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Part 203-2: Test method for measuring performance of fabric-based piezoelectric generator

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

**PROJECT NUMBER:****IEC 63203-203-2 ED1****DATE OF CIRCULATION:****2024-07-26****CLOSING DATE FOR COMMENTS:****2024-10-18****SUPERSEDES DOCUMENTS:****124/225/NP, 124/252A/RVN****IEC TC 124 : WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES****SECRETARIAT:****Korea, Republic of****SECRETARY:****Mr Jae Yeong Park****OF INTEREST TO THE FOLLOWING COMMITTEES:****HORIZONTAL FUNCTION(S):****ASPECTS CONCERNED:**

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Recipients of this document are invited to submit, with their comments, notification of any local regulations or technical reasons that may exist and should be considered should this proposal proceed, recognizing that failure to address such requirements could result in the need for new or existing "In Some Countries" clauses. (SEE [AC/22/2007](#) OR [NEW GUIDANCE DOC](#)).

TITLE:**IEC 63203-203-2: Wearable electronic devices and technologies - Part 203-2: Test method for measuring performance of fabric-based piezoelectric generator****NOTE FROM TC/SC OFFICERS:**

In accordance with recommendation #4 of the minutes of TC 124 AG 1 meeting held on 2024-06-07 in Espoo, Finland, TC 124 agreed the project proceeds to CD.

Contents

Introduction.....	6
1 Scope.....	7
2 Normative References.....	7
3 Terms and definitions	7
3.1 General Terms	8
3.1.1	8
generator	8
3.1.2	8
fabric based piezoelectric generator (F-PENG).....	8
3.1.3	8
piezoelectric effect.....	8
4 Working Principle.....	8
5 Atmospheric conditions for measurement and conditioning	8
6 Characterization method	8
7 Test method.....	9
7.1 General.....	9
7.2 Physical testing of the samples	10
7.2.1 Thickness of the sample.....	10
7.2.2 Areal densityof the sample.....	10
7.3 Electrical characterization.....	10
7.3.1 Calibration of the equipments	10
7.3.2 Modes of testing.....	10
7.3.2.1 Compression mode.....	10
7.3.2.1.1 Adjusting the distance between the sample and impactor in compression mode	11
7.3.2.1.2 Controlling the amount of force while compression.....	11
7.3.3.2 Stretching mode	11
7.3.3.2.1 Controlling the amount of strain in stretching mode	12
7.3.3.3 Bending mode	12
7.3.3.3.1 Controlling the frequency (cycle per unit time) of bending in bending mode	13
7.3.3.3.2 Controlling the bending amplitude in bending mode.....	13
7.3.3.3.3 Controlling bending direction in bending mode	13
7.4 Washability and durability.....	13
8. Electrical characterization.....	13
8.1 Open-circuit voltage	13

8.2	Short-circuit current.....	14
8.3	Output voltage.....	14
8.4	Output current	14
8.5	Output power	14
8.6	Optimal load impedance	14
9	Test report	14
9.1	Compression mode.....	14
9.2	Stretching mode	15
9.3	Bending mode	15
	Annex A (informative).....	17
A.1	Requirement of various mechanisms to control the strain applied during stretching mode	17
A.2	Requirement of various mechanisms to control the strain applied during compression mode ..	18
	Annex B (informative).....	22
	Bibliography	27

INTERNATIONAL ELECTROTECHNICAL COMMISSION

WEARABLE ELECTRONIC DEVICES AND TECHNOLOGUES

Wearable Electronic Devices and Technologies - Part 20X-X: Electronic Textile - Test Method for Measuring Performance of Fabric-based Piezoelectric Generator

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IEC 63203-20X-X has been prepared by IEC technical committee 124: Wearable Electronic devices and technologies.

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

Draft	Report on voting
XX/XX/FDIS	XX/XX/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 https://www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at <https://www.iec.ch/standardsdev/publications>.

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- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended

Introduction

Energy harvesting from ambient mechanical energy sources is gathering a lot of interest in the field of wearable electronics. The IEC has already standardized evaluation methods of piezoelectric energy harvesting devices which are mostly appropriate for continuous flexible films.

IEC 62830-1:2017 described configuration and test methods for vibration based piezoelectric energy harvesting devices. The vibration-based excitation will not be suitable for textile substrate as the electric charge induced due to dipoles will diminish immediately. As the substrate is porous in nature, interdigitated or sputtered electrodes will not be successful for harvesting energy from anisotropic piezoelectric textile. Specific electrode designs consisting of conducting fibers, core-sheath fibers are to be explored. Further encapsulation in PDMS is also not required, as textiles are inherently flexible and will seriously impair the comfort properties of textiles (in other sense the textiles will become a continuous film if it's encapsulated).

IEC 62830-4:2019 stated evaluation and determination of performance characteristics from flexible piezoelectric devices. The energy harvesting was driven by vibration exciter which is not suitable for textile substrate. Instead, stretching and compression of textile substrate can be used to harvest electrical energy from textiles. Stretching along X-Y directions will result in the strain experienced by dipoles, thereby resulting in higher piezoelectric output. Further, conventional bending of the substrate will not be applicable to any textile material as it drapes due to its own weight. Unlike polymeric film conventional textile fabric can be visualized as a mixture of fibre and air which makes the applied bending force more complicated.

IEC 62969-3: 2018 described the shock driven piezoelectric devices for sensing applications in automobiles. In fabric based piezoelectric generator, vibration-based actuation will not be suitable as compared to proposed stretching, compression and bending modes. Moreover, piezoelectric textiles being a standalone material needs no further alternatives for attachment on any external base.

The strain rate and direction (i.e. warp or weft in case of woven structure and course or wale in case of knitted structure) during stretching, nature of the impact forces in compression and electrode configurations in piezoelectric textiles will govern its overall piezoelectric output. Therefore, performance evaluation of properties in anisotropic piezoelectric textile which is not covered in existing standards for isotropic energy generating films and ceramics is a necessity. Hence there is a need for new standard for piezoelectric textiles which will be a significant step towards development of wearable electronics.

WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES

Wearable Electronic Devices and Technologies - Part 20X-X: Electronic Textile - Test Method for Measuring Performance of Fabric-based Piezoelectric Generator

1 Scope

This part of IEC 63203-204-X specifies a method of evaluating energy harvesting performance of fabric based piezoelectric generator for wearable electronic devices. This standard is applicable to analyse the power generation performance under stretching, compression, and bending mode.

2 Normative References

The following documents are referred to in the text in such a way that some or all of their content constitutes the requirements of this document. For dated references, only the cited edition applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 139 *Textile-Standard atmosphere for conditioning and testing*

ISO 22198 *Textiles — Fabrics — Determination of width and length*

ISO 5084 *Textiles — Determination of thickness of textiles and textile products*

ISO 3801 *Textiles — Woven fabrics — Determination of mass per unit length and mass per unit area*

ISO 3915:1981 *Plastics — Measurement of resistivity of conductive plastics*

IEC 62830-1:2017 *Semiconductor devices - Semiconductor devices for energy harvesting and generation - Part 1: Vibration based piezoelectric energy harvesting*

IEC 62830-4:2019 *Semiconductor devices - Semiconductor devices for energy harvesting and generation - Part 4: Test and evaluation methods for flexible piezoelectric energy harvesting devices*

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/ob>