
**Basic human body measurements for
technological design —**

Part 1:
**Body measurement definitions and
landmarks**

iTeh STANDARD PREVIEW
*Définitions des mesures de base du corps humain pour la conception
technologique —*
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Partie 1: Définitions des mesures du corps et repères

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ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

Contents

Page

Foreword.....	v
Introduction	vi
1 Scope	1
2 Terms and definitions	1
2.2 Anthropometric terms	1
3 Measuring conditions and instruments	4
3.1 Conditions	4
3.2 Instruments	4
3.3 Further conditions	4
4 Basic anthropometric measurements	5
4.1 Measurements taken while subject stands	5
4.1.1 Body mass (weight)	5
4.1.2 Stature (body height)	5
4.1.3 Eye height	5
4.1.4 Shoulder height	6
4.1.5 Elbow height	6
4.1.6 Iliac spine height, standing	6
4.1.7 Crotch height	7
4.1.8 Tibial height	7
4.1.9 Chest depth, standing	8
4.1.10 Body depth, standing	8
4.1.11 Chest breadth, standing	9
4.1.12 Hip breadth, standing	9
4.2 Measurements taken while subject sits	10
4.2.1 Sitting height (erect)	10
4.2.2 Eye height, sitting	10
4.2.3 Cervicale height, sitting	10
4.2.4 Shoulder height, sitting	11
4.2.5 Elbow height, sitting	11
4.2.6 Shoulder-elbow length	11
4.2.7 Elbow-wrist length	12
4.2.8 Shoulder (biacromial) breadth	12
4.2.9 Shoulder (bideltoid) breadth	12
4.2.10 Elbow-to-elbow breadth	13
4.2.11 Hip breadth, sitting	13
4.2.12 Lower leg length (popliteal height)	13
4.2.13 Thigh clearance	14
4.2.14 Knee height	14
4.2.15 Abdominal depth, sitting	14
4.2.16 Thorax depth at the nipple	15
4.2.17 Buttock-abdomen depth sitting	15
4.3 Measurements on specific body segments	15
4.3.1 Hand length	15
4.3.2 Palm length perpendicular	16
4.3.3 Hand breadth at metacarpals	16
4.3.4 Index finger length	16
4.3.5 Index finger breadth, proximal	17
4.3.6 Index finger breadth, distal	17
4.3.7 Foot length	17
4.3.8 Foot breadth	18

4.3.9	Head length	18
4.3.10	Head breadth	18
4.3.11	Face length (nasion-menton)	18
4.3.12	Head circumference	19
4.3.13	Sagittal arc	19
4.3.14	Bitracion arc	19
4.4	Functional measurements	20
4.4.1	Wall-acromion distance	20
4.4.2	Grip reach; forward reach	20
4.4.3	Elbow-grip length	21
4.4.4	Fist (grip axis) height	21
4.4.5	Forearm-fingertip length	21
4.4.6	Buttock-popliteal length (seat depth)	22
4.4.7	Buttock-knee length	22
4.4.8	Neck circumference	22
4.4.9	Chest circumference	23
4.4.10	Waist circumference	23
4.4.11	Wrist circumference	24
4.4.12	Thigh circumference	24
4.4.13	Calf circumference	24
	Bibliography	25

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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 7250-1 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 3, *Anthropometry and biomechanics*.

This first edition of ISO 7250-1 cancels and replaces ISO 7250:1996, of which it constitutes a minor revision.

ISO 7250 consists of the following parts, under the general title *Basic human body measurements for technological design*:

- iTeH STANDARD PREVIEW
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- ISO 7250-1:2008
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- *Part 1: Body measurement definitions and landmarks*

Statistical summaries of body measurements from individual ISO populations and worldwide and regional design values for use in ISO equipment standards are to form the subjects of future Parts 2 and 3.

Introduction

The well-being of people is greatly dependent on their geometrical relationship with various factors such as clothing, places of work, transportation, homes and recreational activities. To ensure harmony between people and their environments, it is necessary to quantify the size and shape of people for optimization of the technological design of the workplace and the home environment.

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Basic human body measurements for technological design —

Part 1: Body measurement definitions and landmarks

1 Scope

This part of ISO 7250 provides a description of anthropometric measurements which can be used as a basis for comparison of population groups.

The basic list specified in this part of ISO 7250 is intended to serve as a guide for ergonomists who are required to define population groups and apply their knowledge to the geometric design of the places where people work and live.

This list is not intended to serve as a guide for how to take anthropometric measurements, but it gives information to the ergonomist and designer on the anatomical and anthropometrical bases and principles of measurement which are applied in the solution of design tasks.

This part of ISO 7250 is intended to be used in conjunction with national or international regulations or agreements to assure harmony in defining population groups. In its various applications, it is anticipated that the basic list will be supplemented by specific additional measurements.

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2 Terms and definitions

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

2.1

population group

group of people having some common environment or activity

NOTE These groups may be as diverse as geographically defined populations or specified age groups.

2.2 Anthropometric terms¹⁾

2.2.1

acromion

most lateral point of the lateral edge of the spine of the scapula

NOTE The height of the acromion is usually equated with shoulder height.

2.2.2

anterior

ventral

towards the front of the body

1) A detailed glossary of terms is found in the publications listed in the Bibliography.

2.2.3

bi

prefix denoting connection with, or relation to, each of two symmetrical paired parts

NOTE For example, biacromial, bitragion.

2.2.4

biceps femoris

one of the large posterior muscles in the thigh of the leg

2.2.5

cervicale

prominent bone at the base of the back of the neck (spinous process of the seventh cervical vertebra)

2.2.6

deltoid muscle

large muscle on the lateral border of the upper arm in the shoulder region

2.2.7

distal

away from the main mass of the body

2.2.8

Frankfurt plane

standard horizontal plane at the level of the upper edge of the opening of the external auditory meatus (external ear opening) and the lower border of the orbital margin (lower edge of the eye socket), when the median plane of the head is held vertically

2.2.9

glabella

most anterior point of the forehead between the brow ridges in the midsagittal plane

2.2.10

gluteal fold

skin furrow between the buttock and the thigh

2.2.11

grip axis

axis of the fist corresponding with the longitudinal axis of a rod held in the hand

2.2.12

inferior

caudal

away from the head, towards the bottom

2.2.13

inion

lowest point in the midsagittal plane of the occiput that can be palpated amid the nuchal muscles

2.2.14

lateral

towards the side of the body

2.2.15

medial

towards the midline of the body

2.2.16

menton

gnathion

lowest point of the tip of the chin in the midsagittal plane

2.2.17**mesosternal**

point on the union of the third and fourth sternebrae

2.2.18**metacarpal**

pertaining to the long bones of the hand between the carpals (wristbones) and the phalanges

2.2.19**nasion****sellion**

point of greatest indentation of the nasal root depression

2.2.20**phalanx****phalange**

bone of the fingers or toes

2.2.21**posterior****dorsal**

towards the back of the body

2.2.22**process**

marked prominence of a bone

2.2.23**proximal**

towards the main mass of the body

2.2.24**radius**

long bone in the forearm on the thumb side

2.2.25**sagittal**

pertaining to the anteroposterior (front to back) median plane of the body (midsagittal), or to a plane parallel to the median (parasagittal)

2.2.26**styloid process**

most distal protuberance of the radius or the ulna at the wrist

2.2.27**superior****cranial**

towards the head, towards the top

2.2.28**thyroid cartilage**

prominent cartilage on the anterior surface of the neck

2.2.29**tibiale**

point at the upper inside (medial) edge on the proximal end of the tibial bone of the lower leg

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2.2.30

tragion

notch just above the tragus (the small cartilaginous flap in front of the ear hole)

2.2.31

ulna

long bone in the forearm on the little finger side

2.2.32

vertex

highest level of the head in the midsagittal plane, with the head oriented in the Frankfurt plane

3 Measuring conditions and instruments

3.1 Conditions

It is important that the following conditions be documented together with the numerical results of any survey. Photographs or detailed sketches of measurements and procedures are recommended.

a) Clothing of subject

During measurement, the subject shall be nude or shall wear only minimal clothing and shall be bareheaded and without shoes.

b) Support surfaces

Standing surfaces (floors), platforms or sitting surfaces shall be flat, horizontal and not compressible.

c) Body symmetry

For measurements which may be taken on either side of the body, it is recommended that both sides be measured. If this is not possible, it should be indicated on which side the measurement was taken.

3.2 Instruments

The standard measuring instruments recommended are the anthropometer, sliding calipers, spreading calipers, weighing scale and tape measure.

3.2.1 Anthropometer, a specialized tool used for measuring linear distances between points on the body and standard reference surfaces, such as the floor or a seat platform.

3.2.2 Sliding and spreading calipers, used for measuring the breadth and depth of body segments, as well as the distances between reference marks.

3.2.3 Tape measure, used for measuring body circumferences.

3.2.3.1 Measuring cube, 200 mm on each side, used for determining the maximal posterior protrusion of a seated person.

3.2.3.2 Rod, 20 mm in diameter, used for determining grip measurements.

NOTE For a detailed description of the measuring methods, see Reference [2].

3.3 Further conditions

Chest and other measurements affected by breathing should be taken during gentle breathing.

4 Basic anthropometric measurements

4.1 Measurements taken while subject stands

4.1.1 Body mass (weight)

Description: Total mass (weight) of the body.

Method: Subject stands on a weighing scale.

Instrument: Weighing scale.

4.1.2 Stature (body height)

Description: Vertical distance from the floor to the highest point of the head (vertex). See Figure 1.

Method: Subject stands fully erect with feet together. Head is oriented in the Frankfurt plane.

Instrument: Anthropometer.

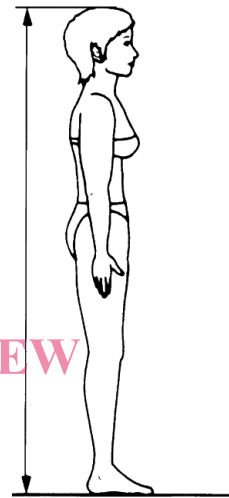


Figure 1 — Stature

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4.1.3 Eye height

Description: Vertical distance from the floor to the outer corner of the eye. See Figure 2.

Method: Subject stands fully erect with feet together. Head is oriented in the Frankfurt plane.

Instrument: Anthropometer.

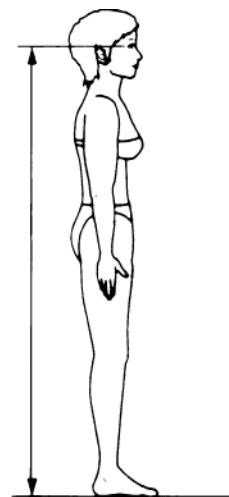


Figure 2 — Eye height

4.1.4 Shoulder height

Description: Vertical distance from the floor to the acromion. See Figure 3.

Method: Subject stands fully erect with feet together. Shoulders are relaxed, with arms hanging freely.

Instrument: Anthropometer.



Figure 3 — Shoulder height

4.1.5 Elbow height

Description: Vertical distance from the floor to the lowest bony point of the bent elbow. See Figure 4.

Method: Subject stands fully erect with feet together. Upper arm hangs freely downwards, with forearm flexed at right angles to it.

Instrument: Anthropometer.

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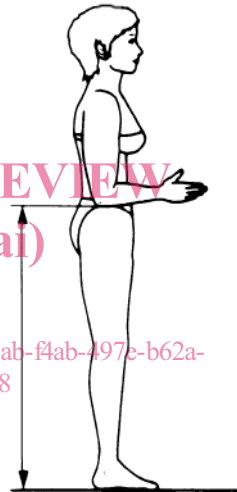


Figure 4 — Elbow height

4.1.6 Iliac spine height, standing

Description: Vertical distance from the floor to the anterosuperior iliac spine (the most downward-directed point of the iliac crest). See Figure 5.

Method: Subject stands fully erect with feet together.

Instrument: Anthropometer.

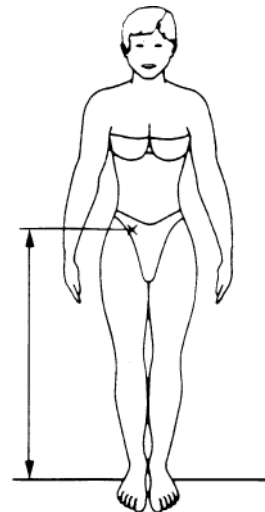


Figure 5 — Iliac spine height, standing