SLOVENSKI STANDARD
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Načela za izbiro in uporabo preskusnih oseb za preskušanje antropometričnih vidikov industrijskih proizvodov in načrtov (ISO/DIS 15537:2021)

Principles for selecting and using test persons for testing anthropometric aspects of industrial products and designs (ISO/DIS 15537:2021)

Grundsätze für die Auswahl und den Einsatz von Prüfpersonen zur Prüfung anthropometrischer Aspekte von Industrieerzeugnissen und deren Gestaltung (ISO/DIS 15537:2021)

Principes de choix et d'utilisation de sujets d'essai pour l'essai des aspects anthropométriques des produits industriels et leur conception (ISO/DIS 15537:2021)

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Principles for selecting and using test persons for testing anthropometric aspects of industrial products and designs

Principes de choix et d'utilisation de sujets d'essai pour l'essai des aspects anthropométriques des produits industriels et leur conception

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 15537 was prepared by the European Committee for Standardization (CEN) Technical Committee CEN/TC 122, *Ergonomics*, in collaboration with Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 3, *Anthropometry and biomechanics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Introduction

An investigation into how far ergonomic requirements are taken into consideration with regard to industrial products and designs is often performed using test equipment, giving possibilities to register only one parameter (for example only the body height) or perhaps a few parameters. With regard to the concurrent multifunctional testing and/or determination of product characteristics for which no technical testing procedures have been laid down, one or several persons are often designated as test persons and are observed and/or questioned while or after using the product under test.

The reliability of any findings established in this way is very much dependent on the extent to which the test persons represent the intended user group in different aspects. How well a product or design is adjusted to the anthropometrics of the intended user population is dealt with in this International Standard.

According to EN 614-1, work equipment, e.g. machinery, has to be designed with proper regard to the body dimensions of the intended user population. One means to verify that a product or a design fulfils this requirement is to set up a panel of test persons and let them test the product in different ways.

An example of the use of this International Standard is given in Annex A (informative).

Principles for selecting and using test persons for testing anthropometric aspects of industrial products and designs

1 Scope

This International Standard establishes methods for determining the composition of groups of persons whose anthropometric characteristics are to be representative of the intended user population of any specific object under test.

This International Standard is applicable to the testing of anthropometric aspects of industrial products and designs having direct contact with the human body or dependent on human body measurements, e.g. machinery, work equipment, personal protective equipment (PPE), consumer goods, working spaces, architectural details or transportation equipment.

This International Standard is also applicable to the testing of such safety aspects of products that are dependent on human body measurements. It does not deal with other aspects of the task or other requirements, such as perception of information (except geometrical arrangement of the viewing targets) and the use of controls (except their geometrical placement).

Although this International Standard deals with selecting test persons from an anthropometric perspective, similar general principles could be applied for other test variables, e.g. biomechanical aspects.

2 Normative references

The following referenced documents are indispensable for the application 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 7250-1:2017, *Basic human body measurements for technological design – Part 1: Body measurement definitions and landmarks*

ISO 7250-3:2015 *Basic human body measurements for technological design - Part 3: Worldwide and regional design ranges for use in product standards*

ISO 15534-3:2000, *Ergonomic design for the safety of machinery — Part 3: Anthropometric data*

3 Terms and definitions

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

3.1
critical dimension of a product to be tested
dimension estimated to cause a major limitation for the usage from an anthropometrical point of view, for the whole body or body parts, depending on the function of the product in question

NOTE 1 Critical dimension is related to reach, clearance, posture, contact pressure, visionor other factors which may result in difficulties of use, discomfort or health risks.

NOTE 2 A product to be tested can have more than one critical dimension, for example, a combination of a reach- and a clearance-dimension.

EXAMPLE The critical dimension for an access opening could be the width, or a combination of two dimensions, for example the width and the opening height.

3.2
critical anthropometric measurement
anthropometric measurement which is most affected by the critical dimensions of the product

NOTE For instance, the critical anthropometric measurement for a person entering an opening for whole body access is the one with the greatest constraint (for example, the body height and/or the body width, depending on the form of the access opening).

3.3
worst-case combination of critical dimensions and anthropometric measurements
combination of critical dimensions of the product, additional equipment and the critical anthropometric measurement imposing the biggest restriction on a person who is able to use the product or design as intended

3.4
slim body type
person for whom at least two width measurements (preferably shoulder width and hip breadth) and two depth measurements (preferably chest depth and abdominal depth) are smaller than the figure representing the 25th percentile or, where this figure is not available, the average value of the 5th and the 50th (mean) percentile for the population in question

3.5
corpulent body type
person for whom at least two breadth measurements (preferably shoulder breadth and hip breadth) and two depth measurements (preferably chest depth and abdominal depth) are bigger than the figure representing the 75th percentile or, where this figure is not available, the average value of the 50th percentile (mean) and the 95th percentile for the population in question

3.6
medium body type
person belonging neither to the slim nor to the corpulent body type

4 Types of tests

4.1 General

Testing may be done with living humans or with virtual humans, sometimes known as computer manikins. Current design processes often involve computer-aided design (CAD) systems, where it is possible to insert virtual humans into the CAD design process. See ISO 15536-1 and ISO 15536-2 for information on computer manikins. The tests described below can be done with living humans in a physical mockup or with virtual humans in a CAD environment. If virtual humans are used, users are cautioned to assess the validity of the models before assuming accurate test results.

Test participants – virtual or human – are defined by anthropometry. The simplest designs require anthropometric information on only a few dimensions. In such cases, defining test participants using population percentiles may be appropriate. For more complex designs, using percentiles on many dimensions may give a false sense of accommodation, because persons who might be accommodated by one or two dimensions might not be accommodated by the next 3 dimensions, while persons accommodated by the third and fourth dimensions may not be accommodated on the first one or two. The reason for this is that many design-critical dimensions are often not well correlated with each other. For these more complex design problems, a good solution is a multivariate anthropometric approach (see ISO TR - XXX Multivariate Anthropometric Methods). Unfortunately, multivariate solutions generally require access to raw anthropometric data, which are often proprietary or otherwise not publicly available.

