



BSI Standards Publication

Wearable electronic devices and technologies

Part 201-2: Electronic textile — Measurement methods for basic properties of conductive fabrics and insulation materials

National foreword

This British Standard is the UK implementation of EN IEC 63203-201-2:2022. It is identical to IEC 63203-201-2:2022, incorporating corrigendum October 2023.

The start and finish of text introduced or altered by corrigendum is indicated in the text by tags. Text altered by IEC corrigendum October 2023 is indicated in the text by AC1 AC1.

The UK participation in its preparation was entrusted to Technical Committee AMT/9, Printed Electronics.

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

Contractual and legal considerations

This publication has been prepared in good faith, however no representation, warranty, assurance or undertaking (express or implied) is or will be made, and no responsibility or liability is or will be accepted by BSI in relation to the adequacy, accuracy, completeness or reasonableness of this publication. All and any such responsibility and liability is expressly disclaimed to the full extent permitted by the law.

This publication is provided as is, and is to be used at the recipient's own risk.

The recipient is advised to consider seeking professional guidance with respect to its use of this publication.

This publication is not intended to constitute a contract. Users are responsible for its correct application.

© The British Standards Institution 2024
Published by BSI Standards Limited 2024

ISBN 978 0 539 29865 9

ICS 59.080.30; 59.080.80

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

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2022.

Amendments/corrigenda issued since publication

Date	Text affected
31 January 2024	Implementation of IEC corrigendum October 2023

English Version

Wearable electronic devices and technologies - Part 201-2:
Electronic textile - Measurement methods for basic properties of
conductive fabrics and insulation materials
(IEC 63203-201-2:2022)

Technologies et dispositifs électroniques prêts-à-porter -
Partie 201-2: Textile électronique - Méthodes de mesure
des propriétés fondamentales des étoffes conductrices et
des matériaux isolants
(IEC 63203-201-2:2022)

Tragbare elektronische Geräte und Technologien - Teil 201-
2: Elektronische Textilien - Messverfahren für die
grundlegenden Eigenschaften von leitfähigen Textilien und
Isolationswerkstoffen
(IEC 63203-201-2:2022)

This European Standard was approved by CENELEC on 2022-05-31. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

European foreword

The text of document 124/176/FDIS, future edition 1 of IEC 63203-201-2, prepared by IEC/TC 124 "Wearable electronic devices and technologies" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 63203-201-2:2022.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2023-02-28
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-05-31

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC shall not be held responsible for identifying any or all such patent rights.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 63203-201-2:2022 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 61557-2:2019 NOTE Harmonized as EN IEC 61557-2:2021 (not modified)

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cenelec.eu.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60243-1	2013	Electric strength of insulating materials - Test methods - Part 1: Tests at power frequencies	EN 60243-1	2013
IEC 60468	1974	Method of measurement of resistivity of metallic materials	-	-
IEC 62631-3-1	2016	Dielectric and resistive properties of solid insulating materials - Part 3-1: Determination of resistive properties (DC methods) - Volume resistance and volume resistivity - General method	EN 62631-3-1	2016
ISO 105-E04	-	Textiles – Tests for colour fastness – Part E04: Colour fastness to perspiration	EN ISO 105-E04	-
ISO 139	-	Textiles – Standard atmospheres for conditioning and testing	EN ISO 139	-
ISO 6330	-	Textiles – Domestic washing and drying procedures for textile testing	EN ISO 6330	-
-	-	Textiles and textile products – Electrically conductive textiles – Determination of the linear electrical resistance of conductive tracks	EN 16812	2016

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	6
2 Normative references	6
3 Terms and definitions	7
4 Materials and structure	7
4.1 Classification of conductive fabric	7
4.2 Classification of insulation materials	8
5 Atmospheric conditions for measurement and conditioning	8
6 Characteristics and measurement methods for conductive fabric	8
6.1 Electrical properties	8
6.1.1 Sheet resistance.....	8
6.1.2 Fusing current	9
6.1.3 Electric insulation properties.....	10
6.2 Chemical and biological resistance	14
6.2.1 Perspiration resistance	14
6.2.2 Detergent resistance	15
Bibliography.....	16
Figure 1 – Classification of electric insulation materials	8
Figure 2 – Test specimen for measurement of insulation properties	11
Figure 3 – Test specimen setting	11
Figure 4 – Measurement circuit of cover insulation layer side.....	11
Figure 5 – Measurement circuit of substrate side	13
Table 1 – Pre-tensioning for fabrics without stretch characteristics	9

INTERNATIONAL ELECTROTECHNICAL COMMISSION

WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES –

**Part 201-2: Electronic textile –
Measurement methods for basic properties of
conductive fabrics and insulation materials**

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.

IEC 63203-201-2 has been prepared by IEC technical committee 124: Wearable electronic devices and technologies. It is an International Standard.

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

Draft	Report on voting
124/176/FDIS	124/181/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.