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Acquisition method of datum points for clothing anthropometry

服装用人体测量基准点的获取方法

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Acquisition method of datum points for clothing anthropometry

1 Scope

This Standard specifies the terms and definitions, content and acquisition method of datum points for clothing anthropometry.

This Standard applies to adult clothing anthropometry.

2 Normative references

The following documents are indispensable for the application of this document. For dated references, only the dated version applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 5703, Basic human body measurements for technological design

GB/T 16160, Anthropometric definitions and methods for garment

3 Terms and definitions

Terms and definitions determined by GB/T 5703 and GB/T 16160, and the following ones are applicable to this document.

3.1 Datum point

The point of measurement that is used during anthropometry.

3.2 Bust width point/chest width point

The outermost point of the vertical tangent point on the front of the human armhole circumference.

3.3 Back width point

The outermost point on the back of the human armhole circumference.

3.4 Waist line

The line of a circle at the thinnest part of the waist between the lower edge of the human rib and the upper end of the tibia.

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o) lateral buttock;

p) wrist point;

q) perineum point;

r) outer ankle point.

5 Acquisition method

5.1 Requirements

5.1.1 Dress and stance

The dress requirements between manual measurement and non-contact anthropometer measurement are the same; the stances vary depending on the difference of non-contact measurement equipment. Dress and stance shall comply with the provisions of Appendix A.

5.1.2 Measurement tools

For manual measurement, tools such as anthropometer, soft ruler, and triangle ruler shall be used.

Non-contact anthropometry shall use tools such as non-contact anthropometer. For the measurement principle of non-contact anthropometer, see Appendix B.

5.2 Graphic of datum points for clothing anthropometry

The datum points for clothing anthropometry shall be acquired from top to bottom, from left to right, from edge to center, and from front to back of the human body. It mainly includes head-vertex, gnathion point, back-neck point, side-neck point, front-neck point, shoulder point, bust width point, back width point, bust-point, elbow point, lateral waist point, anterior waist point, posterior waist point, buttock-peak point, lateral buttock, wrist point, perineum point, outer ankle point (see Figure 1).

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Notes:

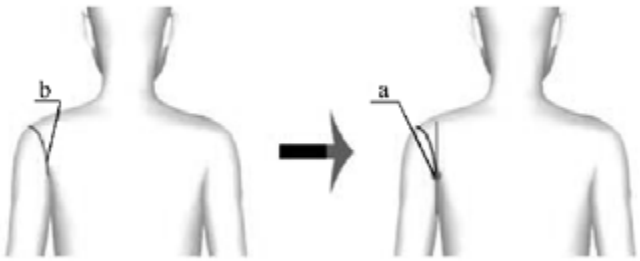
a -- bust width point;

b -- armhole circumference.

Figure 8 -- Schematic diagram of the bust width point acquisition method

5.10 Back width point

In the manual measurement, the subject stands at the position that is specified by the measurer; the subject puts two feet together and stands upright; the subject's eyes look straight ahead; the human body maintains the standing posture; the arm naturally hangs down; the vertical plane slowly moves to the upper arm of the human body; the outermost point in contact with the armhole circumference on the back is the back width point. There are two, namely left and right, back width points. In the non-contact anthropometry, the subject is required to stand according to the non-contact anthropometer; the acquisition method of the back width point can refer to the manual measurement process (see Figure 9).



Notes:

a -- back width point;

b -- armhole circumference.

Figure 9 -- Schematic diagram of the back width point acquisition method

5.11 Bust-point

In the manual measurement, the subject stands sideways at the position that is specified by the measurer; the subject puts two feet together and stands upright; the subject's eyes look straight ahead; the subject maintains the natural state; the vertical plane slowly moves to the human chest; the outermost point in contact with the chest is the bust-point. There are two, namely left and right, bust-points. In the non-contact anthropometry, the subject is required to stand

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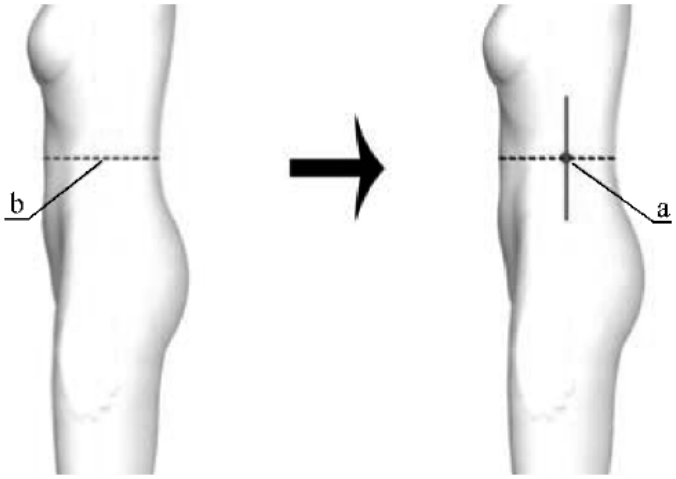
Figure 11 -- Schematic diagram of the elbow point acquisition method

5.13 Lateral waist point

In the manual measurement, the subject stands sideways at the position that is specified by the measurer; the subject puts two feet together and stands upright; the subject's arm is naturally lifted slightly; the thinnest part between the lower edge of the human rib and the upper end of the tibia is the waist line. The measurer stands on the side of the subject, and determines the intersection of the side central line and the waist line of the human body as the lateral waist point. In the non-contact anthropometry, the subject is required to stand according to the non-contact anthropometer; the acquisition method of the lateral waist point can refer to the manual measurement process (see Figure 12).



Notes:

a -- lateral waist point;

b -- waist line.

Figure 12 -- Schematic diagram of the lateral waist point acquisition method

5.14 Anterior waist point

In the manual measurement, the subject stands at the position that is specified by the measurer. The subject puts two feet together and stands upright; the subject's arm is naturally lifted slightly; the thinnest part between the lower edge of the human rib and the upper end of the tibia is the waist line. The measurer stands on the front of the subject, and determines the anterior intersection of the median sagittal plane and the waist line of the human body as the anterior waist point. In the non-contact anthropometry, the subject is required to stand

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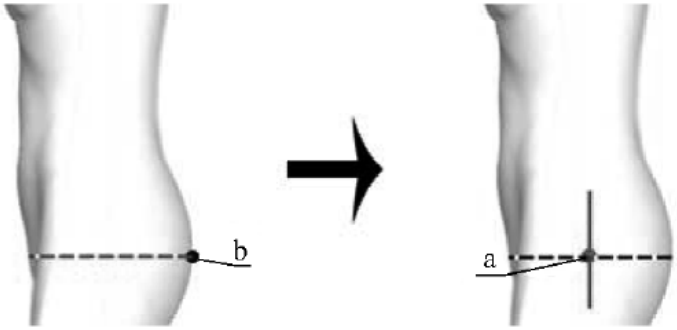
a -- buttock-peak point;

b -- vertical plane.

Figure 15 -- Schematic diagram of the buttock-peak point acquisition method

5.17 Lateral buttock

In the manual measurement, the subject stands sideways at the position that is specified by the measurer; the subject puts two feet together and stands upright; the subject's eyes look straight ahead; the subject maintains the natural state; the horizontal circumference of the buttock-peak point is the hip line. Let the subject's arm rise naturally, and the intersection of the hip coronal plane and the hip line is determined as the lateral buttock. There are two, namely left and right, lateral buttocks. In the non-contact anthropometry, the subject is required to stand according to the non-contact anthropometer; the acquisition method of the lateral buttock can refer to the manual measurement process (see Figure 16).



Notes:

a -- lateral buttock;

b -- hip line.

Figure 16 -- Schematic diagram of the lateral buttock acquisition method

5.18 Wrist point

In the manual measurement, the subject stands at the position that is specified by the measurer; the subject puts two feet together and stands upright; the subject's eyes look straight ahead; the arms naturally hang down; slowly move the plane parallel to the outer side of the palm to the side by the little finger of the human wrist; the highest point of the plane in contact with the wrist is the wrist point. In the non-contact anthropometry, the subject is required to stand

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Figure B.1 -- Basic flow

B.2.2 System calibration

Before performing anthropometry, system calibration is firstly performed to determine the relative positional relationship between the camera and the camera AND the camera and projector in the measurement system. After the calibration, the model parameters of the system can be obtained. The parameters mainly include the focal length of the camera, the lens distortion coefficient, the rotation matrix and the translation matrix between the camera and the camera AND the camera and the projector. The calibration parameters of the system are the premise of calculating the three-dimensional point coordinates of the human body surface by using the triangulation principle.

B.2.3 Structured light projection

After the measurement instrument system model parameters are determined, use the projection module to project the structured light to the surface of the human body to obtain depth information of the surface of the human body. The structured light refers to the artificially designed light with a certain regular arrangement from the projector. According to the shape of the structured light, it can be divided into point structure light, line structure light, multi-line structure light, code structure light and the like.

B.2.4 Acquisition of deformation map

The structured light has a certain regular distribution before being projected onto the surface of the human body. Structured lights of different shapes are different in distribution; the distribution rules depend on the artificial design. When the structured light is projected onto the surface of the human body, it is affected by the change of the shape of the surface of the human body. The projected structured light will be deformed on the surface of the human body. By collecting the deformed structured light patterns that are modulated by the surface of the human body, it is equivalent to recording the depth information of the surface of the human body.

B.2.5 Corresponding point search

It is similar to the human binocular structure. The three-dimensional point coordinates of the human body surface can be calculated by the deformed structured light patterns that are collected by the binocular camera in the system. When using the area array camera to collect, each pixel records the information of different positions in the space; perform corresponding points search for the two images in the binocular camera; search the corresponding points to obtain the coordinates of the corresponding pixel in the camera of the three-dimensional points in the human body surface.

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