INTERNATIONAL STANDARD

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Basic human body measurements for technological design —

Part 1: Body measurement definitions and landmarks

Définitions des mesures de base du corps humain pour la conception technologique —

Partie 1: Définitions des mesures du corps et repères

Reference number
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Foreword

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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*:

— *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.

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.

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 terms[1)]

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

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.

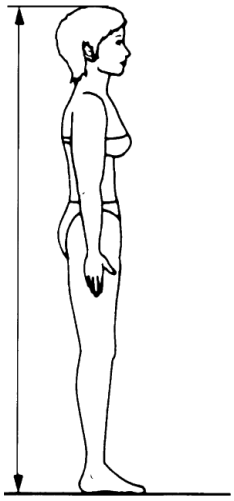

Figure 1 — Stature

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.

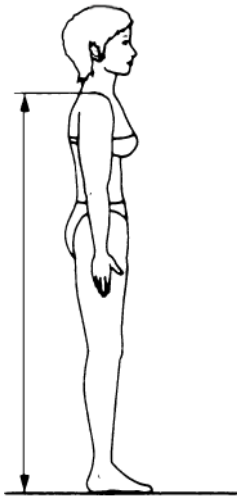

Figure 3 — Shoulder height

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.

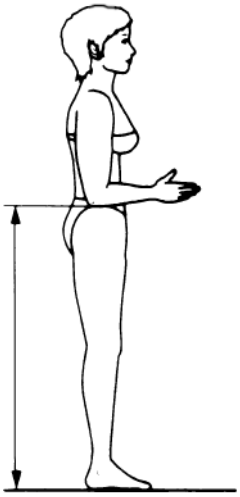

Figure 4 — Elbow height

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.

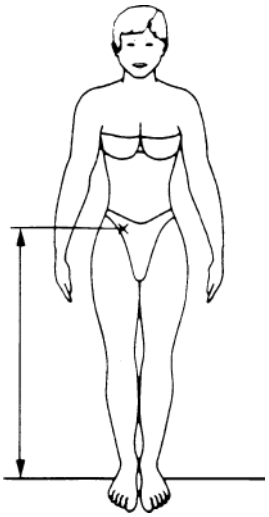

Figure 5 — Iliac spine height, standing

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.

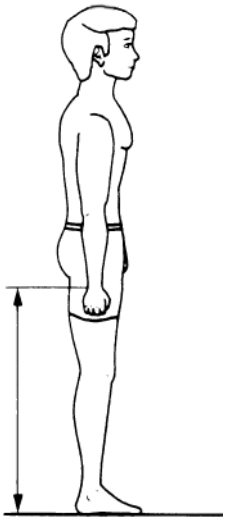

Figure 6 — Crotch height

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.

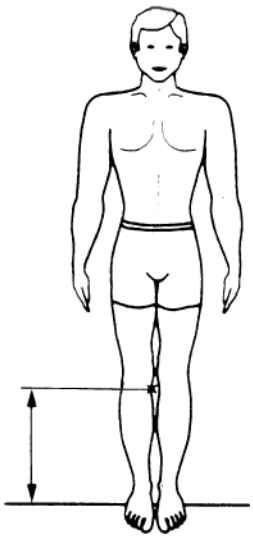

Figure 7 — Tibial height

4.1.9 Chest depth, standing

Description: Depth of the torso measured in the midsagittal 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.

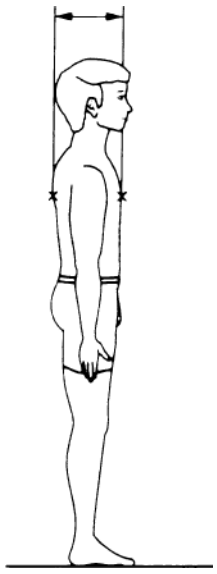

Figure 8 — Chest depth, standing

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 — Body depth, standing

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.

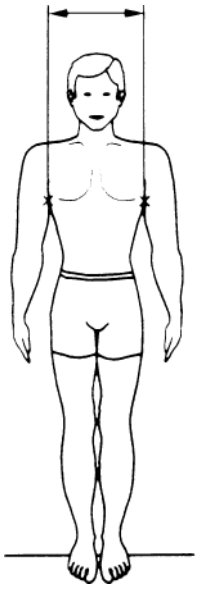

Figure 10 — Chest breadth, standing

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.

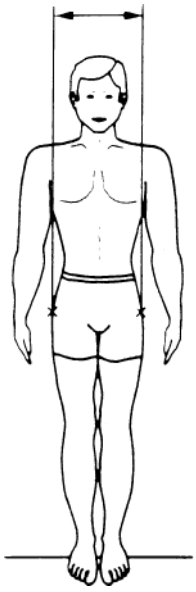

Figure 11 — Hip breadth, standing

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 oriented in the Frankfurt plane.

Instrument: Anthropometer.

Figure 12 — Sitting height (erect)

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 oriented in the Frankfurt plane.

Instrument: Anthropometer.

Figure 13 — Eye height, sitting

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 oriented in the Frankfurt plane.

Instrument: Anthropometer.

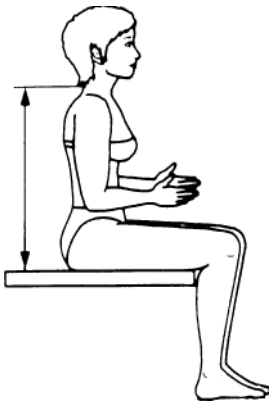

Figure 14 — Cervicale height, sitting

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.

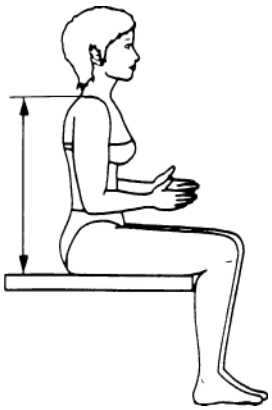

Figure 15 — Shoulder height, sitting

4.2.5 Elbow height, sitting

Description: Vertical distance from a horizontal sitting surface to the lowest bony point of the elbow bent at a right angle with the forearm horizontal. See Figure 16.

Method: Subject sits fully erect with thighs fully supported and lower legs hanging freely. Upper arms hang freely downwards and forearms are horizontal.

Instrument: Anthropometer.

Figure 16 — Elbow height, sitting

4.2.6 Shoulder-elbow length

Description: Vertical distance from acromion to the bottom of the elbow bent at a right angle with the forearm horizontal. See Figure 17.

Method: Subject sits erect with thighs fully supported and lower legs hanging freely. Upper arms hang freely downwards and forearms are horizontal.

Instrument: Anthropometer (large sliding caliper).

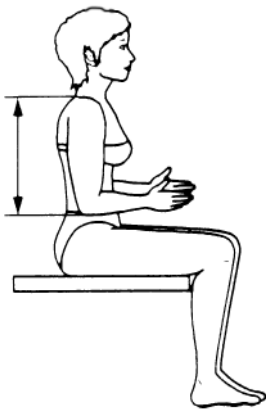

Figure 17 — Shoulder-elbow length

4.2.7 Elbow-wrist length

Description: Horizontal distance from wall to wrist (ulnar styloid process). See Figure 18.

Method: Subject sits or stands erect, back to wall. Upper arms hanging freely downwards, elbows touching wall, forearms horizontal.

Instrument: Anthropometer.

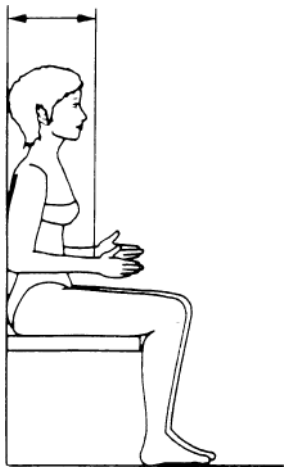

Figure 18 — Elbow-wrist length

4.2.8 Shoulder (biacromial) breadth

Description: Distance along a straight line from acromion to acromion. See Figure 19.

Method: Subject sits or stands fully erect with shoulders relaxed.

Instrument: Large sliding caliper or large spreading caliper.

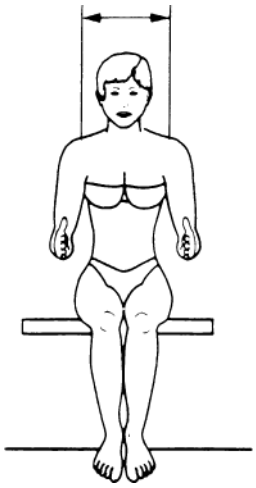

Figure 19 — Shoulder (biacromial) breadth

4.2.9 Shoulder (bideltoid) breadth

Description: Distance across the maximum lateral protrusions of the right and left deltoid muscles. See Figure 20.

Method: Subject sits or stands fully erect with shoulders relaxed.

Instrument: Large sliding caliper or large spreading caliper.

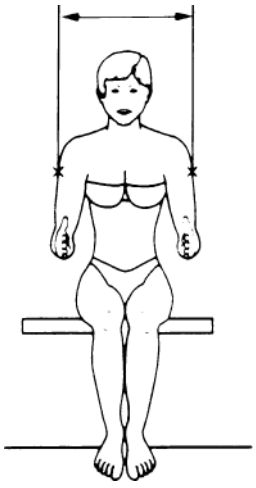

Figure 20 — Shoulder (bideltoid) breadth

4.2.10 Elbow-to-elbow breadth

Description: Maximum horizontal distance between the lateral surfaces of the elbow region. See Figure 21.

Method: Subject sits or stands erect with upper arms hanging down and lightly touching the sides of the body. Forearms are extended horizontally and parallel to each other and the floor. Measurement is taken without pressing into the flesh at the elbows.

Instrument: Large sliding caliper or large spreading caliper.

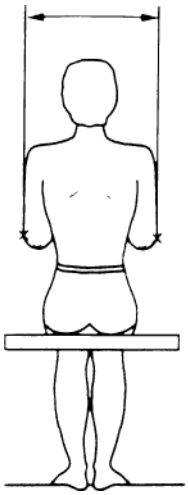

Figure 21 — Elbow-to-elbow breadth

4.2.11 Hip breadth, sitting

Description: Breadth of the body measured across the widest portion of the hips. See Figure 22.

Method: Subject sits with thighs fully supported and lower legs hanging freely, knees together. Measurement is taken without pressing into the flesh of the hips.

Instrument: Large spreading caliper.

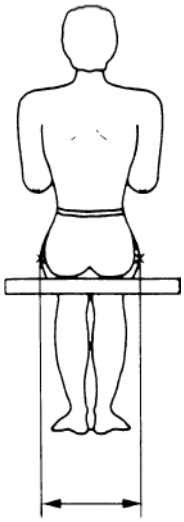

Figure 22 — Hip breadth, sitting

4.2.12 Lower leg length (popliteal height)

Description: Vertical distance from the foot-rest surface to the lower surface of the thigh immediately behind the knee, bent at right angles. See Figure 23.

Method: Subject holds thigh and lower leg at right angles during measurement. Subject may sit, or stand with the foot placed on a raised platform. The movable arm of the measuring instrument is pushed gently against the tendon of the relaxed biceps femoris muscle.

Instrument: Anthropometer.

Figure 23 — Lower leg length (popliteal height)

4.2.13 Thigh clearance

Description: Vertical distance from the sitting surface to the highest point on the thigh. See Figure 24.

Method: Subject sits erect with knees bent at right angles, supporting the feet flat on the floor.

Instrument: Anthropometer.

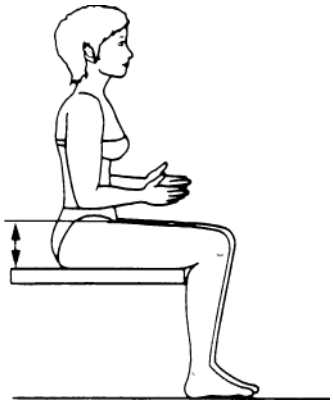

Figure 24 — Thigh clearance

4.2.14 Knee height

Description: Vertical distance from the floor to the highest point of the superior border of the patella. See Figure 25.

Method: Subject sits erect with knees bent at right angles, supporting the feet flat on the floor.

Instrument: Anthropometer.

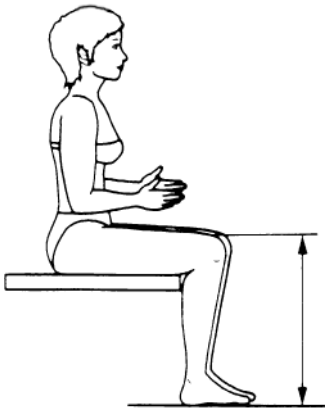

Figure 25 — Knee height

4.2.15 Abdominal depth, sitting

Description: Maximum depth of the abdomen whilst sitting. See Figure 26.

Method: Subject sits fully erect, arms hanging freely downwards.

Instrument: Anthropometer (large sliding caliper).

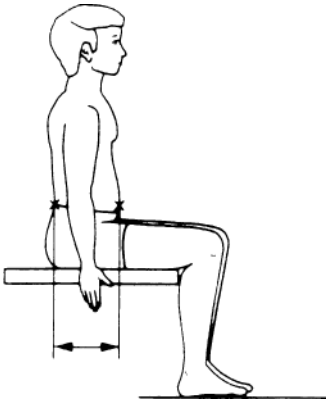

Figure 26 — Abdominal depth, sitting

4.2.16 Thorax depth at the nipple

Description: Maximum depth of the thorax at the level of the nipple. See Figure 27.

Method: Subject sits or stands fully erect, arms hanging freely downwards. Females wear their usual brassiere.

Instrument: Anthropometer (large sliding caliper).

Figure 27 — Thorax depth at the nipple

4.2.17 Buttock-abdomen depth sitting

Description: Projective maximum depth of the lower torso between the maximum anterior protrusion of the abdomen and the maximum posterior protrusion of the buttock. See Figure 28.

Method: Subject sits fully erect with thighs fully supported and lower legs hanging freely, with rearmost point of the buttocks touching the surface of a vertical panel. Distance is measured from the vertical panel to the maximum anterior protrusion of the abdomen.

Instrument: Anthropometer.

Figure 28 — Buttock-abdomen depth sitting

4.3 Measurements on specific body segments

4.3.1 Hand length

Description: Perpendicular distance from a line drawn between the styloid processes to the tip of the middle finger. See Figure 29.

Method: Subject holds the forearm horizontal with hand stretched out flat, palm up. The point of measurement at the styloid process corresponds approximately to the middle skin furrow of the wrist.

Instrument: Sliding caliper.

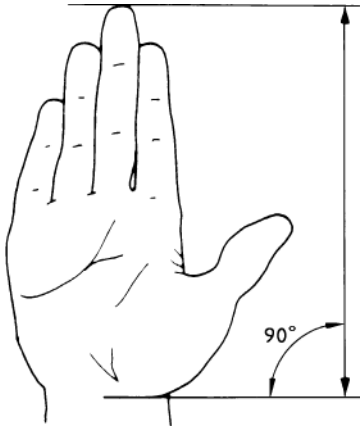

Figure 29 — Hand length

4.3.2 Palm length perpendicular

Description: Distance from a line drawn between the styloid processes to the proximal fingercrease of the middle finger on the palm of the hand. See Figure 30.

Method: Subject holds forearm horizontal with hand stretched out flat, palm up. Measurement is taken on the palmar surface of the hand.

Instrument: Sliding caliper.

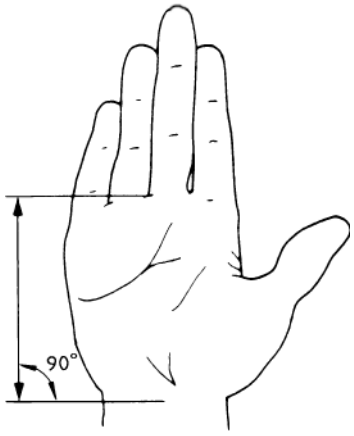

Figure 30 — Palm length perpendicular

4.3.3 Hand breadth at metacarpals

Description: Projected distance between radial and ulnar metacarpals at the level of the metacarpal heads from the second to the fifth metacarpal. See Figure 31.

Method: Subject holds forearm horizontal with hand stretched out flat, palm up.

Instrument: Sliding caliper.

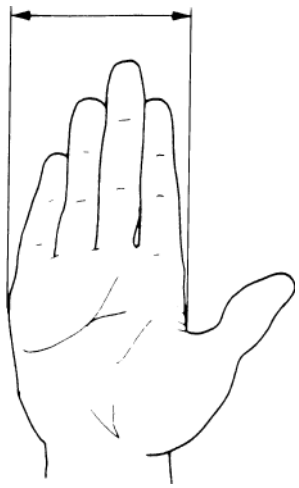

Figure 31 — Hand breadth at metacarpals

4.3.4 Index finger length

Description: Distance from the tip of the second finger to the proximal fingercrease on the palm of the hand. See Figure 32.

Method: Subject holds forearm horizontal with hand stretched out flat and fingers spread, palm up. Measurement is taken on the palmar surface of the hand.

Instrument: Sliding caliper.

Figure 32 — Index finger length

4.3.5 Index finger breadth, proximal

Description: Maximum distance between medial and lateral surfaces of the second finger in the region of the joint between middle and proximal phalanges. See Figure 33.

Method: Subject holds forearm horizontal with hand stretched out flat and fingers spread, palm up.

Instrument: Sliding caliper.

Figure 33 — Index finger breadth, proximal

4.3.6 Index finger breadth, distal

Description: Maximum distance between medial and lateral surfaces of the second finger in the region of the joint between middle and distal phalanges. See Figure 34.

Method: Subject holds the forearm horizontal with hand stretched out flat and fingers spread, palm up.

Instrument: Sliding caliper.

Figure 34 — Index finger breadth, distal

4.3.7 Foot length

Description: Maximum distance from rear of the heel to tip of the longest (first or second) toe, measured parallel to the longitudinal axis of the foot. See Figure 35.

Method: Subject stands with weight equally distributed on both feet.

Instrument: Anthropometer.

Figure 35 — Foot length

4.3.8 Foot breadth

Description: Maximum distance between medial and lateral surfaces of the foot perpendicular to the longitudinal axis of the foot. See Figure 36.

Method: Subject stands with weight equally distributed on both feet.

Instrument: Spreading caliper.

Figure 36 — Foot breadth

4.3.9 Head length

Description: Distance along a straight line between the glabella and the rearmost point of the skull. See Figure 37.

Method: Position of head has no influence on the measurement.

Instrument: Spreading caliper.

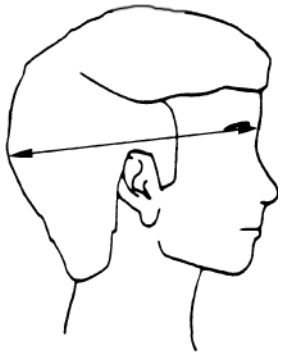

Figure 37 — Head length

4.3.10 Head breadth

Description: Maximum breadth of head above the ears, measured perpendicular to the midsagittal plane. See Figure 38.

Method: Position of head has no influence on the measurement.

Instrument: Spreading caliper.

Figure 38 — Head breadth

4.3.11 Face length (nasion-menton)

Description: Distance between nasion and menton. See Figure 39.

Method: Subject keeps mouth closed. Head is oriented in the Frankfurt plane.

Instrument: Spreading caliper.

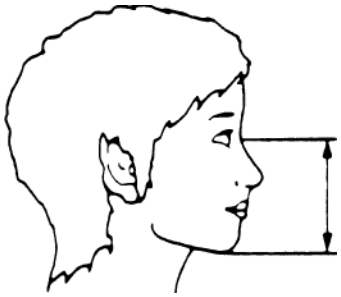

Figure 39 — Face length (nasion-menton)

4.3.12 Head circumference

Description: Maximum, approximately horizontal, circumference of head measured above the glabella and crossing the rearmost point of the skull. See Figure 40.

Method: Tape measure is held on the glabella and led around the head so as to pass over the rearmost point of the skull. Hair shall be included in the measurement.

Instrument: Tape measure.

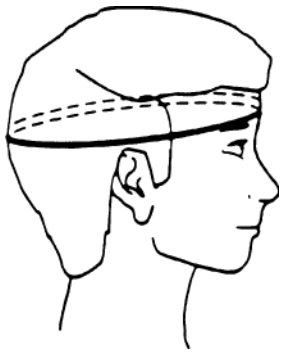

Figure 40 — Head circumference

4.3.13 Sagittal arc

Description: Arc from the glabella over the skull to the inion. See Figure 41.

Method: Tape measure is held on the glabella and led over the head so as to pass over the rearmost point of the skull to the inion. Hair shall be included in the measurement.

NOTE The inion can be found by the point in the nuchal muscle depression just posterior to the inion.

Instrument: Tape measure.

Figure 41 — Sagittal arc

4.3.14 Bitragion arc

Description: Arc from one tragion over the crown of the head to the other tragion. See Figure 42.

Method: Tape measure is held on the tragion of one side of the head and led over the crown to the tragion on the other side. Hair shall be included in the measurement.

Instrument: Tape measure.

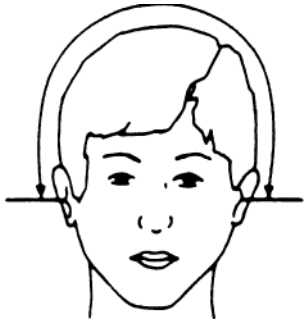

Figure 42 — Bitragion arc

4.4 Functional measurements

4.4.1 Wall-acromion distance

Description: Horizontal distance from a vertical surface to the acromion. See Figure 43.

Method: Subject stands fully erect, with shoulder blades and buttocks firmly against a vertical surface; equal pressure of shoulders against the vertical surface, arms fully extended horizontally.

Instrument: Anthropometer.

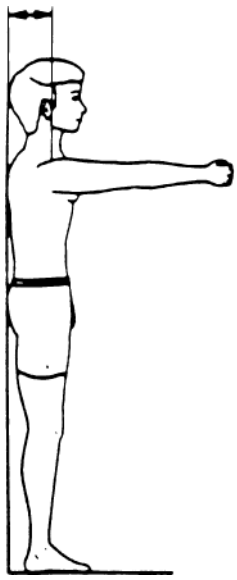

Figure 43 — Wall-acromion distance

4.4.2 Grip reach; forward reach

Description: Horizontal distance from a vertical surface to the grip axis of the hand while the subject leans both shoulder blades against the vertical surface. See Figure 44.

Method: Subject stands fully erect with shoulder blades and buttocks firmly against the vertical surface, arm fully extended horizontally. Hand holds measuring rod with grip axis vertical.

Instrument: Anthropometer, 20 mm diameter rod for determining grip axis.

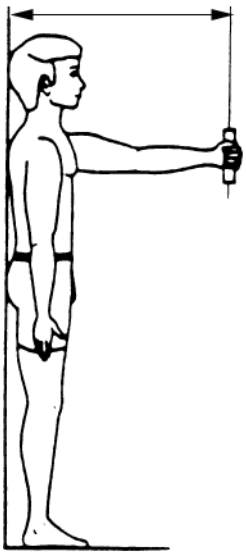

Figure 44 — Grip reach; forward reach

4.4.3 Elbow-grip length

Description: Horizontal distance from back of the upper arm (at the elbow) to grip axis, with elbow bent at right angles. See Figure 45.

Method: Subject sits or stands erect, upper arm hanging freely downwards. Hand holds measuring rod with grip axis vertical.

Instrument: Anthropometer, 20 mm diameter rod for determining grip axis.

Figure 45 — Elbow-grip length

4.4.4 Fist (grip axis) height

Description: Vertical distance from the floor to the grip axis of the fist. See Figure 46.

Method: Subject stands fully erect with feet together, shoulders relaxed, arms hanging freely downwards. Hand holds the measuring rod in the sagittal plane with grip axis horizontal.

Instrument: Anthropometer, 20 mm diameter rod.

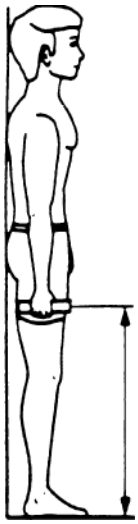

Figure 46 — Fist (grip axis) height

4.4.5 Forearm-fingertip length

Description: Horizontal distance from the back of the upper arm (at the elbow) to the fingertips, with the elbow bent at right angles. See Figure 47.

Method: Subject sits erect with upper arm hanging downwards, forearm horizontal and hand extended.

Instrument: Anthropometer (large sliding caliper).

Figure 47 — Forearm-fingertip length

4.4.6 Buttock-popliteal length (seat depth)

Description: Horizontal distance from the hollow of the knee to the rearmost point of the buttock. See Figure 48.

Method: Subject sits fully erect with thighs fully supported and the sitting surface extending as far as possible into the hollow of the knee, lower legs hanging freely. The position of the rearmost point of the buttock is vertically projected onto the sitting surface by means of a measuring block which touches the buttocks. Distance is measured from the measuring block to the forward edge of the sitting surface.

Instrument: Anthropometer, measuring block.

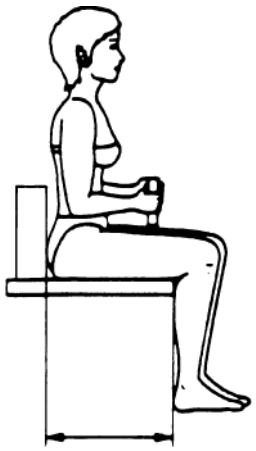

Figure 48 — Buttock-popliteal length (seat depth)

4.4.7 Buttock-knee length

Description: Horizontal distance from the foremost point of the knee-cap to the rearmost point of the buttock. See Figure 49.

Method: Subject sits fully erect with thighs fully supported and lower legs hanging freely. The position of the rearmost point of the buttock is vertically projected onto the sitting surface by means of a measuring block which touches the buttocks. Distance is measured from the measuring block to the foremost point of the knee-cap.

Instrument: Anthropometer, measuring block.

Figure 49 — Buttock-knee length

4.4.8 Neck circumference

Description: Circumference of neck at a point just below the bulge at the thyroid cartilage. See Figure 50.

Method: Subject sits erect with head in the Frankfurt plane.

Instrument: Tape measure.

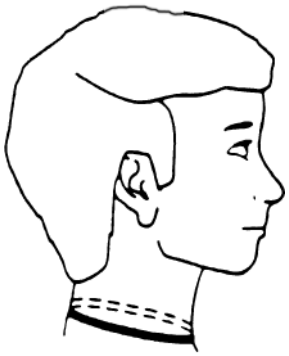

Figure 50 — Neck circumference

4.4.9 Chest circumference

Description: Circumference of the torso measured at nipple level. See Figure 51.

Method: Subject stands fully erect with feet together, arms hanging freely downwards. Females wear their usual brassiere.

Instrument: Tape measure.

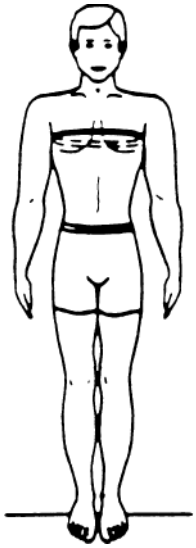

Figure 51 — Chest circumference

4.4.10 Waist circumference

Description: Circumference of trunk at a level midway between the lowest ribs and the upper iliac crest. See Figure 52.

Method: Subject stands fully erect with feet together and is asked to relax the abdominal muscles.

Instrument: Tape measure.

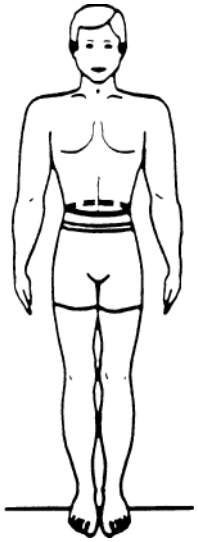

Figure 52 — Waist circumference

4.4.11 Wrist circumference

Description: Circumference of wrist at the level of the styloid processes of the radius and ulna, with the hand outstretched. See Figure 53.
Method: Subject holds forearm horizontal with hand outstretched and fingers extended.
Instrument: Tape measure.

Figure 53 — Wrist circumference

4.4.12 Thigh circumference

Description: Maximum circumference of the thigh. See Figure 54.
Method: Subject stands erect. Measurement is taken by passing the tape horizontally around the thigh immediately below the gluteal fold.
Instrument: Tape measure.

Figure 54 — Thigh circumference

4.4.13 Calf circumference

Description: Maximum circumference of the calf. See Figure 55.
Method: Subject stands erect. Measurement is taken by passing the tape horizontally around the maximum circumference of the calf.
Instrument: Tape measure.

Figure 55 — Calf circumference

Bibliography

[1] HERTZBERG, H.T.E. *et al. Anthropometric survey of Turkey, Greece and Italy*. Pergamon Press, 1963

[2] KNUSSMANN, R. *et al*. (eds.). *Anthropologie, Handbuch der vergleichenden Biologie des Menschen (begründet von Rudolf Martin)*. Vol. I/1. Fischer, Stuttgart, 1988

[3] WEINER, J.S. and LOURIE, J.A. (eds.). *Human biology: A guide to field methods*. Blackwell Scientific Press, Oxford, 1969

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