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## REDLINE VERSION

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### **Anslutningsdon för elektronikutrustning – Provning och mätning – Del 99-002: Provningsprogram för livslängdsprovning – Provning 99b: Provningsprogram för isärkoppling med elektrisk belastning**

*Connectors for electrical and electronic equipment –  
Tests and measurements –  
Part 99-002: Endurance test schedules –  
Test 99b: Test schedule for unmating under electrical load*

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IEC 60512-99-002

Edition 2.0 2022-01  
REDLINE VERSION

# INTERNATIONAL STANDARD



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**Connectors for electrical and electronic equipment – Tests and measurements –  
Part 99-002: Endurance test schedules – Test 99b: Test schedule for unmating  
under electrical load**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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### CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – TESTS AND MEASUREMENTS –

#### Part 99-002: Endurance test schedules – Test 99b: Test schedule for unmating under electrical load

#### FOREWORD

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**This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 60512-99-002:2019. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.**

IEC 60512-99-002 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 2019. This edition constitutes a technical revision.

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

- a) Test group UEL has been revised with respect to the order of the test phases, the test severities and the requirements.

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

Draft	Report on voting
48B/2922/FDIS	48B/2938/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 60512 series, published under the general title *Connectors for electrical and electronic equipment – Tests and measurements*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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# CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – TESTS AND MEASUREMENTS –

## Part 99-002: Endurance test schedules – Test 99b: Test schedule for unmating under electrical load

### 1 Scope

This part of IEC 60512 is used for ~~testing~~ the assessment of connectors within the scope of SC 48B that are used in twisted pair communication cabling with remote power, such as ISO/IEC 11801-1 Class D, or better, balanced cabling in support of ~~IEEE Std 802.3bt™, (PoE Plus – Power over Ethernet Plus)~~ IEEE 802.3bt™ (Power over Ethernet, supporting up to 90 W from the power sourcing equipment).

The object of this document is to detail a test schedule to determine the ability of ~~pairs~~ sets of connectors to withstand a ~~sequence of tests with a total of 100 engagements and separations. The electrical current is passed through the connectors during the separation (unmating) step only, in accordance with IEC 60512-9-3~~ minimum of 100 mechanical operations with electrical load, where an electrical current is being passed through the connectors in accordance with IEC 60512-9-3 during the separation (unmating) step.

### 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 60512-1-1, *Connectors for electronic equipment – Tests and measurements – Part 1-1: General examination – Test 1a: Visual examination*

IEC 60512-2-1, *Connectors for electronic equipment – Tests and measurements – Part 2-1: Electrical continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level method*

IEC 60512-3-1, *Connectors for electronic equipment – Tests and measurements – Part 3-1: Insulation tests – Test 3a: Insulation resistance*

IEC 60512-4-1, *Connectors for electronic equipment – Tests and measurements – Part 4-1: Voltage stress tests – Test 4a: Voltage proof*

IEC 60512-9-3:2014, *Connectors for electronic equipment – Tests and measurements – Part 9-3: Endurance tests – Test 9c: Mechanical operation (engaging and separating) with electrical load*

IEC 60512-11-7, *Connectors for electronic equipment – Tests and measurements – Part 11-7: Climatic tests – Test 11g: Flowing mixed gas corrosion test*

~~IEC 60512-99-001, Connectors for electronic equipment – Tests and measurements – Part 99-001: Test schedule for engaging and separating connectors under electrical load – Test 99a: Connectors used in twisted pair communication cabling with remote power~~

~~ISO/IEC 11801(all parts): Information technology – Generic cabling for customer premises~~

~~ISO/IEC TS 29125: 2017, Information technology—Telecommunications cabling requirements for remote powering of terminal equipment~~

~~TIA-568-A:1995, Commercial building telecommunications cabling standard~~

~~TIA-568-B.2:2001, Commercial building telecommunications cabling standard, Part 2: Balanced twisted pair cabling components~~

~~TIA TSB-184-A:2017, Guidelines for supporting power delivery over balanced twisted-pair cabling~~

IEEE Std 802.3™-2018, *IEEE Standard for Ethernet*

IEEE Std 802.3bt™-2018, *IEEE Standard for Ethernet. Amendment 2: Physical Layer and Management Parameters for Power over Ethernet over 4 pairs*

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## **Anslutningsdon för elektronikutrustning – Provning och mätning – Del 99-002: Provningsprogram för livslängdsprovning – Provning 99b: Provningsprogram för isärkoppling med elektrisk belastning**

*Connectors for electrical and electronic equipment –  
Tests and measurements –  
Part 99-002: Endurance test schedules –  
Test 99b: Test schedule for unmating under electrical load*

Som svensk standard gäller europastandarden EN IEC 60512-99-002:2022. Den svenska standarden innehåller den officiella engelska språkversionen av EN IEC 60512-99-002:2022.

### **Nationellt förord**

Europastandarden EN IEC 60512-99-002:2022

består av:

- **europastandardens ikraftsättningsdokument**, utarbetat inom CENELEC
- **IEC 60512-99-002, Second edition, 2022 - Connectors for electrical and electronic equipment - Tests and measurements - Part 99-002: Endurance test schedules - Test 99b: Test schedule for unmating under electrical load**

utarbetad inom International Electrotechnical Commission, IEC.

Tidigare fastställd svensk standard SS-EN IEC 60512-99-002, utgåva 1, 2019, gäller ej fr o m 2025-03-04.

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Denna standard är fastställd av SEK Svensk Elstandard, som också kan lämna upplysningar om **sakinnehållet** i standarden.  
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English Version

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99b: Test schedule for unmating under electrical load  
(IEC 60512-99-002:2022)

Connecteurs pour équipements électriques et électroniques  
- Essais et mesures - Partie 99-002: Programmes d'essais  
d'endurance - Essai 99b: Programme d'essai pour le  
désaccouplement sous charge électrique  
(IEC 60512-99-002:2022)

Steckverbinder für elektrische und elektronische  
Einrichtungen - Mess- und Prüfverfahren - Teil 99-002:  
Prüfpläne für die Lebensdauer - Prüfung 99b: Prüfplan zum  
unbeabsichtigten Trennen unter elektrischer Last  
(IEC 60512-99-002:2022)

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## **European foreword**

The text of document 48B/2922/FDIS, future edition 2 of IEC 60512-99-002, prepared by SC 48B "Electrical connectors" of IEC/TC 48 "Electrical connectors and mechanical structures for electrical and electronic equipment" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60512-99-002:2022.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2022-12-04 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2025-03-04 document have to be withdrawn

This document supersedes EN IEC 60512-99-002:2019 and all of its amendments and corrigenda (if any).

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The text of the International Standard IEC 60512-99-002:2022 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60512-99-001 NOTE Harmonized as EN 60512-99-001

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60512-1-1	-	Connectors for electronic equipment - Tests and measurements - Part 1-1: General examination - Test 1a: Visual examination	EN 60512-1-1	-
IEC 60512-2-1	-	Connectors for electronic equipment - Tests and measurements - Part 2-1: Electrical continuity and contact resistance tests - Test 2a: Contact resistance - Millivolt level method	EN 60512-2-1	-
IEC 60512-3-1	-	Connectors for electronic equipment - Tests and measurements - Part 3-1: Insulation tests - Test 3a: Insulation resistance	EN 60512-3-1	-
IEC 60512-4-1	-	Connectors for electronic equipment - Tests and measurements - Part 4-1: Voltage stress tests - Test 4a: Voltage proof	EN 60512-4-1	-
IEC 60512-9-3	-	Connectors for electronic equipment - Tests and measurements - Part 9-3: Endurance tests - Test 9c: Mechanical operation (engaging and separating) with electrical load	EN 60512-9-3	-
IEC 60512-11-7	-	Connectors for electronic equipment - Tests and measurements - Part 11-7: Climatic tests - Test 11g: Flowing mixed gas corrosion test	EN 60512-11-7	-
IEEE Std 802.3™	2018	IEEE Standard for Ethernet	-	-
IEEE Std 802.3bt™	2018	IEEE Standard for Ethernet. Amendment 2:- Physical Layer and Management Parameters for Power over Ethernet over 4 pairs	-	-

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

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**Connectors for electrical and electronic equipment – Tests and measurements –  
Part 99-002: Endurance test schedules – Test 99b: Test schedule for unmating  
under electrical load**

**Connecteurs pour équipements électriques et électroniques – Essais et  
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d'essai pour le désaccouplement sous charge électrique**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT –  
TESTS AND MEASUREMENTS –****Part 99-002: Endurance test schedules –  
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- amended.

# CONNECTORS FOR ELECTRICAL AND ELECTRONIC EQUIPMENT – TESTS AND MEASUREMENTS –

## Part 99-002: Endurance test schedules – Test 99b: Test schedule for unmating under electrical load

### 1 Scope

This part of IEC 60512 is used for the assessment of connectors within the scope of SC 48B that are used in twisted pair communication cabling with remote power, such as ISO/IEC 11801-1 Class D, or better, balanced cabling in support of IEEE 802.3bt™ (Power over Ethernet, supporting up to 90 W from the power sourcing equipment).

The object of this document is to detail a test schedule to determine the ability of sets of connectors to withstand a minimum of 100 mechanical operations with electrical load, where an electrical current is being passed through the connectors in accordance with IEC 60512-9-3 during the separation (unmating) step.

### 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.

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IEC 60512-2-1, *Connectors for electronic equipment – Tests and measurements – Part 2-1: Electrical continuity and contact resistance tests – Test 2a: Contact resistance – Millivolt level method*

IEC 60512-3-1, *Connectors for electronic equipment – Tests and measurements – Part 3-1: Insulation tests – Test 3a: Insulation resistance*

IEC 60512-4-1, *Connectors for electronic equipment – Tests and measurements – Part 4-1: Voltage stress tests – Test 4a: Voltage proof*

IEC 60512-9-3, *Connectors for electronic equipment – Tests and measurements – Part 9-3: Endurance tests – Test 9c: Mechanical operation (engaging and separating) with electrical load*

IEC 60512-11-7, *Connectors for electronic equipment – Tests and measurements – Part 11-7: Climatic tests – Test 11g: Flowing mixed gas corrosion test*

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IEEE Std 802.3bt™-2018, *IEEE Standard for Ethernet. Amendment 2: Physical Layer and Management Parameters for Power over Ethernet over 4 pairs*