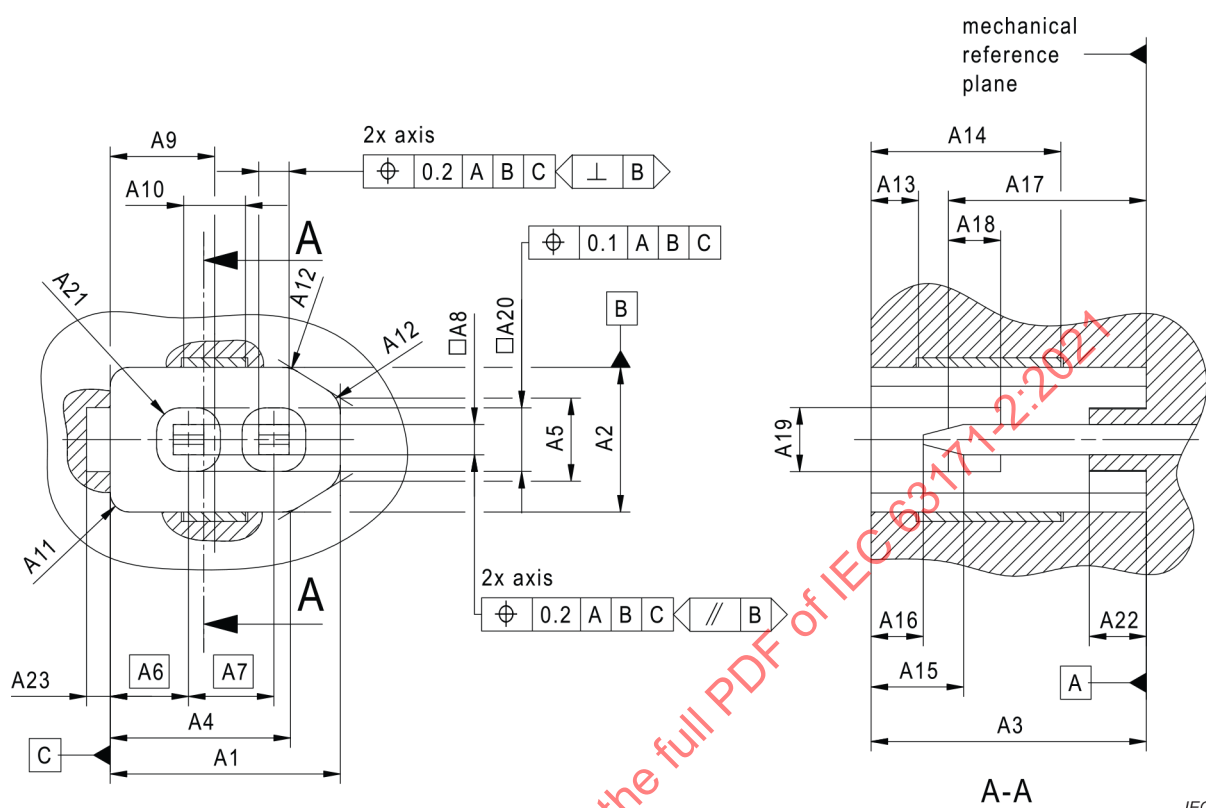
Dimensions are given in millimetres. Drawings are shown in first angle projection. The shape of connectors may deviate from those given in Figure 2 to Figure 5, as long as the dimensions specified are not changed, see also Table 1 and Table 2.

NOTE When using the snap-in version of the free connector, the mating face of the free connector can also be used as mating face of a fixed connector and the mating face of the fixed connector can be used as mating face of a free connector.

<sup>1</sup> Under preparation. Stage at the time of publication: IEC/RFDIS 63171:2020.

<sup>2</sup> Under preparation. Stage at the time of publication: IEC/PRVC 63171-5:2020.

#### 4.1.2.1 Shielded fixed connector



**Figure 2 – Shielded fixed connector details**

**Table 1 – Dimensions for Figure 2 and Figure 3**

Dimensions in mm

| Letter | Dimensions |         |         | Notes                         |
|--------|------------|---------|---------|-------------------------------|
|        | Minimum    | Nominal | Maximum |                               |
| A1     | 4,8        | 4,85    | 4,9     |                               |
| A2     | 3          | 3,05    | 3,1     |                               |
| A3     | 5,65       | 5,8     | 5,95    |                               |
| A4     | 3,7        | 3,8     | 3,9     |                               |
| A5     | 1,69       | 1,75    | 1,81    |                               |
| A6     | -          | 1,65    | -       | Theoretically exact dimension |
| A7     | -          | 1,8     | -       | Theoretically exact dimension |
| A8     | 0,59       | 0,64    | 0,69    |                               |
| A9     | 2,1        | 2,2     | 2,3     |                               |
| A10    | 1,3        | -       | -       | Valid for shield contact zone |
| A11    | -          | -       | 0,4     |                               |
| A12    | -          | -       | 0,6     |                               |
| A13    | -          | -       | 1       | Valid for shield contact zone |
| A14    | 4          | -       | -       | Valid for shield contact zone |
| A15    | 1,8        | 1,95    | 2,1     |                               |
| A16    | 1,1        | -       | -       |                               |
| A17    | 4,1        | 4,17    | 4,24    |                               |
| A18    | 1,1        | -       | -       |                               |
| A19    | 1,35       | -       | -       |                               |
| A20    | 1,29       | 1,34    | 1,39    |                               |
| A21    | 0,5        | -       | -       |                               |
| A22    | 1,15       | 1,2     | 1,25    |                               |
| A23    | 0,5        | -       | -       |                               |

#### 4.1.2.2 Unshielded fixed connector

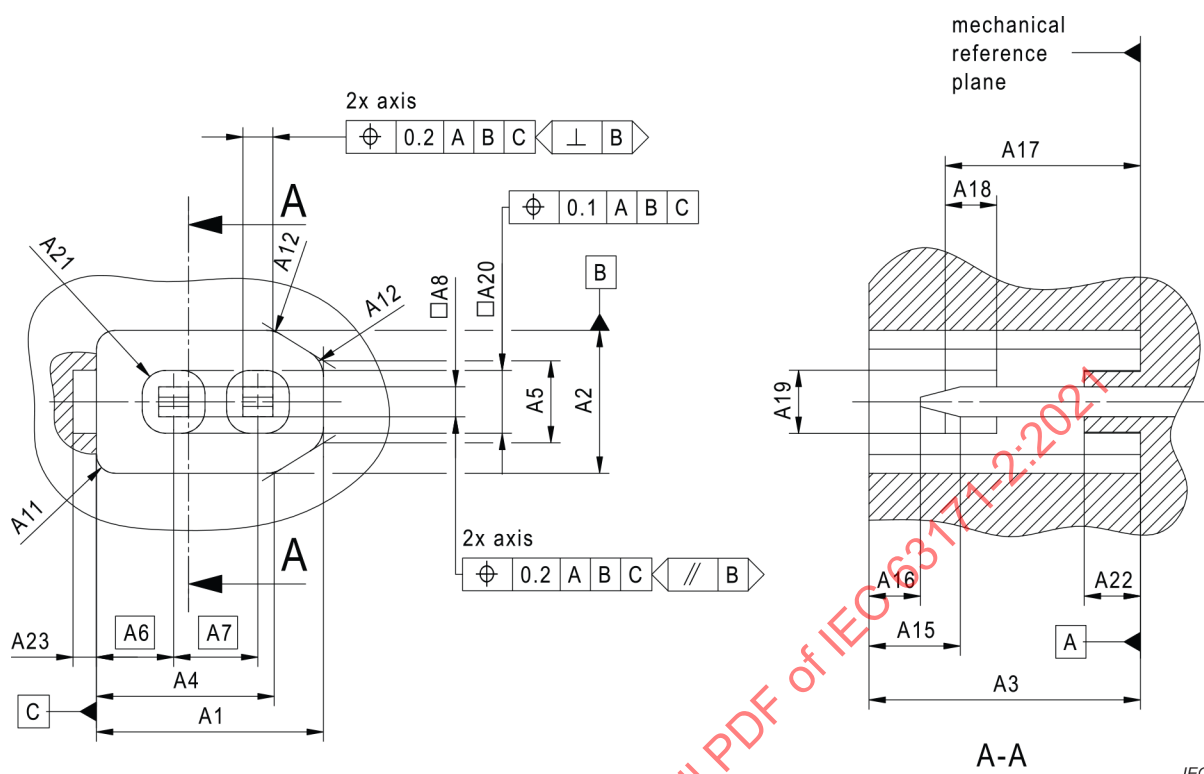
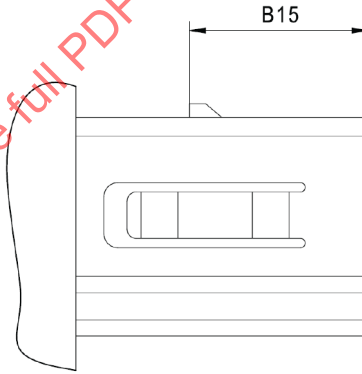
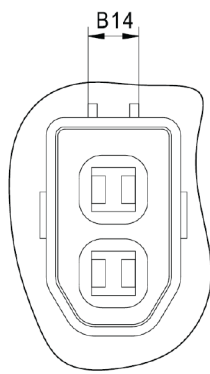
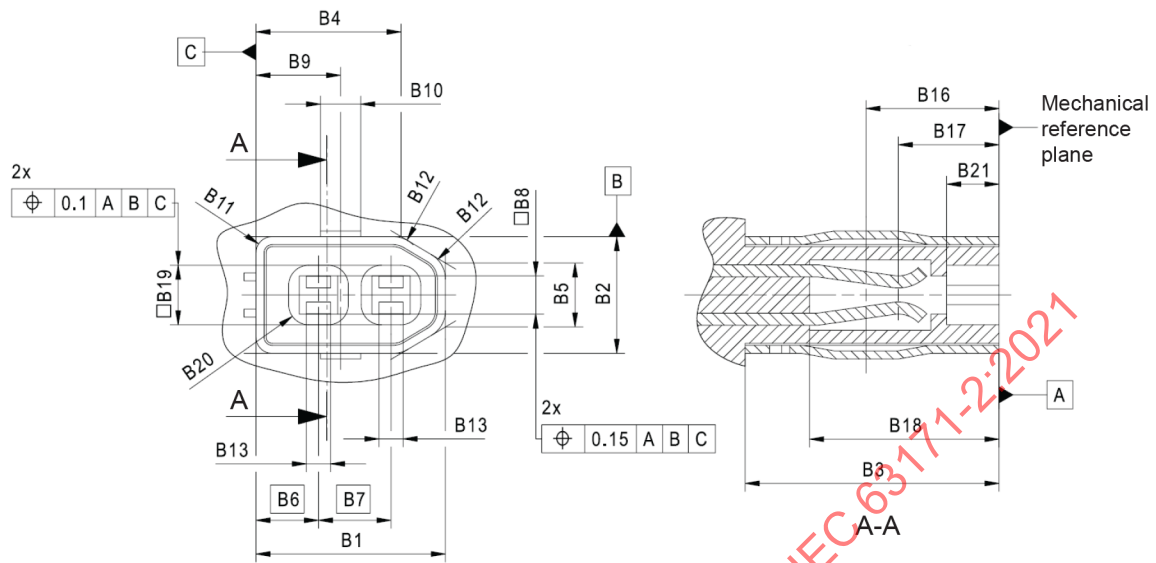


Figure 3 – Unshielded fixed connector details

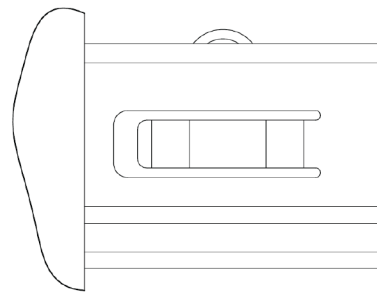
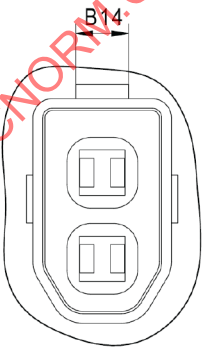
### 4.1.3 Free connector

#### 4.1.3.1 Shielded free connector



IEC

a) Locking mechanism



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b) Snap-in mechanism

Figure 4 – Shielded free connector

**Table 2 – Dimensions for Figure 4 and Figure 5**

Dimensions in mm

| Letter | Dimensions |         |         | Notes                         |
|--------|------------|---------|---------|-------------------------------|
|        | Minimum    | Nominal | Maximum |                               |
| B1     | 4,65       | 4,7     | 4,75    |                               |
| B2     | 2,85       | 2,9     | 2,95    |                               |
| B3     | 6,3        | -       | -       |                               |
| B4     | 3,55       | 3,6     | 3,65    |                               |
| B5     | 1,54       | 1,59    | 1,64    |                               |
| B6     | -          | 1,55    | -       | Theoretically exact dimension |
| B7     | -          | 1,8     | -       | Theoretically exact dimension |
| B8     | 0,95       | -       | -       |                               |
| B9     | 2          | 2,1     | 2,2     |                               |
| B10    | 0,9        | 1       | 1,1     |                               |
| B11    | 0,4        | -       | -       |                               |
| B12    | 0,7        | -       | -       |                               |
| B13    | 0,6        | -       | -       | Valid for contact zone        |
| B14    | -          | -       | 1,1     |                               |
| B15    | 3,75       | 3,85    | 3,95    |                               |
| B16    | 2,8        | 3,3     | 3,8     |                               |
| B17    | 2,35       | 2,5     | 2,65    |                               |
| B18    | 4,7        | -       | -       |                               |
| B19    | 1,43       | 1,48    | 1,53    |                               |
| B20    | -          | -       | 0,5     |                               |
| B21    | 1,25       | 1,3     | 1,35    |                               |

### 4.1.3.2 Unshielded free connector

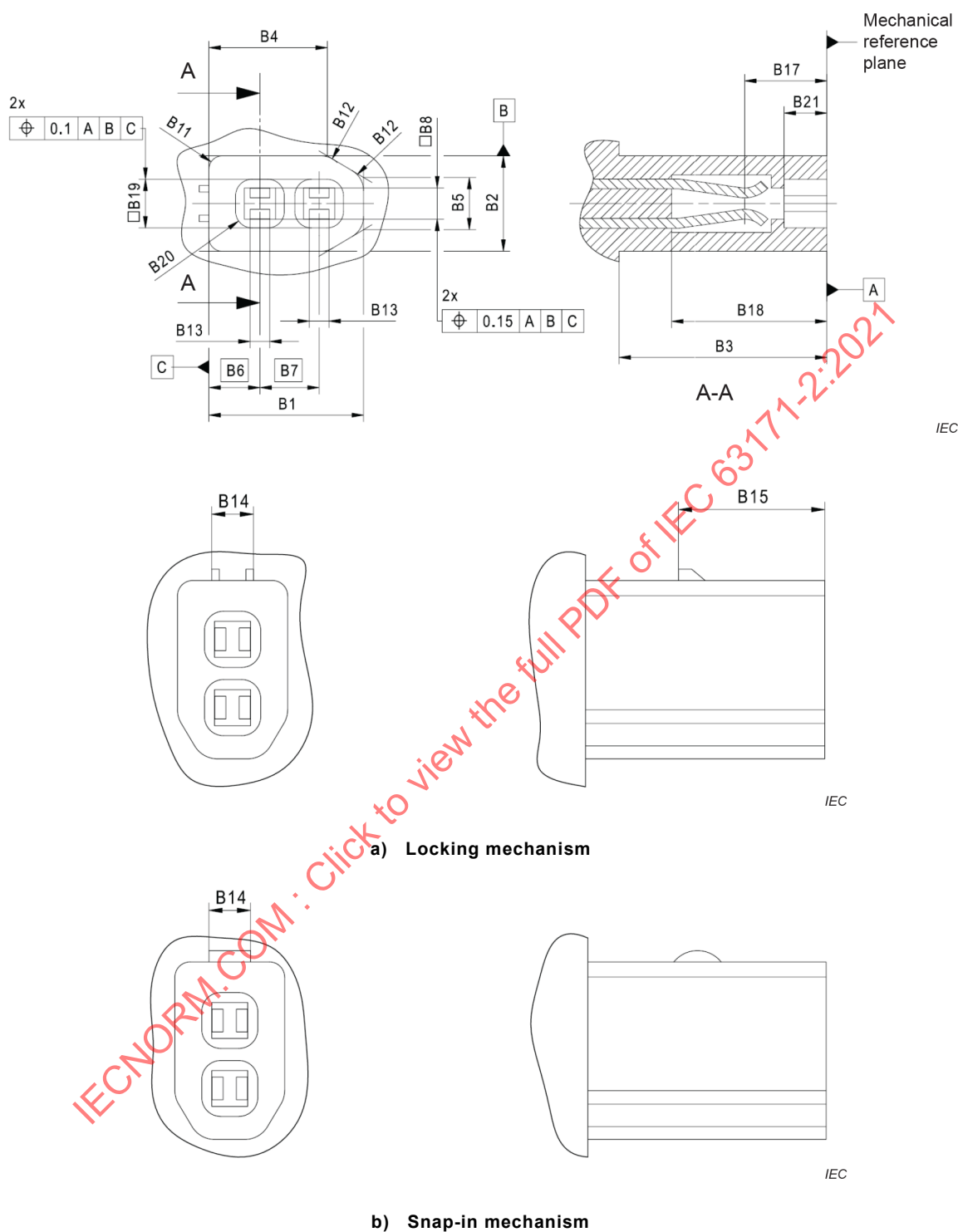


Figure 5 – Unshielded free connector

## 5 Characteristics

### 5.1 General

Compliance to the test schedules is intended to ensure the reliability of all performance parameters, including transmission parameters, over the range of operating climatic conditions.

## 5.2 Pin assignment

For those specifications where pin assignment is relevant the pin assignment shall be as shown in Figure 6, unless otherwise specified.

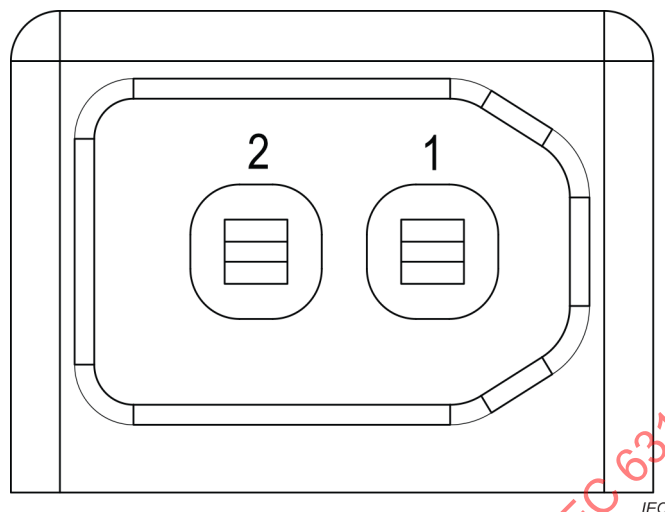


Figure 6 – Fixed connector pin assignment (front view of connector)

## 5.3 Classification into climatic category

The temperature range and climatic category shall be compatible with ISO/IEC 11801-1 classification of a M11C1E1 environment.

## 5.4 Electrical characteristics

### 5.4.1 Creepage and clearance distances

The permissible operating voltages depend on the application and on the specified safety requirements.

Although insulation coordination is not required for safety aspects for these connectors, it is still required for their electrical functional requirements.

In general, for minimum values of clearances and creepage distances IEC 60664-1 shall apply, based on the assigned voltage rating 50 VAC and 60 V DC.

NOTE As indicated in IEC 60664-1, IEC TR 63040 provides an alternative and more precise dimensioning procedure for clearances equal to or less than 2 mm.

The creepage and clearance distances that cover performance requirements in IEC 60664-1 may be reduced, based on IEC TR 63040.

The creepage and clearance distances given in Table 3 apply as operating characteristics for mated connectors according to this document.

In practice, reductions in creepage or clearance distances may occur due to the conductive pattern of the printed board or the wiring used and should duly be taken into account.

**Table 3 – Creepage and clearance distances**

Dimensions in mm

| Minimum distance between contacts and chassis |           | Minimum distance between adjacent contacts |           |
|-----------------------------------------------|-----------|--------------------------------------------|-----------|
| Creepage                                      | Clearance | Creepage                                   | Clearance |
| 1,40                                          | 0,51      | 0,40                                       | 0,40      |

**5.4.2 Voltage proof**

According to 5.4.2 of IEC 63171.

**5.4.3 Current-temperature derating**

According to Level II of 5.4.3 of IEC 63171.

**5.4.4 Initial contact resistance – interface only**

According to 5.4.4 of IEC 63171.

**5.4.5 Input to output DC resistance**

According to 5.4.5 of IEC 63171.

**5.4.6 Input to output DC resistance unbalanced**

According to 5.4.6 of IEC 63171.

**5.4.7 Initial insulation resistance**

According to 5.4.7 of IEC 63171.

**5.5 Transmission characteristics****5.5.1 General**

Compliance to this document, in respect to transmission characteristics, shall be determined according to specified test methods described in test group EP.

All transmission performance requirements shall apply between the reference planes specified in IEC 60512-28-100.

All transmission results shall be reported as worst case overall result after testing all samples.

**5.5.2 Insertion loss**

According to Category B of 5.5.2 of IEC 63171.

**5.5.3 Return loss**

According to Category B of 5.5.3 of IEC 63171.

**5.5.4 Propagation delay**

According to 5.5.4 of IEC 63171.

**5.5.5 Transverse conversion loss**

According to Category B of 5.5.5 of IEC 63171.

**5.5.6 Transverse conversion transfer loss**

According to Category B of 5.5.6 of IEC 63171.

**5.5.7 Transfer impedance (shielded only)**

According to 5.5.7 of IEC 63171.

**5.5.8 Coupling attenuation**

According to 5.5.8 of IEC 63171.

**5.5.9 Power sum alien (exogenous) NEXT**

According to Category B of 5.5.9 of IEC 63171.

**5.5.10 Power sum alien (exogenous) FEXT**

According to Category B of 5.5.10 of IEC 63171.

**5.6 Mechanical characteristics****5.6.1 Mechanical operation**

According to Mating Performance Level MPL750 of 5.6.1 of IEC 63171.

**5.6.2 Effectiveness of connector coupling devices**

According to Latch or Snap-in definition of 5.6.2 of IEC 63171.

**5.6.3 Insertion and withdrawal forces**

According to 5.6.3 of IEC 63171.

**5.6.4 Polarizing method**

According to 5.6.4 of IEC 63171.

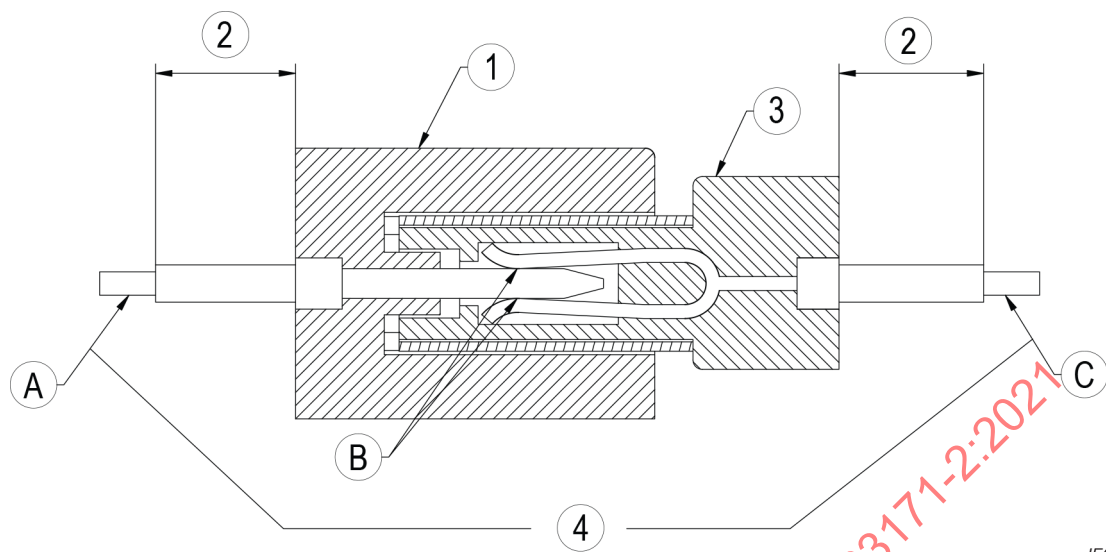
**5.6.5 Dynamic stress**

According to 5.6.5 of IEC 63171.

**6 Tests and test schedule****6.1 General**

According to Clause 6 of IEC 63171.

## 6.2 Arrangement for interface contact resistance measurement



### Key

- 1 Fixed connector
- 2 Attached wires: as short as practical
- 3 Free connector
- 4 Contact resistance measuring points
- A Fixed connector measuring point
- B Measuring point, B1: on the contact of the fixed connector, B2: on the contact of the free connector
- C Free connector measuring point

**Figure 7 – Arrangement for interface contact resistance measurement**

The test procedure is defined in 6.3 of IEC 63171. Figure 7 shows a test setup arrangement for the interface contact resistance measurement.