भारतीय मानक
Indian Standard

IS/IEC 63203-204-1 : 2023

वेरबल इलेक्ट्रोनिक डिवाइसस एवं टेक्नॉलजीस

भाग 204 इलेक्ट्रॉनिक टेक्सटाइल

अनुभाग 1 ई-टेक्सटाइल उत्पादों की धुलाई स्थायित्व मूल्यांकन की परीक्षण पद्धति

Wearable Electronic Devices and Technologies

Part 204 Electronic Textile

Section 1 Test Method for Assessing Washing Durability of E-Textile Products

ICS 59.080.80; 59.080.01

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Wearable Electronic Devices and Technologies Sectional Committee, LITD 33

NATIONAL FOREWORD

This Indian Standard (Part 204/Sec 1) which is identical to IEC 63203-204-1 : 2023 'Wearable electronic devices and technologies — Part 204-1: Electronic textile — Test method for assessing washing durability of e-textile products' issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of Wearable Electronic Devices and Technologies Sectional Committee and approval of the Electronics and Information Technology Division Council.

The text of IEC standard has been approved as suitable for publication as an Indian Standard without deviations. Certain conventions are however, not identical to those used in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words 'International Standard' appears referring to this standard, they should be read as 'Indian Standard'; and

b) Comma (,) has been used as a decimal marker while in Indian Standards, the current practice is to use a point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standard, which is to be substituted in its place, is listed below along with its degree of equivalence for edition indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 6330 : 2012 Textiles — Domestic washing and drying procedures for textile testing	IS 15370 : 2020/ ISO 6330 : 2012 Textiles — Domestic washing and drying procedures for textiles testing (*first revision*)	Identical

The Committee has reviewed the provisions of the following International Standards referred in this adopted standard and has decided that they are acceptable for use in conjunction with this standard. For undated references, the latest edition of the referenced document applies, including any corrigenda and amendment .

International Standards	*Title*
ISO 139	Textiles — Standard atmospheres for conditioning and testing

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be same as that of the specified value in this standard.

CONTENTS

Indian Standard

WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES

PART 204 ELECTRONIC TEXTILE

SECTION 1 TEST METHOD FOR ASSESSING WASHING DURABILITY OF E-TEXTILE PRODUCTS

1 Scope

This document specifies a household washing durability test method for e-textile products. This document includes testing procedures for e-textile products with electrically conductive components and sensors to collect the data of the user.

This document does not cover safety or heat-generation test methods. Products containing components other than those listed in this clause are not covered by this document.

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.

ISO 139, *Textiles – Standard atmospheres for conditioning and testing*

ISO 6330:2012, *Textiles – Domestic washing and drying procedures for textile testing*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

3.1
e-textile product
product made from textiles and integrated electronics that together perform one or more functions such as measuring body temperature, heart rate or electrocardiogram, etc.

3.2
washing procedure
cycle of washing action including water supplying, washing, and repeated rinsing, spinning and water supplying and ending with spinning as predetermined on the washing machine

4 Test method – General

4.1 Checklist before carrying out washing durability test

Check the product as described in the user manual and confirm the proper operation according to the instructions in the manual. (Measurement of conductive tracks is optional. If the product contains areas of non-isolated conductive textile, resistance measurement

according to EN 16812 can be conducted additionally.) Then, measure the resistance and mark the measurement point, so that the same point can be measured after each washing durability test. Since the shape of the product varies, select the appropriate method to measure the resistance. The method of measuring conductive track resistance should be decided between the manufacturer and the user.

4.2 Washing durability test conditions

The washing durability test shall comply with the test procedure in ISO 6330:2012. ISO 6330:2012 offers various test procedures. E-textile products contain a unit that connects the modules with conductive track because of the nature of the product. Therefore, a hand-wash procedure is considered appropriate because it causes less damage to the product.

Conditions for washing the e-textile products are given as follows in this Subclause 4.2 and in 4.3.

The type of washing machine, detergent, washing method, drying method and number of repetitions are selected from methods standardized based on the manufacturer's designated care label. If not specified, the washing machine type is an ISO 6330:2012 reference washing machine Type A, the washing procedure is 4H, and the drying method is procedure A – line dry.

If there is an agreement between the user and the supplier to apply the washing conditions as specified in another International Standard, those alternative washing conditions shall be applied instead of those specified in this Subclause 4.2.

4.3 Check of operation before and after washing durability test

It is necessary to check the operation of the e-textile product under test after repeated washing and drying of the product in accordance with the test conditions. According to the procedure to check the operation status before washing in accordance with the user manual, double-check the operation status after washing and measure the resistance of the conductive textile to determine whether there is any disconnection (see Annex A).

5 Test procedure

5.1 Pretreatment

The specimens shall be stored for at least 24 h in standard atmosphere conditions ((20,0 ± 2,0) °C and (65,0 ± 4,0) % relative humidity (RH) in accordance with ISO 139). Start operating the product in the manner specified in the user manual. The product shall be checked to ensure it is operating normally, and that it functions in accordance with the user manual. If the features do not work as described in the user manual, record malfunction in the test report. All detachable components (e.g. connection module or batteries) shall be detached before washing. All embedded components shall remain on the product during the washing durability test.

5.2 Washing

Wash and dry the specimens in accordance with one of the procedures specified in ISO 6330:2012, following the manufacturer's designated care label.

5.3 Test after washing and drying

After the e-textile products have been processed with washing and drying, prepare to check the performance of the product. Check the operation status and function of the product according to the specified order in the user manual (see example in Figure 1).

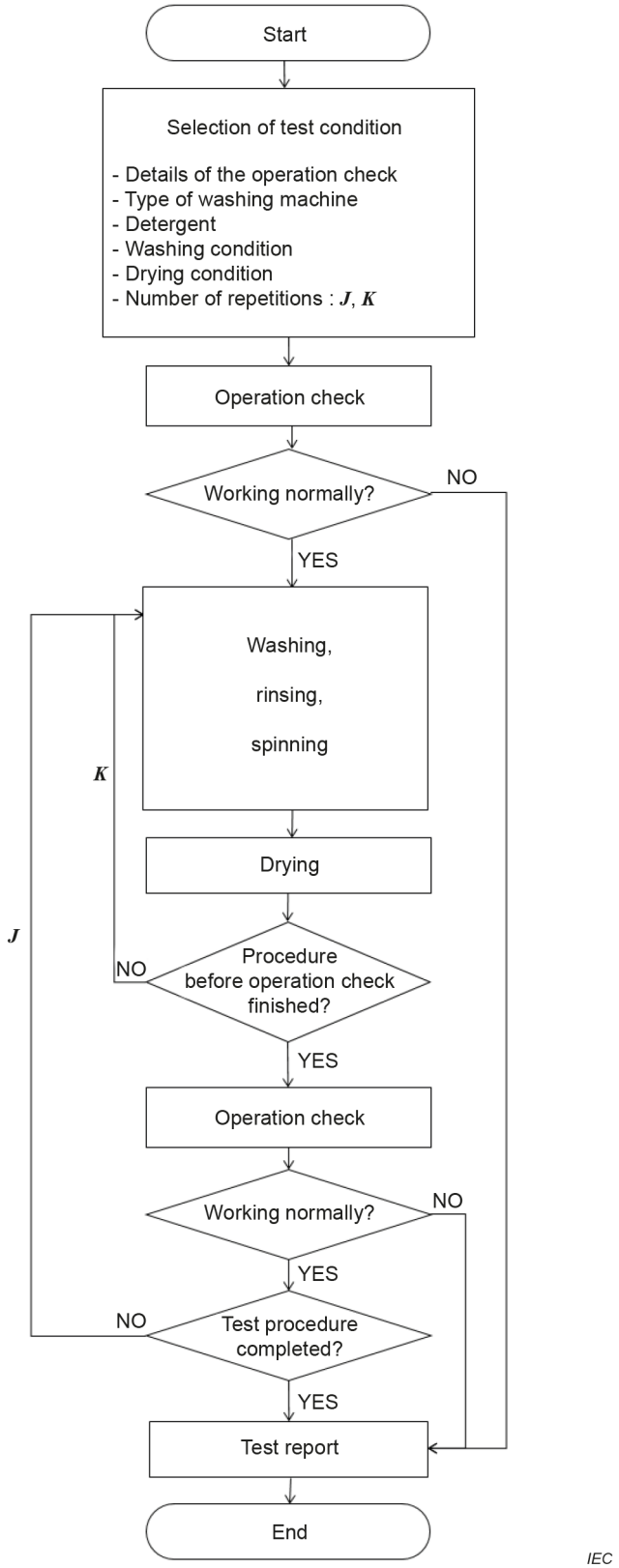


Figure 1 – Flow chart of test procedure

The number of repetitions, K, is determined by the agreement between the manufacturer and the user. Unless otherwise agreed, K = 0.

J is the number of repetitions until one of the following conditions is reached

a) when the function of the e-textile product is lost in the operation check;
b) when the conductive track is broken;
c) when the number of washing and drying procedures agreed in advance between the manufacturer and the user is reached.

6 Test report

The test reports of every test based on this document shall contain the following information:

a) number and year of publication of this document (i.e., "IEC 63203-204-1:2023");
b) product, intended use and type of (detachable) components in the test report;
c) operation status of the product in accordance with the user manual;
d) care label instructions (if applicable);
e) washing and drying method, the number of washes, number of repetitions, K;
f) electrical resistance after laundering (if applicable);
g) electrical resistance, measurement dimensions and measurement method;
h) operation status of the product in accordance with the user manual after the product has been washed;
i) number of repetitions, J.

Annex A
(informative)

Result of studies – Resistance measurement

A.1 Test procedure

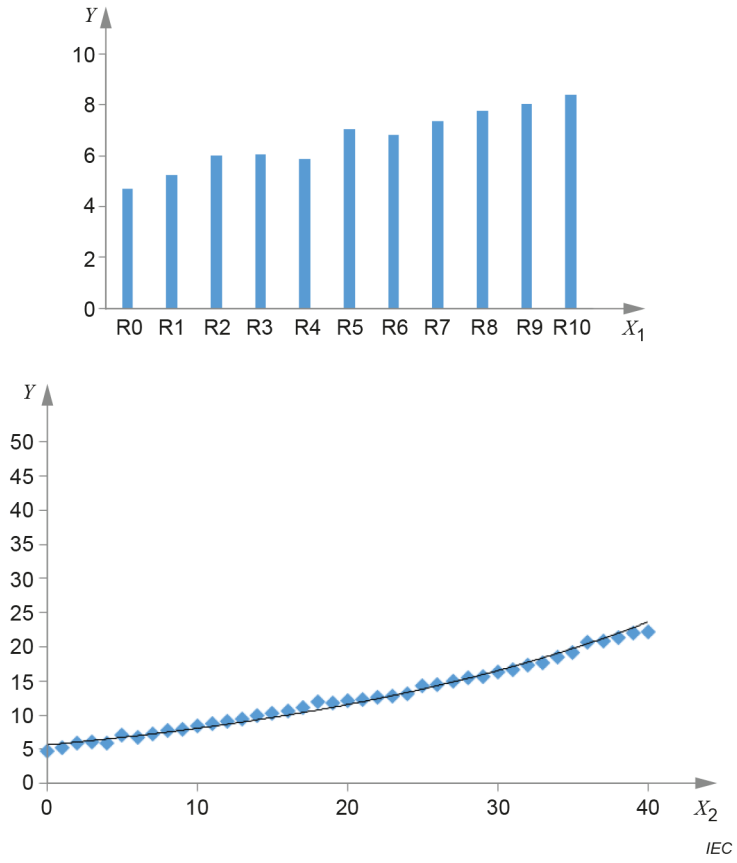
1) Prepare the test specimen, except for electrical components incorporated with batteries for the test pieces provided by the manufacturer.
2) Set measurement points at 100 mm each to the right and left of the centre of conductive areas, and measure the resistance three times at each point.
3) Pretreat the specimen in accordance with ISO 6330:2012. Make sure the pretreatment conditions comply with washing procedures: 9B, standard reference detergent 1 without optical brightener, and procedure C – flat dry.
4) Line dry the pretreated specimen for 8 h, and measure the resistance at the points mentioned in list item 2) above, three times.
5) Repeat testing 10 times to measure resistance values at each cycle.

A.2 Test results

After 19 washing procedures under extreme washing conditions, disconnections have been observed. For other products, resistance values before and after 10 washing procedures were slightly increased (see Table A.1 and Figure A.1). It is predictable that the higher the number of washing procedures, the greater the impact on the product's operability, therefore resistance measurement shall be factored into performance assessment. By testing e-textiles with optimal washing conditions which guarantee the lifespan and performance of the product, some possible defects of e-textiles can be proactively detected.

Table A.1 – Test conditions and results

Samples	Type	Test method – Conditions taken from Table D.1, Annex D of ISO 6330:2012	Results
A	E-textile	9B-flat dry, laundry test carried out 20 times, and operation check of each laundry test	After 19 iterations of the test procedure, sample is damaged
B	E-textile	9B-flat dry, laundry test carried out 10 times, operation check of each laundry test, electrical resistance measurement	Normal operation, resistance increased
C	E-textile shirt	9B-flat dry, laundry test carried out 20 times, and operation check for each laundry test	Normal operation



Key

X_1 Resistance after number of laundry tests

X_2 Number of laundry tests

Y Electrical resistance (Ω)

Figure A.1 – Test results of resistance measurement after laundry test

Bibliography

EN 16812:2016, *Textiles and textile products – Electrically conductive textiles – Determination of the linear electrical resistance of conductive tracks*

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Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the website-www.bis.gov.in or www.standardsbis.in.

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Amendments Issued Since Publication

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