



SLOVENSKI STANDARD
oSIST prEN IEC 63203-402-2:2022

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Nosljive elektronske naprave in tehnologije - 402-2. del: Merjenje zmogljivosti nosljivih izdelkov za fitnes - Štetje korakov

Wearable electronic devices and technologies - Part 402-2: Performance Measurement of Fitness Wearables - Step Counting

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Technologies et dispositifs électroniques prêts-à-porter - Partie 402-2: Mesure des performances des dispositifs prêts-à-porter d'activité physique - Podomètres

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124/189/CDV

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IEC TC 124 : WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES	
SECRETARIAT: Korea, Republic of	SECRETARY: Mr Jae Yeong Park
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Wearable electronic devices and technologies - Part 402-2: Performance Measurement of Fitness Wearables - Step Counting

PROPOSED STABILITY DATE: 2027

NOTE FROM TC/SC OFFICERS:

WG4 agreed this project proceeds to CDV and It was agreed at AG1 meeting held on 2022-05-27.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES

Part 402-2: Performance Measurement of Fitness Wearables –
Step Counting

FOREWORD

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International Standard IEC xxxxxx-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:

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

92 The committee has decided that the contents of this document will remain unchanged until the
93 stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to
94 the specific document. At this date, the document will be

- 95 • reconfirmed,
- 96 • withdrawn,
- 97 • replaced by a revised edition, or
- 98 • amended.

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106

107 Introduction

108 The step counting feature is a common functionality of wearable devices. The accurate
109 measurement and reporting of the step count is an important factor in that count being accepted
110 by consumers. Data from wearable devices may be useful in helping to improve the health and
111 well-being of consumers that use wearable devices. The usability of the data to improve
112 outcomes is dependent on the reliability of the data to facilitate acceptance and improvement.

113

114 This document defines and provides standard test methods to evaluate the performance and
115 reliability of step counting on wearable devices. The benefit of using this standard is that it
116 provides a method to compare the step counting function of a wearable device against actual
117 step count, which can provide manufacturers with a method to improve step counts on their
118 devices.

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WEARABLE ELECTRONIC DEVICES AND TECHNOLOGIES

Part 402-2: Performance Measurement of Fitness Wearables – Step Counting

1 Scope

This part of IEC XXX specifies terms and test methods to measure and evaluate the performance, reliability, and accuracy of step counting feature in any wearable devices that can count steps (e.g.: activity/fitness trackers, smart bands, smart shoes, and smart insoles).

This standard test method excludes the evaluation of data associated with travel distance or calorie consumption.

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.

There are no normative references in this document.

3 Terms, definitions, symbols and abbreviated terms

For the purpose of this document, the following 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/obp>

3.1

body mass index

BMI

value derived from the mass (weight in kilograms) and height (in metres) of an individual, defined as the body mass divided by the square of the body length, expressed in units of kg/m², calculated by the following formula: [Source : ISO 20342-1:2019]

$$\text{BMI} = m/l^2$$

where

m is the mass in kg;

l is the length in metres.

3.2

DUT

device under test

177 **3.3**178 **investigator**

179 qualified person responsible for testing at a testing site

180

181 **3.4**182 **jogging**

183 Raising and lowering each foot, with a period of time where neither foot is in contact with the
184 ground, with less intensity than running.

185

186 **3.5**187 **running**

188 action of moving faster than jogging with more vigorous intensity than jogging never having both
189 feet on the ground simultaneously with the express purpose of locomotion

190

191 **3.6**192 **step**

193 action or movement of lifting and then placing one foot in front of the other during walking or
194 running with the goal of locomotion

195

196 **3.7**197 **subject**

198 person wearing a DUT

199

200 **3.8**201 **treadmill**

202 training equipment with a unidirectional moving surface on which a walking or running activity
203 can take place, where the feet are free to leave the moving surface [Source : ISO 20957-6:2005]

204

205 **3.9**206 **walking**

207 action of moving at a regular pace by lifting and setting down each foot in turn, never having
208 both feet off the ground simultaneously with the express purpose of locomotion

209

210

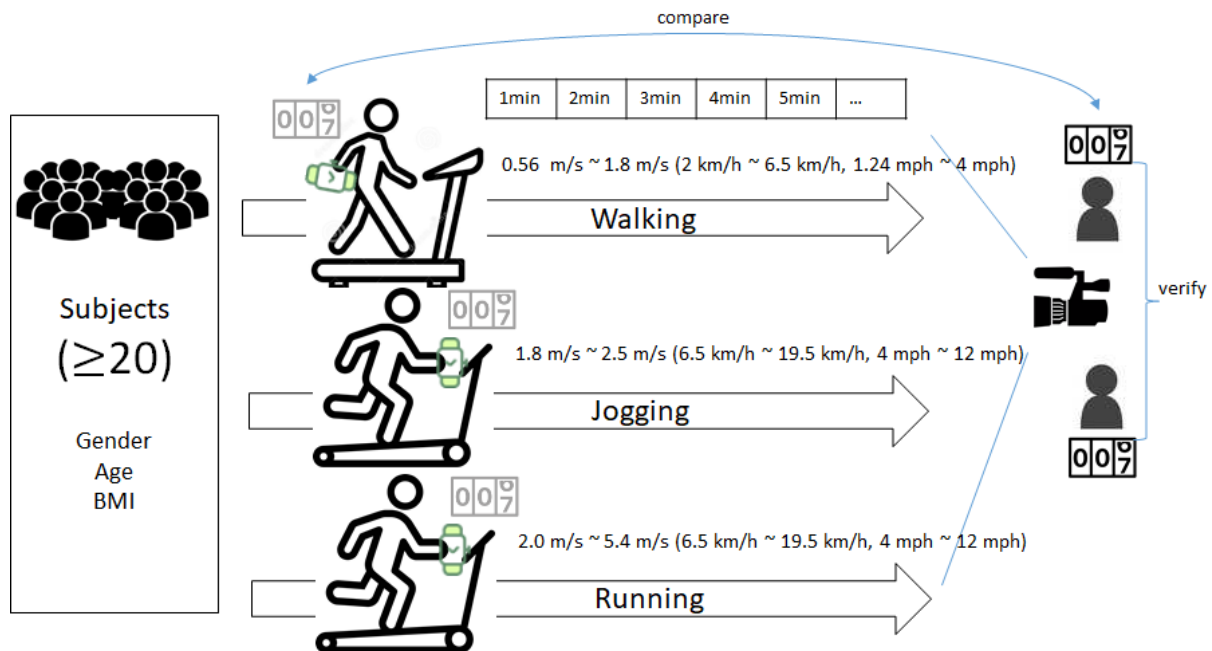
211 **4 Test methods and procedures**212 **4.1 General**

213 A subject shall either walk, jog, or run on a motor-driven treadmill at a pre-set speed while the
214 activity is video-recorded. The recorded video shall be analysed by two investigators to acquire
215 the confirmed actual step counts.

216

217

218



Environmental condition : Temperature should be $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, Ambient light, Humidity $< 70\%$ RH

Figure 1: overview of test environment and methods

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4.2 Apparatus

The usual laboratory apparatus and, in particular, the following shall be used.

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4.2.1 Treadmill

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- A motorized treadmill shall be used for testing.
- A motorized treadmill should be capable to adjust the speed from 0.56 m/s to 5.4 m/s and tilt to 0 degrees for at least 5 minutes.

230

4.2.2 Video recorder

231

232

233

- A video recorder is configured securely and properly to capture the entire view of the test area for each test. A video recorder should be affixed to a device that ensures it remains stationary during the test (e.g., tripod, stand).

234

235

236

- A video recorder should provide recording and monitoring capability, would be able to record for at least 5 minutes, and should have sufficient camera angle and sensitivity to record the motion of feet.

237

238

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- The recorded scene shall include the entire body of the subject and the treadmill without obstructions. Video frame shall clearly show all the subject's foot strikes on the treadmill during the test.

240

241

4.3 Preparation

242

4.3.1 Subject requirement

243

244

245

246

- Subjects shall have no medical conditions that restrict the subject from completing the test. Prior to testing, subjects shall complete the Physical Activity Readiness Questionnaire (PAR-Q) to determine eligibility to be included in testing. Any subject that answers "yes" to one or more questions on the PAR-Q shall be excluded.

- 247 • Clothing or shoes worn by the subject under test should not obstruct the ability to count
248 steps.
- 249 • Subjects shall not hold onto the treadmill during walking, jogging, or running tests on
250 the treadmill. Subjects' arms shall be able to freely swing and move during testing.
- 251 • For effective test design, it is important to select test participants using the PAR-Q.
- 252 • Unexpected errors can occur with a specific test subject resulting in unusual test results,
253 in which case additional subjects should be considered.
- 254 • Any excluded test results can be explained in Item 9 in the test report.

255 **4.3.2 Number of subjects**

- 256 • Testing shall include at least 20 subjects.

257 **4.3.3 Gender – Balance**

- 258 • At least 40% of subjects shall be male. At least 40% of subjects shall be female.

259 **4.3.4 Age**

- 260 • All subjects shall be at least 18 years of age and no older than 69 years of age.

261 **4.3.5 BMI – Range**

- 262 • The following percentage of subjects should be within the BMI range specified:
- 263 ○ At least 10% of subjects should be below 20 kg/m² BMI and
- 264 ○ At least 10 % of subjects should be above 25 kg/m² BMI
- 265 • Height and weight of each subjects are measured with light clothing and without shoes.
266 BMI is calculated from height and weight measurements.
- 267 **4.3.6 Wearing position of DUT**
- 268 • For wrist-worn devices, all subjects should identify which wrist they prefer for DUT (i.e.,
269 left wrist or right wrist). Other DUT should follow manufacturer recommendations.
- 270 • The DUT shall be worn in the recommended position provided by the manufacturer. The
271 investigator shall assist the subject in the proper placement of the DUT according to
272 device manufacturer's instruction. This information shall be recorded in the test report.

273 **4.3.7 Balanced speed conditions**

- 274 • For testing of each activity, balanced distribution of speed conditions should be
275 considered.

276

277 **4.4 Testing conditions**

278 **4.4.1 Temperature**

279 Temperature should be 23 °C ±5 °C, which is typical of indoor environments.

280 **4.4.2 Ambient light**

281 The ambient light levels in the testing area should consist of typical lighting conditions for indoor
282 environments.

283 **4.4.3 Humidity**

284 Relative humidity conditions in the test room should be less than 70 % RH.