

# INTERNATIONAL STANDARD

**ISO  
7250**

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

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

*Mesurages de base du corps humain pour la conception technologique*

ISO 7250:1996

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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.

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.

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

Annex A of this International Standard is for information only.

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## 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

## 1 Scope

This International Standard provides a description of anthropometric measurements which can be used as a basis for comparison of population groups.

The basic list specified in this International Standard 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 International Standard may 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.

## 2 Definitions

For the purposes of this International Standard, the following definitions apply.

**2.1 population group:** Group of people having some common environment or activity.

NOTE 1 These groups may be as diverse as geographically defined populations or specified age groups.

### 2.2 Anthropometric terms<sup>1)</sup>

**2.2.1 acromion:** Most lateral point of the lateral edge of the spine of the scapula.

NOTE 2 The height of the acromion is usually equated with shoulder height.

**2.2.2 anterior; ventral:** Towards the front of the body.

**2.2.3 bi:** Prefix denoting connection with or relation to each of two symmetrical paired parts.

NOTE 3 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.

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

**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.

**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

It is important that the following conditions are documented together with the numerical results of any

survey. Photographs or detailed sketches of measurements and procedures are recommended.

#### 3.1 Clothing of subject

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

#### 3.2 Support surfaces

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

#### 3.3 Body symmetry

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

#### 3.4 Measuring tools

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

**3.4.1 The anthropometer** is a specialized tool for measuring linear distances between points on the body and standard reference surfaces, such as the floor or a seat platform.

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

**3.4.3 A tape measure** is used for measuring body circumferences. To determine the maximal posterior protrusion of a seated person, a measuring cube 200 mm on each side is used. To determine hip measurements, a rod 20 mm in diameter is used<sup>2)</sup>.

#### 3.5 Further conditions

For chest and other measurements affected by breathing, it is recommended that they are 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.

2) For a detailed description of the measuring methods, see reference [2], annex A.

#### 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 orientated in the Frankfurt plane.

**Instrument:** Anthropometer.

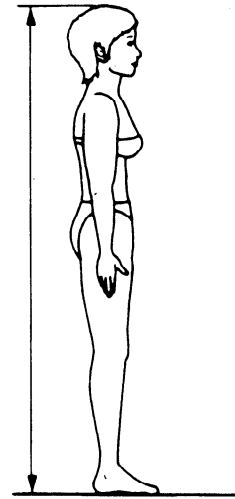


Figure 1

#### 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 orientated in the Frankfurt plane.

**Instrument:** Anthropometer.

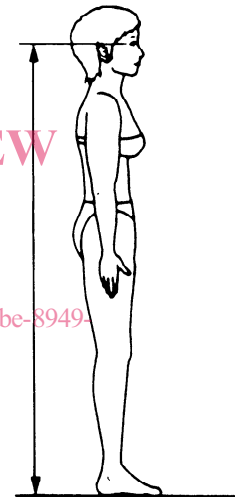


Figure 2

#### 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.

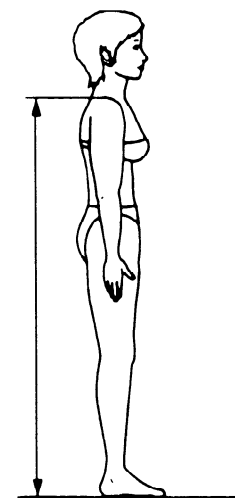


Figure 3

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#### 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.

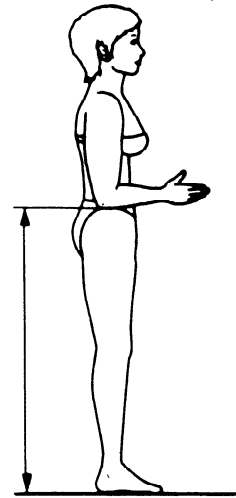


Figure 4

#### 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.

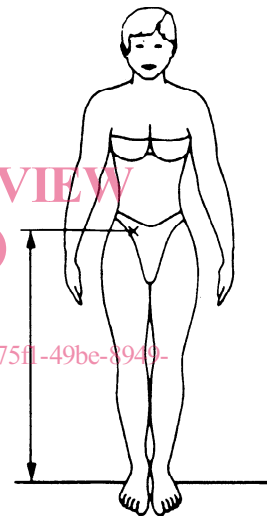


Figure 5

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#### 4.1.7 Crotch height

**Description:** Vertical distance from the floor to the distal part of the inferior ramus of the pubic bone. See figure 6.

**Method:** Subject first stands with legs a maximum of 100 mm apart and the movable arm of the measuring instrument is placed against the inner surface of the thigh in such a way that, when pushed higher, it gently presses against the pubic bone. Subject then closes the legs and stands fully erect during the measurement.

**Instrument:** Anthropometer.

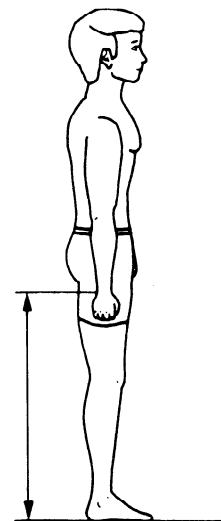


Figure 6



#### 4.1.8 Tibial height

**Description:** Vertical distance from the floor to the tibiale. See figure 7.

**Method:** Subject stands fully erect with feet together.

**Instrument:** Anthropometer.

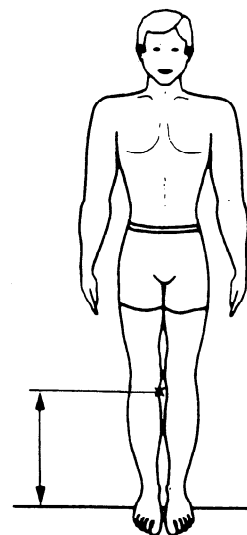


Figure 7

#### 4.1.9 Chest depth, standing

**Description:** Depth of the torso measured in the mid-sagittal plane at mesosternal level. See figure 8.

**Method:** Subject stands fully erect with feet together. Arms hang freely downwards.

**Instrument:** Large sliding caliper with curved arms.

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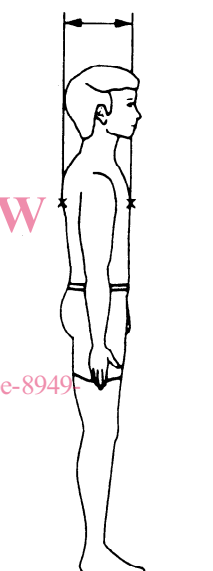


Figure 8

#### 4.1.10 Body depth, standing

**Description:** Maximum depth of the body. See figure 9.

**Method:** Subject stands erect against a wall with feet together and arms hanging freely downwards.

**Instrument:** Anthropometer.

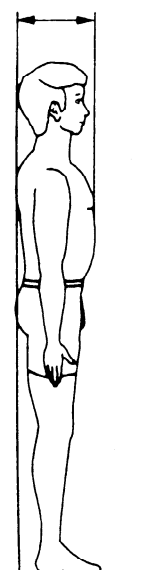


Figure 9

#### 4.1.11 Chest breadth, standing

**Description:** Breadth of the torso measured at mesosternal level. See figure 10.

**Method:** Subject stands fully erect with feet together and arms hanging freely downwards.

**Instrument:** Anthropometer (large sliding caliper), large spreading caliper.

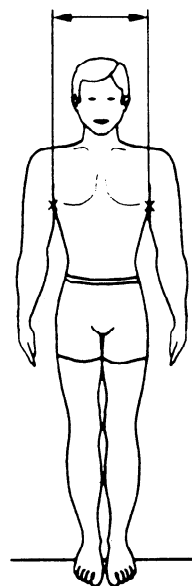


Figure 10

#### 4.1.12 Hip breadth, standing

**Description:** Maximum horizontal distance across the hips. See figure 11.

**Method:** Subject stands erect with feet together. Measurement is taken without pressing into the flesh of the hips.

**Instrument:** Anthropometer (large sliding caliper), large spreading caliper.

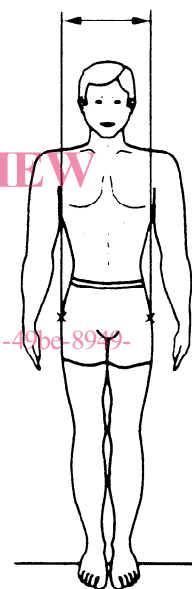


Figure 11

### 4.2 Measurements taken while subject sits

#### 4.2.1 Sitting height (erect)

**Description:** Vertical distance from a horizontal sitting surface to the highest point of the head (vertex). See figure 12.

**Method:** Subject sits fully erect with thighs fully supported and lower legs hanging freely. Head is orientated in the Frankfurt plane.

**Instrument:** Anthropometer.

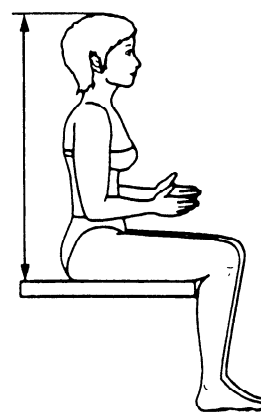


Figure 12

#### 4.2.2 Eye height, sitting

**Description:** Vertical distance from a horizontal sitting surface to the outer corner of the eye. See figure 13.

**Method:** Subject sits fully erect with thighs fully supported and lower legs hanging freely. Head is orientated in the Frankfurt plane.

**Instrument:** Anthropometer.

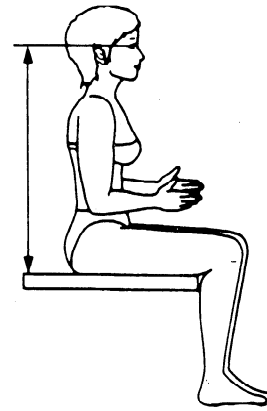


Figure 13

#### 4.2.3 Cervicale height, sitting

**Description:** Vertical distance from a horizontal sitting surface to the cervicale. See figure 14.

**Method:** Subject sits fully erect with thighs fully supported and lower legs hanging freely. Head is orientated in the Frankfurt plane.

**Instrument:** Anthropometer.

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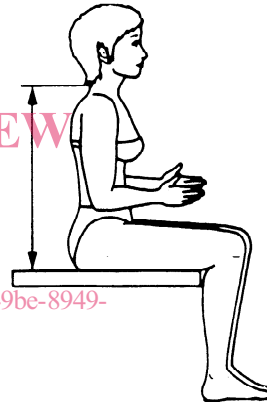


Figure 14

#### 4.2.4 Shoulder height, sitting

**Description:** Vertical distance from a horizontal sitting surface to the acromion. See figure 15.

**Method:** Subject sits fully erect with thighs fully supported and lower legs hanging freely. Shoulders are relaxed, with upper arms hanging freely.

**Instrument:** Anthropometer.

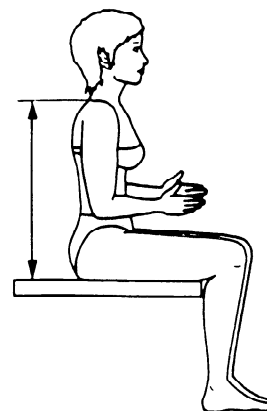


Figure 15