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Indian Standard

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एंथ्रोपोमेट्रिक डेटाबेस स्थापित — सामान्य अपेक्षाएँ

(पहला पुनरीक्षण)

Establishing Anthropometric Databases — General Requirements

(First Revision)

ICS 13.180

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NATIONAL FOREWORD

This Indian Standard (First Revision), which is identical to ISO 15535 : 2023 'General requirements for establishing anthropometric databases' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Ergonomics Sectional Committee and approval of the Production and General Engineering Division Council.

The well-being of people is very much dependent on their proportional and geometric relationship with several factors, such as growth, design principles for clothing, transportation, workplace and homes, as well as, sporting and recreational activities. Implementation of databases on body dimensions of a population supports essential health and safety requirements, as well as, standards in the field of machinery safety and personal protective equipment, and has acquired importance in the devising of computer-generated manikins of the human body.

One of the major difficulties in formulating databases on anthropometry is, that the numerous existing studies are rarely comparable in the strictest sense. Difficulties arise in comparing one study with another because either the methods used differ or they are not sufficiently well described. The anthropometric standards used for the data collection are fundamental to setting up any anthropometric databases.

This standard was originally published in 2017 based on ISO 15535 : 2012. This first revision has been brought out to align it with the latest version of ISO 15535.

The major changes in this revision are as follows:

a) Recommendation of tabulation for sex combined statistics in **9.4** has been removed;

b) Term "sex" has been replaced with "gender";

c) Term "subject" has been replaced with "participant";

d) Term "examination" has been replaced with "measurement";

e) Annex A has been revised to add another method for estimating a necessary sample size;

f) Table C.1 has been revised to correspond with dimension numbers in IS 13214 (Part 1)/ ISO 7250-1 and also some minor technical revisions have been made in the table; and

g) Former Annexes G and H have been removed.

The text of ISO 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' appear 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, references appear to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards, which are to be substituted in their respective places, are listed below along with their degree of equivalence for the editions indicated:

International Standard	*Corresponding Indian Standard*	*Degree of Equivalence*
ISO 3166-1 Codes for the representation of names of countries and their subdivisions — Part 1: Country code	IS 14836 (Part 1) : 2020/ISO 3166-1 : 2013 Codes for the representation of names of countries and their subdivisions: Part 1 Country codes (*second revision*)	Identical

(*Continued on third cover*)

Contents

Page

Introduction

The well-being of people is very much dependent on their proportional and geometric relationship with several factors, such as growth, design principles for clothing, transportation, workplace and homes, as well as sporting and recreational activities. Implementation of databases on the body dimensions of a population supports essential health and safety requirements, as well as International Standards in the field of machinery safety and personal protective equipment and has acquired importance in the devising of computer-generated manikins of the human body.

One of the major difficulties in formulating international databases on anthropometry is that the numerous existing studies are rarely comparable in the strictest sense. Difficulties arise in comparing one study with another because either the methods used differ or they are not sufficiently well described. The anthropometric standards used for the data collection are fundamental to setting up any anthropometric databases.

This document is intended to be used in close conjunction with ISO 7250-1. The ultimate goal is that a database developed by one researcher can be easily used by other researchers. This would be in a form that is readily accessible by those responsible for developing standards in support of good design and health and safety requirements (e.g. the ISO 15534 series and ISO 14738). To achieve this goal, it has been necessary to develop an appropriate International Standard to ensure that anthropometric databases and their associated reports are internationally compatible.

Indian Standard

ESTABLISHING ANTHROPOMETRIC DATABASES — GENERAL REQUIREMENTS

(First Revision)

1 Scope

This document specifies general requirements for anthropometric databases and their associated reports that contain measurements taken in accordance with ISO 7250-1.

It provides necessary information, such as characteristics of the user population, sampling methods, measurement items and statistics, to make international comparison possible among various population segments. The population segments specified in this document are people who are able to hold the postures specified in ISO 7250-1.

NOTE The traditional anthropometry defined in ISO 7250-1 is considered to be a necessary complement to 3-D methods, which are used in some countries. Scanned data are verified according to the definitions given in ISO 7250-1 (see ISO 20685-1). State-of-the-art software allows integration of traditional anthropometric measures with those obtained by 3-D imaging.

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 3166-1, *Codes for the representation of names of countries and their subdivisions — Part 1: Country code*

ISO 7250-1:2017, *Basic human body measurements for technological design — Part 1: Body measurement definitions and landmarks*

ISO 8601-1, *Date and time — Representations for information interchange — Part 1: Basic rules*

ISO/IEC 8859-1, *Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet No. 1*

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
population segment
group of people having one or more common background characteristics that influence their anthropometric distributions

3.2
user population
population segment (3.1) or segments for whom a technological design is intended

3.3
random sampling
sampling which follows a set of procedures to ensure that each and every individual in the population has an equal chance of being selected

3.4
stratified random sampling
sampling following a procedure in which the population is divided into sub-populations (strata), each one of which contributes with a specified number of randomly selected individuals

3.5
demographic data
background information (e.g. gender, dwelling or working place, occupation, education) used to describe members of the *user population* (3.2) and/or *population segments* (3.1)

3.6
anthropometry
study and measurement of the physical dimensions and mass of the human body and its constituent (external) parts

3.7
anthropometric data
dimensional measurements (e.g. weight, height, length, depth, breadth and circumference) of the human body and its component parts

3.8
anthropometric database
collection of individual body measurements [*anthropometric data* (3.7)] and background information [*demographic data* (3.5)] recorded on a group of people (the sample)

3.9
anthropometric report
technical report describing the origin, contents, methods and statistical characteristics of an *anthropometric database* (3.8)

3.10
relative accuracy
ratio of accuracy of measurement to the population mean of the dimension in question

4 Data collection design

4.1 General

The following methods shall be used in assembling internationally compatible anthropometric databases.

4.2 Definitions, techniques and conditions of measurement

4.2.1 The measuring methods given in ISO 7250-1 shall be used. Any deviation from this shall be indicated in the anthropometric report. It is anticipated that items other than those specified by ISO 7250-1 will be measured according to the purpose of the investigation. In such cases, definitions, methods, instruments and measurement units shall be clearly indicated in the report.

4.2.2 When a measurement can be taken on both the left and right sides of the human body, the report shall clearly indicate on which side the measurement has been taken.

4.2.3 Photographs or detailed sketches of the measurements taken should be provided and the measurement procedures should be documented.

4.2.4 The participant shall be nude or wearing minimal clothing, shall be bareheaded and without shoes. The type of clothing, if relevant, shall be coded on the anthropometric data sheet.

4.2.5 The measurement conditions shall be documented, together with the numerical results of any survey.

4.3 Sampling techniques

4.3.1 The demographic characteristics of the population shall be indicated as clearly as possible in the report. In the event that the population is divided into several subgroups, for example measurement location and dwelling location for either sampling or statistical reporting, this shall be stated in the report.

4.3.2 It is recommended that random or stratified random sampling methods be used. However, if this is not possible, the report shall indicate the sampling method used.

4.3.3 It is recommended that the number of participants needed for a database be established using a statistical power formula based on the accuracy of results desired by the investigator (see 5.5). However, in reality the selection of participants is often influenced by various factors, such as population size, number of people who agree to participate, and cost and period of time required for the investigation.

5 Data collection requirements

5.1 Basic demographic description of participants

Biographic questionnaires shall be filled out to provide information that includes gender, date of birth, date of measurement and measurement location. Other demographic data may be included on the questionnaire depending upon the purposes of the study.

5.2 Detection and treatment of measurement errors

The editing of obvious anomalies during data collection shall be carried out following the procedure described in Annex F, for example using computer software specifically written for the purpose of detecting figures that lie outside any reasonable range of data given for that dimension.

5.3 Instrument accuracy

Anthropometric instruments for taking linear and circumferential measures shall measure to the nearest millimetre. Instruments for measuring body mass shall weigh to the nearest 500 g.

5.4 Sample composition

The following shall always be taken into account during planning of data collection:

— age;

— gender.

5.5 Sample size

The sample size shall be sufficient to estimate the value of the given measurement in a specified group, following a method for calculating sample size described in Annex A.

Where appropriate for a particular study, the following may also be taken into account for sample size determination:

— geographical location;

— socio-economic status;

— educational level;

— occupation;

— other demographic variables that influence anthropometric distributions.

5.6 Data-storage system

All biographical and participant data should be recorded on digital media compatible with widespread digital systems, whenever possible.

5.7 Type of clothing

The type of clothing shall be coded and identified (e.g. nude = 0, underwear = 1, light clothing = 2, other clothing as specified = 3) for analysis purposes.

5.8 Measurer training and quality control

Frequent and regular measurer training and quality control shall be carried out by persons experienced in anthropometry, in order to ensure acceptable standards of accuracy. The expected performance of skilled anthropometrists is given in ISO/TR 7250-4.[1)] Repeated measurement data should be recorded. Inter- and intra-measurer standard error of measurement, or mean absolute difference, shall be calculated and recorded for all anthropometric variables, in order that random checks can be carried out on the measuring teams during the survey.

6 Database format

6.1 The ASCII code according to ISO/IEC 8859-1 shall be used. For analytical purposes, it can also be convenient to utilize other data storage formats in addition to ASCII.

6.2 Each data item shall be separated by a tab.

6.3 The contents of rows in the database are given in 6.4 to 6.6.

6.4 The data shall be entered in English.

6.5 The name of each data item shall be shown in the first row of the database using the designated English words and appropriate labels in other language(s), if needed. Item code numbers and acronyms should not be used in row 1 instead of English names, as they can cause confusion.

1) Under preparation. Stage at the time of publication: ISO/DTR 7250-4:2023.

6.6 The second and subsequent rows of the database shall contain actual data from participants, with each data item in the same order as its name is listed in row 1.

EXAMPLE

Participant number	Gender	Measurement location	Measurement date	...	Body mass	Stature	...
0001	M	GB/London	2000-05-23	...	78,5	1 756	...

6.7 All body measurements shall be recorded in millimetres (mm) or kilograms (kg) (SI units).

6.8 Missing data shall be recorded as 9 999.

6.9 An example of database format from an anthropometric survey using the sample data sheet (Annex C) is seen in Annex G. The example shows the format of a database when some, but not all, ISO 7250-1 dimensions are measured.

7 Database contents

7.1 General

The following data items shall be included in the database.

7.2 Required background data

7.2.1 Item 1 – Participant number.

7.2.2 Item 2 – Gender: M for male participants, F for female participants.

7.2.3 Item 3 – Measurement location: country, country code (in accordance with ISO 3166-1) and location.

7.2.4 Item 4 – Measurement date: use the method specified in ISO 8601-1, yyyy-mm-dd (e.g. 2003-05-23 for 23 May 2003).

7.2.5 Item 5 – Birth date: use the method specified in ISO 8601-1, yyyy-mm-dd (e.g. 2003-04-05 for 5 April 2003).

7.2.6 Item 6 – Decimal age: participant's age calculated after the measurement in accordance with the method described in Annex D.

7.3 Recommended background data

Additional background data items, such as birthplace, school, occupation or population segment, may also be included, depending upon the purposes of the study.

7.4 Anthropometric data

In accordance with ISO 7250-1, anthropometric data shall be recorded as items 11 to 72. In the event that some variables in ISO 7250-1 are not measured, or if there are missing data, these shall be recorded as 9 999.

7.5 Complementary data

In the event that additional body measurements not present in ISO 7250-1 are measured, these data shall be recorded as data items 73 and higher, in alphabetical order.

8 Anthropometric data sheets

Biographical data and measurements of each participant shall be recorded on electronic forms or data sheets described in Annex B (see also Annex C).

9 Statistical processing

9.1 Before calculating statistical values, irregular values shall be detected and reviewed along with the procedure described in Annex F.

9.2 The age of each participant shall be calculated by decimal notation (see Annex D).

9.3 In the event that participants are in the growth period, their measurements shall be tabulated for each 1-year age interval as described in Annex E, Table E.1.

9.4 It is recommended that the data be tabulated for adult participants in 5-year divisions (see Annex E). If that is impossible, for example when sample sizes are small, 10-year divisions or 20-year divisions, as given in Table E.2, shall be used. It is desirable to tabulate data for the adult male and adult female samples.

9.5 Information on the presentation of data and interpretation of statistics is given in Annex F.

Annex A
(normative)

Method for estimating the number of participants needed on a sample

The sample size shall be estimated to be sufficient for the purposes of investigation. In most cases, anthropometric data for technological design are of interest at the 5th and 95th percentiles.

The following method is one way of estimating the sample size required to have a particular confidence at 5th and 95th percentiles. This method assumes that the anthropometric data from the population to be measured will be normally distributed. If that cannot be assumed, it is desirable to use a larger sample size. Another estimation method which gives a larger sample size is found in Formula (A.14).

The minimum number of randomly sampled participants, n, needed to ensure that a database 5th and 95th percentile estimates the true population 5th and 95th percentiles with 95 % confidence and a percentage of relative accuracy is calculated using Formula (A.1):

$$n = \left(\frac{1{,}96 \times C_V}{a} \right)^2 \times 1{,}534^2 \tag{A.1}$$

where

1,96 is the critical value (z value) from a standard normal distribution for a 95 % confidence interval;

C_V is the coefficient of variation:

$$C_V = \frac{S}{\bar{x}} \times 100 ,$$

where

$\bar{x}$ is the mean;

S is the standard deviation of the population for the body dimension in question.

a is the percentage of relative accuracy desired;

1,534 is the value derived in the following explanation.

Formula (A.1) for minimum sample size is derived as follows.

The 95 % confidence interval for a percentile is given by Formula (A.2):

$$P \pm 1{,}96 \times S_P \tag{A.2}$$

where

P is the percentile estimate;

S_P is the standard error of this percentile.

It is desirable that the confidence interval is no larger than ± some percentage (a) of the mean. Therefore, a sample size is required sufficient to ensure Formula (A.3):

$$1,96 \times S_P \leq \frac{a\bar{x}}{100} \tag{A.3}$$

To solve this formula, an expression for S_P is needed – in this case, the standard error for a 5th or 95th percentile according to Formula (A.4):

$$S_P = \sqrt{S_{\bar{x}}^2 + 1,645^2 \times S_{s_x}^2} \tag{A.4}$$

where

$S_{\bar{x}}$ is the standard error of the mean;

S_{s_x} is the standard error of the standard deviation;

±1,645 is the z-value at which the cumulative distribution function of the standard normal distribution is 0,05 or 0,95.

Formula (A.4) can be simplified, however, because both $S_{\bar{x}}$ and S_{S_x} are functions of S_x, the standard deviation, as shown in Formula (A.5) and Formula (A.6):

$$S_{\bar{x}} = \sqrt{\frac{S_x^2}{n}} \tag{A.5}$$

$$S_{s_x} = \sqrt{\frac{S_x^2}{2n}} \tag{A.6}$$

Therefore, the standard error of a 5th or 95th percentile in Formula (A.4) can be expressed according to Formula (A.7):

$$S_P = \sqrt{\frac{S_x^2}{n} + 1,645^2 \times \frac{S_x^2}{2n}} \tag{A.7}$$

And it can be further reduced algebraically as shown in Formula (A.8):

$$S_P = \frac{S_x}{\sqrt{n}} \sqrt{1 + \frac{1,645^2}{2}} = \frac{S_x}{\sqrt{n}} \times 1,534 \tag{A.8}$$

Substituting Formula (A.8) into Formula (A.3) gives Formula (A.9):

$$1,96 \times \frac{S_x}{\sqrt{n}} \times 1,534 \leq \frac{a\bar{x}}{100} \tag{A.9}$$

Rearranging algebraically gives Formula (A.10):

$$1,96 \times \frac{100 S_x}{a\bar{x}} \times 1,534 \leq \sqrt{n} \tag{A.10}$$

However, the coefficient of variation is defined according to Formula (A.11):

$$C_V = \frac{s_x}{\bar{x}} \times 100 \tag{A.11}$$

Therefore, Formula (A.10) can be further reduced to Formula (A.12):

$$1{,}96 \times \frac{C_V}{a} \times 1{,}534 \leq \sqrt{n} \tag{A.12}$$

and solved for n according to Formula (A.13):

$$n \geq \left(1{,}96 \times \frac{C_V}{a} \right)^2 \times 1{,}534^2$$

$$n \geq \left(3{,}006 \times \frac{C_V}{a} \right)^2 \tag{A.13}$$

In practice, the true mean and standard deviation of the population are usually unknown, so these values are estimated by using the results of a previous study on a similar population. ISO/TR 7250-2 can be a source to find such results.

Because each body dimension in a study will have a different coefficient of variation (CV), each will require a slightly different minimum sample size to ensure that its percentile value will estimate the population 5th and 95th percentiles with a certain percentage precision and 95 % confidence. In practice, however, it is desirable to calculate the minimum sample size for a study using the body dimension having the largest CV. When this approach is taken, the calculated sample size will be sufficient for a certain percentage of relative accuracy and 95 % confidence in the worst case and it will be more than sufficient for all the other body dimensions.

For example, suppose an investigator wishes the study sample to approximate that true population 5th and 95th percentiles of stature, chest circumference and shoulder (bideltoid) breadth, with at least 1 % relative accuracy and 95 % confidence. A previous study of the same or similar population resulted in the sample statistics in Table A.1.

Table A.1 — Example of sample statistics

	Mean $\bar{x}$	**Standard deviation** S	**Coefficient of variation** C_V
Stature	1 756	67	3,8
Chest circumference	991	69	7,0
Shoulder (bideltoid) breadth	492	26	5,3

Entering these data into Formula (A.1), the sample sizes in Table A.2 are calculated.

Table A.2 — Minimum sample size for 95 % confidence and 1 % relative accuracy

Stature	$n=\left(1{,}96\times\frac{3{,}8}{1}\right)^2\times(1{,}534)^2=130{,}5=131$ participants
Chest circumference	$n=\left(1{,}96\times\frac{7{,}0}{1}\right)^2\times(1{,}534)^2=443{,}0=443$ participants
Shoulder (bideltoid) breadth	$n=\left(1{,}96\times\frac{5{,}3}{1}\right)^2\times(1{,}534)^2=253{,}9=254$ participants

As can be seen in Table A.2, by measuring 443 participants, the investigator ensures that the desired levels of relative accuracy and confidence are achieved for all the variables.

When the distribution of a measurement deviates significantly from the normal distribution, alternative methods can be used which give larger sample sizes. One way is shown in Formula (A.14) (see Reference [8]):

$$n=\left(\frac{K_1\times C_V}{a}\right)^2 \tag{A.14}$$

where K_1 is 4,14 for 5th and 95th percentiles with 95 % confidence.

Annex B
(normative)

Anthropometric data sheet

B.1 General

At the minimum, the following basic items shall be present on the anthropometric data sheet of each participant. Other demographic variables of importance to the study should also be recorded on this data sheet.

B.2 Participant identification

Each participant's data sheet shall have an arbitrary or randomly assigned identification number and/or the participant's name. It is strongly recommended that both be used during data collection so that participants can be addressed respectfully by name, and to ensure that assigned identification numbers are unique to each participant. However, after data collection is completed, the anthropometric database shall be rendered anonymous and retained in a form in which personal identification of the participant is no longer possible.

B.3 Gender

The participant's gender shall be recorded.

B.4 Measurement location

The region and/or country shall be recorded.

B.5 Measurement date

It shall be recorded as year-month-day.

B.6 Birth date

It shall be recorded as year-month-day.

B.7 Measurement items

Measurement items from ISO 7250-1 should appear as the first measurement items on the data sheet. According to the purpose of the investigation, the measurement items which are provided by any International Standard other than ISO 7250-1 may be added. In that case, definitions, measuring methods, instruments, etc., shall be indicated at the beginning of the accompanying report.

B.8 Name of the measurer

Name of the measurer(s) who is (are) measuring the participant. This information is helpful during data collection and whenever questions about unusual values arise. However, there is no need to include this information as a data item in the final version of the database.

Annex C
(informative)

Example of anthropometric data sheet

C.1 Personal identifying information

Personal data that can be used to identify individual participants (e.g. their names) are protected by privacy laws in many ISO member nations (see B.1.1). To address privacy requirements, it is recommended that names are recorded with their corresponding arbitrary participant numbers in a file that is kept separately from the anthropometric database itself. In this case, original data sheets which associate names and other identifying information with anthropometric data are destroyed once the digital database has been created.

C.2 Order of measurement variables

In the example shown in Table C.1, measurement variables are arranged according to the anthropometric instrument in use at the time. It should be noted that this arrangement is different from the one used for storing data in the database.

Efficiency at the workplace should take precedence over database considerations when arranging the anthropometric data sheet.

C.3 Memorandum from the measurer(s)

Space on the measurement sheet is left for the measurer to note anything unusual about the participant that could be helpful during data analysis and interpretation. If the participant is extremely large or small or asymmetrical, for example, this is noted and used to corroborate the validity of that participant's unusual values during the pre-processing data review.

Table C.1 — Example of anthropometric data sheet, where numbering after dimensions refers to corresponding subclauses of ISO 7250-1:2017

Participant no.: Gender: M F Measurement location:					
Measurement date: yyyy-mm-dd Birth date: yyyy-mm-dd					
Decimal age: yy.xxx					
Firm/affiliation: Section:					
School: basic/secondary/high/university (grade: class:) (School name:)					
Type of clothing: 0 1 2 3 Occupation:					
1. Body mass	6.1.1	kg	11. Chest circumference	6.4.10	mm
2. Stature	6.1.2	mm	12. Waist circumference	6.4.11	mm
3. Iliac spine height, standing	6.1.6	mm	13. Thigh circumference	6.4.13	mm
4. Fist (grip axis) height	6.4.5	mm	14. Calf circumference	6.4.14	mm
5. Knee height, sitting	6.2.13	mm	15. Sagittal arc	6.3.13	mm
6. Shoulder (biacromial) breadth	6.2.7	mm	16. Head length	6.3.9	mm
7. Chest breadth, standing	6.1.11	mm	17. Head breadth	6.3.10	mm
8. Hip breadth, standing	6.1.12	mm	18. Hand length (stylion)	6.3.1	mm
9. Hip breadth, sitting	6.2.10	mm	19. Foot length	6.3.7	mm
10. Abdominal depth, sitting	6.2.14	mm	20. Foot breadth	6.3.8	mm
Memorandum: Measurer(s):					

Annex D
(normative)

Method of calculating decimal-notation date and age

D.1 General

A participant's decimal age is calculated as a ratio of day counts to the whole days of a year. This annex provides a table of decimal ages and a simple program for calculation. Commercially available software, such as spreadsheets, can be used and can address the problem introduced by leap years.

D.2 Manual method of calculating decimal age

Days	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
	1	2	3	4	5	6	7	8	9	10	11	12
1	000	085	162	247	329	414	496	581	666	748	833	915
2	003	088	164	249	332	416	499	584	668	751	836	918
3	005	090	167	252	334	419	501	586	671	753	838	921
4	008	093	170	255	337	422	504	589	674	756	841	923
5	011	096	173	258	340	425	507	592	677	759	844	926
6	014	099	175	260	342	427	510	595	679	762	847	929
7	016	101	178	263	345	430	512	597	682	764	849	932
8	019	104	181	266	348	433	515	600	685	767	852	934
9	022	107	184	268	351	436	518	603	688	770	855	937
10	025	110	186	271	353	438	521	605	690	773	858	940
11	027	112	189	274	356	441	523	608	693	775	860	942
12	030	115	192	277	359	444	526	611	696	778	863	945
13	033	118	195	279	362	447	529	614	699	781	866	948
14	036	121	197	282	364	449	532	616	701	784	868	951
15	038	123	200	285	367	452	534	619	704	786	871	953
16	041	126	203	288	370	455	537	622	707	789	874	956
17	044	129	205	290	373	458	540	625	710	792	877	959
18	047	132	208	293	375	460	542	627	712	795	879	962
19	049	134	211	296	378	463	545	630	715	797	882	964
20	052	137	214	299	381	466	548	633	718	800	885	967
21	055	140	216	301	384	468	551	636	721	803	888	970
22	058	142	219	304	386	471	553	638	723	805	890	973
23	060	145	222	307	389	474	556	641	726	808	893	975
24	063	148	225	310	392	477	559	644	729	811	896	978
25	066	151	227	312	395	479	562	647	731	814	899	981
26	068	153	230	315	397	482	564	649	734	816	901	984
27	071	156	233	318	400	485	567	652	737	819	904	986

Days	Month											
	January	February	March	April	May	June	July	August	September	October	November	December
	1	2	3	4	5	6	7	8	9	10	11	12
28	074	159	236	321	403	488	570	655	740	822	907	989
29	077	159	238	323	405	490	573	658	742	825	910	992
30	079	—	241	326	408	493	575	660	745	827	912	995
31	082	—	244	—	411	—	578	663	—	830	—	997

EXAMPLE The 14th day of October is found in the column of October and its 14th line, as 784. Therefore, the measurement date 2002-10-14 is shown as 2 002,784, and the birth date 1981-06-17 is shown as 1 981,458, so the decimal age at the measurement date is calculated as 2 002,784 – 1 981,458 = 21,33 (rounded off to two decimal places).

D.3 Computer program

Function agecalc(measyear, measmonth, measdate, birthyear, birthmonth, birthdate)

Dim Cmeas As Integer: Dim Cbirth As Integer

If measmonth = 1 Then Cmeas = 0

If measmonth = 2 Then Cmeas = 31

If measmonth = 3 Then Cmeas = 59

If measmonth = 4 Then Cmeas = 90

If measmonth = 5 Then Cmeas = 120

If measmonth = 6 Then Cmeas = 151

If measmonth = 7 Then Cmeas = 181

If measmonth = 8 Then Cmeas = 212

If measmonth = 9 Then Cmeas = 243

If measmonth = 10 Then Cmeas = 273

If measmonth = 11 Then Cmeas = 304

If measmonth = 12 Then Cmeas = 334

If birthmonth = 1 Then Cbirth = 0

If birthmonth = 2 Then Cbirth = 31

If birthmonth = 3 Then Cbirth = 59

If birthmonth = 4 Then Cbirth = 90

If birthmonth = 5 Then Cbirth = 120

If birthmonth = 6 Then Cbirth = 151

If birthmonth = 7 Then Cbirth = 181

If birthmonth = 8 Then Cbirth = 212

If birthmonth = 9 Then Cbirth = 243

If birthmonth = 10 Then Cbirth = 273

If birthmonth = 11 Then Cbirth = 304

If birthmonth = 12 Then Cbirth = 334

If birthmonth = 2 And birthdate = 29 Then birthdate = 28 (This means 02-29 is counted as 02-28 for Birthdate)

If measmonth = 2 And measdate = 29 Then measdate = 28 (This means 02-29 is counted as 02-28 for Measurement date)

$$agecalc = measyear - birthyear + (Cmeas + measdate - Cbirth - birthdate) / 365$$

End Function

Annex E
(normative)

Age stratification at specified growth period

The individual age, calculated by the method given in Annex D, shall be divided into age groups as indicated in Tables E.1 and E.2.

Table E.1 — Method of age division for children and young adults

Age group	5,0	6,0	7,0	8,0	9,0	10,0	11,0	12,0	13,0	14,0	15,0	16,0	17,0	18,0	19,0
Individual age	4,50 to 5,49	5,50 to 6,49	6,50 to 7,49	7,50 to 8,49	8,50 to 9,49	9,50 to 10,49	10,50 to 11,49	11,50 to 12,49	12,50 to 13,49	13,50 to 14,49	14,50 to 15,49	15,50 to 16,49	16,50 to 17,49	17,50 to 18,49	18,50 to 19,49

Table E.2 — Method of age division

5-year division		**10-year division**		**20-year division**		**Adults**	
Age group	**Individual age**	**Age group**	**Individual age**	**Age group**	**Individual age**	**Age group**	**Individual age**
20 to 24	19,50 to 24,49	20 to 29	19,50 to 29,49	20 to 39	19,50 to 39,49	20 and more	Older than 19,50
25 to 29	24,50 to 29,49						
30 to 34	29,50 to 34,49	30 to 39	29,50 to 39,49				
35 to 39	34,50 to 39,49						
40 to 44	39,50 to 44,49	40 to 49	39,50 to 49,49	40 to 59	39,50 to 59,49		
45 to 49	44,50 to 49,49						
50 to 54	49,50 to 54,49	50 to 59	49,50 to 59,49				
55 to 59	54,50 to 59,49						
60 to 64	59,50 to 64,49	60 to 69	59,50 to 69,49	60 to 79	59,50 to 79,49		
65 to 69	64,50 to 69,49						
70 to 74	69,50 to 74,49	70 to 79	69,50 to 79,49				
75 to 79	74,50 to 79,49						
80 to 84	79,50 to 84,49	80 to 89	79,50 to 89,49	80 to 99	79,50 to 99,49		
85 to 89	84,50 to 89,49						
90 to 94	89,50 to 94,49	90 to 99	89,50 to 99,49				
95 to 99	94,50 to 99,49						

Annex F
(normative)

Procedure for preparing data and statistics

F.1 Data preparation

F.1.1 First, the mean value and the standard deviation of each age group shall be obtained, then the participants' measurement data over ± 3 SD from the mean shall be reviewed individually for accuracy.

F.1.2 Second, the scatter diagrams of measurement pairs having a high correlation and those which make practical sense shall be prepared for each age group. Then the participants shown in the diagram to be outliers shall be investigated. If the cause of the discrepancy is clear, the data shall be corrected, if necessary. If the cause is unclear, the data shall be replaced with 9 999 to denote missing data.

F.1.3 The data reviewed by these procedures shall form the reference data set. The basic statistical values to be reported shall be obtained from the reference data set.

F.1.4 Some dimensions, such as skinfold thicknesses, which are not included in ISO 7250-1 and do not have a Gaussian distribution, should be normalized.

F.2 Data reporting

F.2.1 After completing the pre-processing of the data set, the following descriptive statistics should be presented for each dimension measured:

— number of participants;

— minimum;

— maximum;

— arithmetic mean;

— standard error of the mean ($S_{\bar{x}}$);

— standard deviation (S);

— standard error of the 5^{th} and 95^{th} percentiles;

— coefficient of variation;

— frequency distribution;

— skewness;

— kurtosis;

— percentiles, 1^{st} to 99^{th}: the percentile values reported shall be calculated from the actual distribution of individual participants in the sample rather than estimated from a theoretical Gaussian distribution using the sample mean and standard deviation: 1^{st}, 5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}, 95^{th} and 99^{th}.

F.2.2 Where individual participant data or raw data are not provided, it is recommended that correlation coefficients (calculated to three decimal places) between variables are provided. Correlation coefficients shall be presented as a matrix.

F.2.3 In statistical tables, English dimension names shall be used. Information specified in Clause 5 shall also be given in English.

Annex G
(informative)

Sample database format

Participant number	Gender	Measurement location	Measurement date	Birth date	Decimal age	Firm/affiliation	School	Clothing	Occupation	6.1.1 Body mass (weight)	6.1.2 Stature (body height)	6.1.3 Eye height	6.1.4 Shoulder height	6.1.5 Elbow height	6.1.6 Iliac spine height, standing	6.1.7 Crotch height	6.1.8 Tibial height	6.1.9 Chest depth, standing	6.1.10 Body depth, standing	6.1.11 Chest breadth, standing	6.1.12 Hip breadth, standing	6.2.1 Sitting height (erect)	6.2.2 Eye height, sitting	...
1	M	US/New York	2010-05-23	1992-02-12	18,27	ATT	3	0	Clerk	87,5	1 607	9 999	9 999	9999	965	9 999	9999	9 999	9999	287	317	9999	9 999	...
2	M	US/New York	2010-05-23	1990-04-17	20,1	Goldman	3	0	Office work	72,0	1 653	9 999	9 999	9999	1005	9 999	9999	9 999	9999	302	323	9999	9 999	...
3	F	US/New York	2010-05-24	1991-04-05	19,13	Chase	3	0	Bank teller	42,5	1 696	9 999	9 999	9999	1 030	9 999	9999	9 999	9999	307	334	9999	9 999	...
4	F	US/New York	2010-05-24	1990-02-02	20,3	Picholine	3	0	Waiter	50,5	1 804	9 999	9 999	9999	962	9 999	9999	9 999	9999	322	345	9999	9 999	...
5	M	US/New York	2010-05-24	1992-03-03	18,22	9 999	3	0	Actor	78,0	1 744	9 999	9 999	9999	1 134	9 999	9999	9 999	9999	347	398	9999	9 999	...
..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	

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2) Under preparation. Stage at the time of publication: ISO/DTR 7250-4:2023.

(*Continued from second cover*)

ISO 7250-1 :2017 Basic human body measurements for technological design — Part 1 : Body measurement definitions and landmarks	IS 13214 (Part 1) : 2020/ISO 7250-1 : 2017 Basic human body measurements for technological design: Part 1 Body measurement definitions and landmarks (*second revision*)	Identical
ISO 8601-1 Date and time — Representations for information interchange — Part 1: Basic rules	IS/ISO 8601-1 : 2019 Date and time — Representations for information interchange : Part 1 Basic rules	Identical

The Committee has reviewed the provisions of the following International Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

International Standard	*Title*
ISO/IEC 8859-1	Information technology — 8-bit single-byte coded graphic character sets — Part 1: Latin alphabet no. 1

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 the same as that of the specified value in this standard.

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