

ISO/TC 159/SC 3

Secretariat: JISC

Voting begins on:  
2023-03-17

Voting terminates on:  
2023-06-09

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## Basic human body measurements for technological design —

### Part 2: Statistical summaries of body measurements from national populations

iTeh STANDARD PREVIEW  
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*Définitions des mesures de base du corps humain pour la conception  
technologique —*

*Partie 2: Résumés statistiques des mesurages du corps de populations  
nationales* [TR 7250-2](#)

<https://standards.iteh.ai/catalog/standards/sist/9ac2b8fa-30e9-4dde-ae99-a8b5d0900ca8/iso-dtr-7250-2>

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Reference number  
ISO/DTR 7250-2:2023(E)

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Published in Switzerland

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

This second edition cancels and replaces the first edition (ISO/TR 7250-2:2010), which has been technically revised. It also incorporates the amendment ISO/TR 7250-2:2010/Amd 1:2013.

The main changes are as follows:

- Measurement item numbers have been updated to harmonize with ISO 7250-1.
- Statistics for the male and female combined data have been deleted.
- Data from the Republic of Korea have been updated.
- New data from Sweden and Brazil have been added.

A list of all parts in the ISO 7250 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Anthropometric data used for technological design have been included in many ISO product standards. However, different review cycles make it impossible for simultaneous revision of these product standards as new anthropometric data become available. This document is intended to serve as a continually updated repository of the most current national anthropometric data. It is intended to make current and updated anthropometric data available for inclusion by reference in the various ISO product standards requiring ISO 7250-1 body measurement input, wherever national specificity of design parameters is required.

Body dimensions of people have been increasing in many countries over the past few decades. The rate of increase differs from country to country. In the area where significant secular change is going on, statistical summaries described in this document will be outdated sooner. Therefore, it is intended that statistical summaries of human body measurements described in this document be updated as new data become available.

This document provides body dimensions data for people of working age. In order to provide practical data, the working age population is not defined and the decision is left to each country, because working age differs between countries. However, the data for children under 16 years are not included.

To ensure the comparability of measurements, body dimensions in this document are measured according to ISO 7250-1. To ensure the reliability of statistical data, databases from which statistics are calculated adhere to ISO 15535:2012 and ISO 15535:—.<sup>1)</sup>

Users of this document and ISO member bodies are encouraged to submit anthropometric data for this document. Users with knowledge of additional anthropometric data are encouraged to contact their ISO member body and copy the ISO/TC 159/SC 3 committee manager on the communication (e-mail addresses can be found on the ISO website: <https://www.iso.org/>). Member bodies can contact the ISO/TC 159/SC 3 committee manager directly.

[ISO/DTR 7250-2](https://standards.iteh.ai/catalog/standards/sist/9ac2b8fa-30e9-4dde-ae99-a8b5d0900ca8/iso-dtr-7250-2)

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1) Under preparation. Stage at the time of publication: ISO/DIS 15535:2023.

# Basic human body measurements for technological design —

## Part 2: Statistical summaries of body measurements from national populations

### 1 Scope

This document provides statistical summaries of body measurements measured according to ISO 7250-1, together with database background information for working age people prepared according to ISO 15535:2012 in the national populations of individual ISO member bodies. This document also describes the process of the measurement and preparation of statistical summaries.

### 2 Normative references

There are no normative references in this document.

### 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:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

#### 3.1

##### **secular change**

changes in mean body dimensions of a specific group over time

Note 1 to entry: The direction of change can be positive or negative.

### 4 Anthropometric measurements

Measuring conditions and definitions of measurements in this document are the same as those described in ISO 7250-1. Body measurements are described in millimetres (mm) or kilograms (kg).

Body measurements obtained from 3-D systems or obtained using instruments different from those described in ISO 7250-1 are confirmed by member bodies to be sufficiently close to those produced by the traditional methods of ISO 7250-1 according to ISO 20685-1:2018, Clause 5.

Sometimes a measurement is not performed exactly as described in ISO 7250-1, but is very similar. In such cases, the measurement can be substituted for the ISO 7250-1 measurement if its value is adequately close. To judge closeness, the method described in ISO 20685-1 is used. The criteria for the judgment are given in [Annex A](#).

The measured side (right or left) is described.

When measurements not described in ISO 7250-1 are also available, the number of these measurements and the reference are provided.

Age statistics are tabulated similarly and presented together with the anthropometric measurements.

## 5 Statistical procedures

### 5.1 Data editing

Before calculating statistical values, irregular values are detected and reviewed according to ISO 15535:2012, Annex F or ISO 15535:—, Annex F.<sup>2)</sup>

### 5.2 Statistics

In this document, the following statistics are described for each measurement: sample size, mean, standard deviation (SD) and 1st, 5th, 50th, 95th and 99th percentile values.

### 5.3 Population stratification

Population can be stratified by gender, age, location, occupation or education. To keep this document at a reasonable size, statistics are presented for females and males, but not for other strata.

### 5.4 Age stratification

In order to provide practical data and to keep this document at a reasonable size, only one age group, including all working-age people, is considered.

### 5.5 Body measurements for representative body forms

Measurements for body forms representing large, medium and small types are useful for technological design. While the medium type can be represented by P50 values for all measurements, fixed percentile options are problematic for extreme body forms, such as those derived from all P5 or P95 values. When sitting height and leg length are P5, height is smaller than P5. Though such a problem is well recognized, there is no consensus on the method for obtaining measurements for body forms statistically representing the variation in a population. Considering this lack of consensus, it was decided not to present such data in this document.

## 6 Background information

### 6.1 General

Statistics of body dimensions are described together with the following information for users to judge their reliability and context.

### 6.2 Background of database

#### 6.2.1 Time period of examination

Year(s) of measurement.

#### 6.2.2 Location of examination

Name of the country and city.

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2) Under preparation. Stage at the time of publication: ISO/DIS 15535:2023.



### 6.2.3 Demographic data

For demographic data (e.g. gender, age), information on the following items is provided:

- a) definition of the working age;
- b) description of participants;
- c) number of participants by gender;
- d) 10-year age groups.

When more than one subgroup based on criteria other than the age and gender is involved, the percentage of each subgroup is provided, if necessary.

### 6.2.4 Publication on the anthropometric research

The author, publication year, title of the publication and the name of publisher are provided when the data have been published.

## 6.3 Representativeness of the sample

### 6.3.1 Sampling method

A description is given of the grounds on which the sample was judged to be representative of the intended population. These include an examination of the sampling method and can also include the comparison of height and weight in the measured sample data with those from a large sample representing the intended population. If the data need to be weighted in order to be representative, then the weighting method is described.

### 6.3.2 Information on secular change

When significant secular changes are going on, information on the rate of change over the past few decades is presented, when available, and appropriate references are given.

## 6.4 Accuracy and reliability of measurements

### 6.4.1 Skill of measurers

The number of measurers and information on the skill of each measurer, such as intra-observer mean absolute difference or technical error of measurement (TEM) or repeated measurements, are shown when such data are available. When more than one measurer is involved, the methods used to control the quality of the measurement technique are documented. When the research is continued for more than one month, the method of quality control during the research period is documented.

### 6.4.2 Measurements from 3-D scanners

When measurements are extracted from 3-D scans, the results are compared to measurements obtained by traditional methods using the procedures in ISO 20685-1:2018, Clause 5. Similarly, measurements taken using instruments not described in ISO 7250-1 are compared to those obtained by traditional methods.

## 7 Procedure for presenting member body statistics

### 7.1 General

This clause describes how the statistics given in this document are gathered and checked.

## 7.2 Submission of data

Users of this document and ISO member bodies are encouraged to submit anthropometric data for this document. Users with knowledge of additional anthropometric data can contribute by contacting their ISO member body and copying the ISO/TC 159/SC 3 secretariat on the communication (e-mail addresses can be found on the ISO website: <https://www.iso.org/>). Member bodies can contact the ISO/TC 159/SC 3 committee manager directly. When information is received, it is processed as described in this clause.

## 7.3 One data set from each member body

In the case of countries with more than one possible database, the member body determines which of the databases is to be used. If more than one set of statistics is submitted, the member body will be asked to choose only one data set.

## 7.4 Meeting the criteria outlined in 5.2, 5.3 and 5.4

Member bodies will provide summary statistics that meet the criteria outlined in 5.2, 5.3 and 5.4. If the criteria are not met on the first submission, the member body will be asked to resubmit the statistics according to the criteria.

## 7.5 Examination of possible errors

### 7.5.1 General

Recognizing that errors can accidentally occur in any data set, the submitted summary statistics are examined for reasonableness. The steps used are those in 7.5.2 to 7.5.5.

### 7.5.2 Minima and maxima

The minima and maxima for each dimension are examined, comparing them to minima and maxima from other member body submissions. If minima or maxima are likely to be the result of errors, the member body will be contacted to verify the submission.

### 7.5.3 Percentile values

The distance of the P1 and P99, P5 and P95 from the P50 percentile value are examined. If the distant percentiles are unusually distant from the P50, the member body will be contacted to verify the submission.

### 7.5.4 Standard deviation (SD)

The SD is compared to the SD submitted by other member bodies. If the SD is unusually large or unusually small, the member body will be contacted to verify the submission.

### 7.5.5 Comparison of mean or P50 values from member bodies

The mean or P50 values are examined with respect to mean or P50 values from other member bodies to make sure that the dimension being reported is that described in ISO 7250-1. If it appears that a different measuring technique, or different measurement definition, has been used, the member body will be contacted to verify the measurement procedure.

## 7.6 Marks on values likely to be in error

If resubmitted summary statistics are still likely to be in error, the published values are marked with a footnote.

## 8 Statistics for ISO national members

### 8.1 General

Background information and a statistical summary from each member body are presented in separate tables in this clause. Data from Germany are in [Table 1](#) and [Table 2](#). Data from Italy are in [Table 3](#) and [Table 4](#). Data from Japan are in [Table 5](#) and [Table 6](#). Data from Kenya are in [Table 7](#) and [Table 8](#). Data from the Republic of Korea are in [Table 9](#) and [Table 10](#). Data from the Netherlands are in [Table 11](#) and [Table 12](#). Data from Thailand are in [Table 13](#) and [Table 14](#). Data from the United States of America are in [Table 15](#) and [Table 16](#). Data from China are in [Table 17](#) and [Table 18](#). Data from India are in [Table 19](#) and [Table 20](#). Data from Sweden are in [Table 21](#) and [Table 22](#). Data from Brazil are in [Table 23](#) and [Table 24](#).

### 8.2 Austria

Organization: Austrian Standards Institute

Name of study: —

Austria adopts anthropometric data from DIN 33402-2.

### 8.3 Germany

Organization: Deutsches Institut für Normung - German Standardization Institute (DIN)

Name of study: —

**Table 1 — Germany — Database**

<b>1 Measurement</b>		
1.1	Measured side (right/left)	Right
1.2	Measurement definitions different from those described in ISO 7250-1	None
1.3	Substituted measurements	
1.4	Number of measurements not described in ISO 7250-1	
<b>2 Age range</b>		
2.1	Working age	18 to 65
2.2	Age range of participants	18 to 65
<b>3 Background data</b>		
3.1	Time period of examination	1999 to 2002
3.2	Location of examination	Different areas of Germany
3.3	Survey sample	Representative (regional, social, ethnic)
3.4	Publication	DIN 33402-2
<b>4 Representativeness of the sample</b>		
4.1	Sampling method	

**Table 1 (continued)**

4.2	Information on secular change	The secular trend in Germany has stopped.
<b>5 Accuracy and reliability of measurements</b>		
5.1	Intra- and inter-observer error rates	Exist
5.2	Measurements from 3-D scanners	None
5.3	Other measurement not taken using instruments described in ISO 7250-1	None
5.4	Type of clothing	Without shoes, minimal clothing

**Table 2 — Germany — Statistical summary**

No.	ISO 7250-1 measurement		Sample size	Mean	SD	P1	P5	P50	P95	P99
			<i>n</i>							
		Age	Male							
			Female							
1	6.1.1	Body mass (weight), kg	Male				64	79	100	
			Female				52	66	87	
2	6.1.2	Stature (body height)	Male				1 650	1 750	1 855	
			Female				1 535	1 625	1 720	
3	6.1.3	Eye height	Male				1 530	1 630	1 735	
			Female				1 430	1 515	1 605	
4	6.1.4	Shoulder height	Male				1 345	1 450	1 550	
			Female				1 260	1 345	1 425	
5	6.1.5	Elbow height	Male				1 025	1 100	1 175	
			Female				960	1 020	1 080	
6	6.1.6	Iliac spine height, standing	Male							
			Female							
7	6.1.7	Crotch height	Male				760	830	905	
			Female				710	775	830	
8	6.1.8	Tibial height	Male				430	460	480	
			Female				400	425	450	
9	6.1.9	Chest depth, standing	Male				195	225	270	
			Female				165	190	235	
10	6.1.10	Body depth, standing	Male				260	285	380	
			Female				245	290	345	
11	6.1.11	Chest breadth, standing	Male							
			Female							
12	6.1.12	Hip breadth, standing	Male				340	360	385	
			Female				340	365	400	
13	6.2.1	Sitting height (erect)	Male				855	910	965	
			Female				810	860	910	
14	6.2.2	Eye height, sitting	Male				740	795	855	
			Female				705	755	805	

Table 2 (continued)

No.	ISO 7250-1 measurement			Sample size <i>n</i>	Mean	SD	P1	P5	P50	P95	P99
15	6.2.3	Cervical height, sitting	Male								
			Female								
16	6.2.4	Shoulder height, sitting	Male				570	625	670		
			Female				540	590	630		
17	6.2.5	Elbow height, sitting	Male				210	240	285		
			Female				185	230	275		
18	6.2.6	Shoulder-elbow length	Male				330	365	400		
			Female				290	320	350		
19	6.2.7	Shoulder (biacromial) breadth	Male				370	405	435		
			Female				345	370	400		
20	6.2.8	Shoulder (bideltoid) breadth	Male				440	480	525		
			Female				395	435	485		
21	6.2.9	Elbow-to-elbow breadth	Male				415	480	555		
			Female				395	485	555		
22	6.2.10	Hip breadth, sitting	Male				350	375	420		
			Female				360	390	460		
23	6.2.11	Popliteal height, sitting	Male				410	450	490		
			Female				375	415	450		
24	6.2.12	Thigh clearance	Male				130	150	180		
			Female				125	145	175		
25	6.2.13	Knee height, sitting	Male				495	535	585		
			Female				460	500	545		
26	6.2.14	Abdominal depth, sitting	Male				200	280	330		
			Female				205	250	325		
27	6.2.15	Thorax depth	Male								
			Female								
28	6.2.16	Buttock-abdomen depth, sitting	Male								
			Female								
29	6.3.1	Hand length (stylion)	Male				175	189	207		
			Female				162	177	193		
30	6.3.2	Palm length	Male				104	111	121		
			Female				92	100	108		
31	6.3.3	Hand breadth at metacarpals	Male				80	87	94		
			Female								
32	6.3.4	Index finger length	Male				68	75	83		
			Female				62	69	77		
33	6.3.5	Index finger breadth, proximal	Male				19	21	23		
			Female				17	19	21		
34	6.3.6	Index finger breadth, distal	Male				17	18	20		
			Female				14	16	18		
35	6.3.7	Foot length	Male				245	265	285		
			Female				225	245	260		

Table 2 (continued)

No.	ISO 7250-1 measurement			Sample size <i>n</i>	Mean	SD	P1	P5	P50	P95	P99
36	6.3.8	Foot breadth	Male					92	101	111	
			Female				83	92	102		
37	6.3.9	Head length	Male					185	195	205	
			Female				170	185	195		
38	6.3.10	Head breadth	Male					145	155	165	
			Female				140	150	160		
39	6.3.11	Face length (menton-sellion)	Male					105	115	130	
			Female				95	110	125		
40	6.3.12	Head circumference	Male					545	570	600	
			Female				520	545	570		
41	6.3.13	Sagittal arc	Male					330	350	375	
			Female				310	330	360		
42	6.3.14	Bitragion arc	Male					340	365	385	
			Female				320	335	360		
43	6.3.15	Thumb length	Male								
			Female								
44	6.3.16	Thumb breadth	Male								
			Female								
45	6.3.17	Hand thickness	Male								
			Female								
46	6.3.18	Hand breadth, including thumb	Male								
			Female								
47	6.3.19	Arm circumference flexed	Male								
			Female								
48	6.3.20	Forearm circumference flexed	Male								
			Female								
49	6.4.1	Wall-acromion distance	Male								
			Female								
50	6.4.2	Grip reach; forward reach	Male					685	740	815	
			Female				625	690	750		
51	6.4.3	Elbow-wrist length	Male								
			Female								
52	6.4.4	Elbow-grip length	Male					325	350	390	
			Female				295	315	350		
53	6.4.5	Fist (grip axis) height	Male					730	765	825	
			Female				670	715	760		
54	6.4.6	Forearm-fingertip length	Male					440	475	510	
			Female				400	430	465		
55	6.4.7	Buttock-popliteal length (seat depth)	Male					450	495	540	
			Female				435	485	530		
56	6.4.8	Buttock-knee length	Male					565	610	655	
			Female				545	590	640		

Table 2 (continued)

No.	ISO 7250-1 measurement			Sample size <i>n</i>	Mean	SD	P1	P5	P50	P95	P99
57	6.4.9	Neck circumference	Male					335	380	410	
			Female				305	345	385		
58	6.4.10	Chest circumference	Male					870	975	1 110	
			Female				850	990	1 180		
59	6.4.11	Waist circumference	Male					700	875	1 010	
			Female				665	790	990		
60	6.4.12	Wrist circumference	Male					160	175	190	
			Female				150	165	180		
61	6.4.13	Thigh circumference	Male					490	570	640	
			Female				485	565	670		
62	6.4.14	Calf circumference	Male					325	375	415	
			Female				325	360	415		

## 8.4 Italy

Organization: Ente Nazionale Italiano di Unificazione (UNI)

Name of study: "Italia si misura" project

Table 3 — Italy — Database

1 Measurement		
1.1	Measured side (right/left)	Right
1.2	Measurement definitions different from those described in ISO 7250-1	None
1.3	Substituted measurements	6.1.7 crotch height: obtained from the difference of stature less sitting height (6.1.2 – 6.2.1). 6.2.3 Cervical height, sitting and 6.2.4 shoulder height, sitting as the difference of stature less Cervical height, standing and stature less shoulder height, standing from sitting height: 6.2.3= [6.2.1- (6.1.2 – Cervical height, standing)] and 6.2.4 = [6.2.1- (6.1.2 – shoulder height standing)]
1.4	Number of measurements not described in ISO 7250-1	Five measurements: Cervical height, standing (see Reference [2], no. 11), cre-stale height (see Reference [3] Altezza Crista iliaca), bi-cristal breadth, shoulder height, standing (see References [2] and [3]), styloid height, standing, (see References [2] and [3])
2 Age range		
2.1	Working age	Age 17 to 84: the full sample ( $n = 4\ 135$ )
2.2	Age range of participants	Age 18 to 65: the sample used for this statistical presentation ( $n = 4\ 020$ )
3 Background data		
3.1	Time period of examination	1990 to 1991, July to September