DRAFT INTERNATIONAL STANDARD

ISO/DIS 20947-2

ISO/TC **133**

Secretariat: **SABS**

Voting begins on:
2019-05-28

Voting terminates on:
2019-08-20

Performance evaluation protocol for digital fitting systems —

Part 2:
Virtual garment

Protocole d'évaluation de la performance des systèmes d'habillage virtuel —

Partie 2: Vêtement virtuel

ICS: 61.020

This document is circulated as received from the committee secretariat.

Reference number
ISO/DIS 20947-2:2019(E)

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Published in Switzerland

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 133, *Clothing sizing systems - size designation, size measurement methods and digital fittings.*

ISO 20947 consists of three parts, under the general title Performance evaluation protocol for digital fitting systems.

— Part 1– *Accuracy of virtual human body representation*

— Part 2 –*Virtual garment*

— Part 3 –*Digital fitting performance*

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Digital fitting systems are used more frequently for evaluating the fit of garment without making actual physical patterns or physical garments. In a digital fitting system, a virtual garment is made using virtual patterns, and the fit of physical garment on a physical human body is assessed by draping a virtual garment on a virtual body or a virtual fit mannequin (fit form) model. Such system is useful for designers, manufacturers, educationalists because the system helps to improve the fit of garments and productivity.

The use of the digital fitting system, employed to evaluate the suitability of real garments on real human body with the use of virtual garments on a virtual human body in cyberspace, is growing in popularity. The system eliminates the need for physical garment production with fabric in product evaluation. Using computer-generated virtual garment pattern, virtual garment is created and tested on either a virtual human body or a virtual fit mannequin (fit form) model. The technology is expected to improve garment fit and increasing productivity. It benefits not only those engaged in garment design but also consumers at the time of garment purchase, with better fit and wider choice of sizes in mass-produced products.

Digital fitting technology is still developing, and there is a wide range of differences in the specification and performance between digital fitting systems. This makes it difficult for users (designers, manufacturers, educationalists and retailers of garments) to select an appropriate system for their purposes.

Notwithstanding, the digital fitting system is still developing, with wide differences among systems regarding functions and performance description. This makes the choice of the right system extremely difficult for the system user (garment design and retail).

This international standards addresses the second standard of the series. It explains a protocol for describing the performance and specification of virtual garment pattern cutting and clothing simulation. This international standard is intended to be used by fashion designers and pattern technologists (makers) for generating virtual garment patterns, and testing them on a virtual fit mannequin (fit form) model or a virtual human body. Additionally, data for the virtual fit mannequin (fit form) model and virtual garment pattern will be developed as reference, to enable the system user to reproduce the purported system performance values.

Performance evaluation protocol for digital fitting systems —

Part 2:
Virtual garment

1 Scope

This standard specifies the method for describing the functions and the method for evaluating the performance of the virtual garment pattern cutting and clothing simulation modules of digital fitting systems. This international standard is intended to be used by fashion designers and pattern technologists (makers) for generating virtual garment patterns, and testing them on a virtual fit mannequin (fit form) model.

This standard specifies a method for describing the functions and a method for evaluating the performance of the virtual garment pattern cutting and clothing simulation modules of digital fitting systems. The performance is evaluated by comparison between the length of 2D pattern and corresponding length of 3D garment in digital (virtual) space. The standard also requires reporting format of the functions and the performance. This international standard is intended to be used by fashion designers and pattern technologists (makers) for generating virtual garment patterns, and testing them on a virtual fit mannequin (fit form) model or a virtual human body.

A typical design process of virtual pattern cutting and virtual try-on starts from 2D virtual garment pattern cutting. Then virtual garment patterns are put on a virtual fit mannequin (fit form) model or a virtual human body in the virtual 3D space. Whereas, some systems enable another design process, such as direct 3D pattern cutting on a virtual human body with clothing simulation. This international standard is not limited to the system based on the typical design process. The performance evaluation method is independent from the design process. The method is developed to assess the performance of the clothing simulation module.

Intended users of this standard are users those who plan to introduce/renew digital fitting systems. The user sends material information of specific fabric to multiple developers of digital fitting systems. Developers assess their systems based on this standard using the specified information, and return the result report to the user according to this standard.

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 18163, *Clothing — Digital fittings — Vocabulary and terminology used for the virtual garment*

ISO 18825-1, *Clothing — Digital fittings — Part 1: Vocabulary and terminology used for the virtual human body*

ISO/CD 20947-1, *Performance evaluation protocol for digital fitting systems — Part 1: Accuracy of virtual human body representation*

3 Terms and definitions

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

3.1
Digital fitting system
Digital fitting system provides qualitative and/or quantitative evaluation of overall and/or specific simulation garment fit through analysis of the distribution of surface strain, gap between body and garment, heat map, cross section, surface wrinkles, garment balance, etc.

3.2
Virtual fit mannequin (fit form) model
Virtual model of a fit mannequin (fit form) in a virtual space used for digital fitting. Fit mannequin (fit form) model is used for draping and examining silhouette and fit of a garment.

Note 1 to entry: see ISO/WD 20947-1 Performance evaluation protocol for digital fitting systems - Part1 Accuracy of virtual human body representation

3.3
Virtual garment pattern
Shapes consisting of straight lines and closed curves that mark the area of a digitized pattern to be used on the virtual garment. Each pattern consists of a contoured and multiple internal lines, which are used to express seams, internal openings, fold lines, and other garment characteristics.

3.4
Virtual garment
Three-dimensional clothing in digital form that exists in virtual space.

3.5
Clothing simulation
Creation and drape simulation of a virtual garment on the virtual human body using a virtual garment pattern, virtual sewing and bounding volume.

3.6
Material properties
Physical properties of material include tensile modulus, bending rigidity, shear resistance, thickness, weight, etc. These can be simulated for virtual fabrics using cloth simulation models eg (see AnnexD).

3.7
Sewing information
Information necessary to construct a virtual garment from virtual garment patterns. Sewing information includes seam lines, specific points on a virtual garment pattern such as positions of snaps, hooks, and buttons, notch marks, grain line, and layer information.

3.8
Lines on virtual pattern and their lengths

3.8.1
General
Lengths are measured on lines of the virtual garment pattern and described in clause 3.8. For lines that may be measured on either side of virtual garment pattern or virtual garment, it should be indicated on which side the length was measured. The virtual garment pattern that is used for evaluating the performance of digital fitting systems does not have easing or stretching at any lines or darts. Darts are not included in the length measurement. In order to evaluate the performance of a digital fitting system using an asymmetrical virtual garment pattern or lines including easing or stretching, it is recommended that any additional lengths are measured.

3.8.2
Upper pattern

3.8.2.1
Bust line
Straight line passing the level of the breast point of the pattern and perpendicular to the front centre line of the front bodice from the left side line to the right side line (front bust line), or perpendicular to the back centre line of the back bodice from the left side line to the right side line (back bust line). See Figure 1. Length of the front bust line, length of back bust line, and total length are measured.

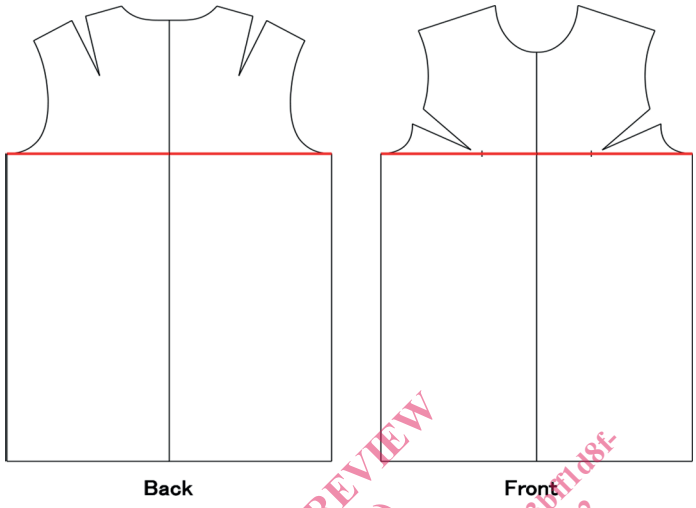

Figure 1 — Bust line

3.8.2.2
Shoulder line
Straight line at the shoulder of front bodice or back bodice along which the front bodice and back bodice are stitched together. See Figure 2. Length of shoulder lines are measured.

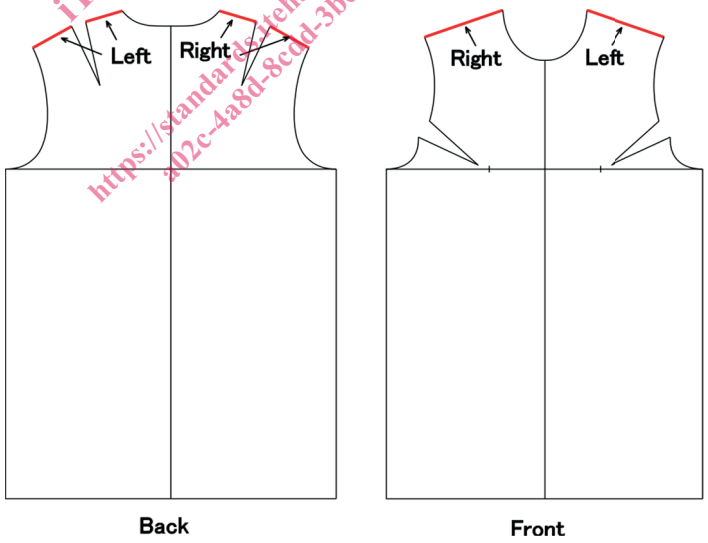

Figure 2 — Shoulder line

3.8.2.3
Armhole line
Lines at the armhole of front bodice or back bodice. See Figure 3. Length of armhole lines, and total length of armhole lines of front bodice and back bodice are measured.

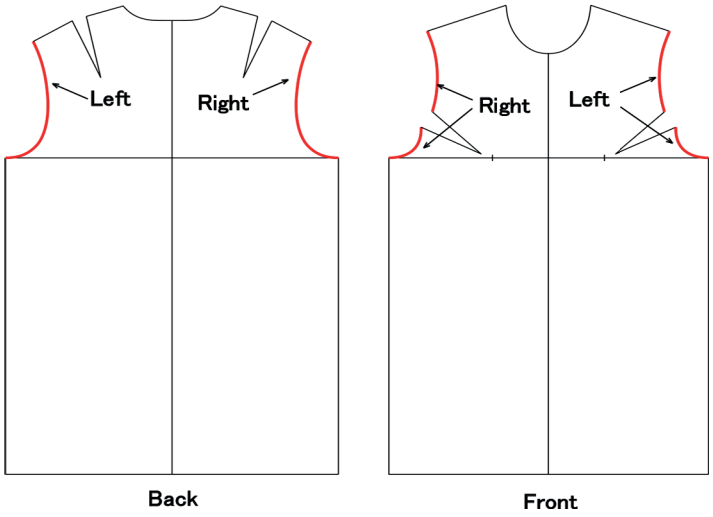

Figure 3 — Armhole line

3.8.2.4
Neck line
Lines at the neck of front bodice or back bodice. See Figure 4. Length of front neck line, length of back neck line, and total length are measured.

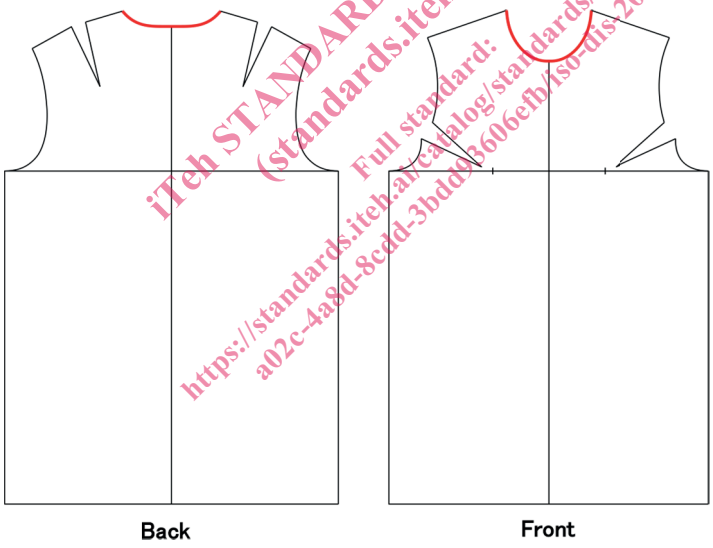

Figure 4 — Neck line

3.8.2.5
Side seam line
Lines at the side of front bodice or back bodice along which the front bodice and back bodice are stitched together. See Figure 5. Length of side lines (right or left of front or back side lines) are measured.

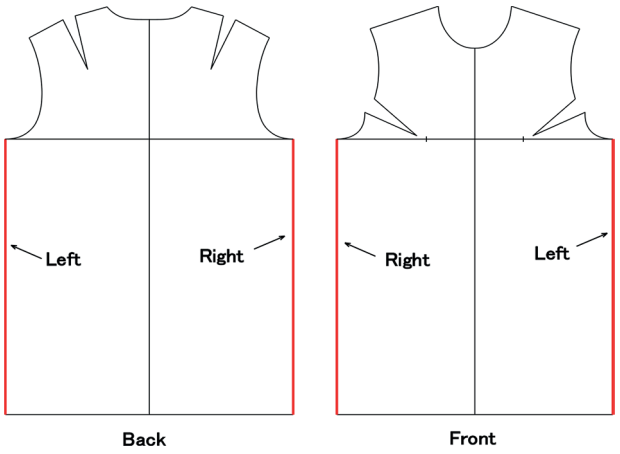

Figure 5 — Side line

3.8.2.6
Centre front line
Straight line passing the centre of front neck line and perpendicular to the bust line. See Figure 6. Length is measured from neck line to hem line.

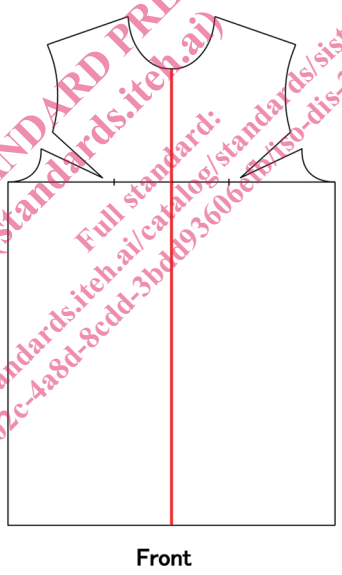

Figure 6 — Centre front line

3.8.2.7
Centre back line
Straight line passing the centre of back neck line and perpendicular to the bust line. See Figure 7. Length is measured from neck line to hem line.

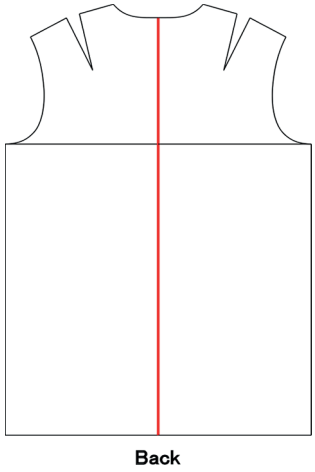

Figure 7 — Centre back line

3.8.2.8
Hem line
Line at the hem of front bodice or back bodice. See Figure 8. Length of the front hem line, length of back hem line, and total length are measured.

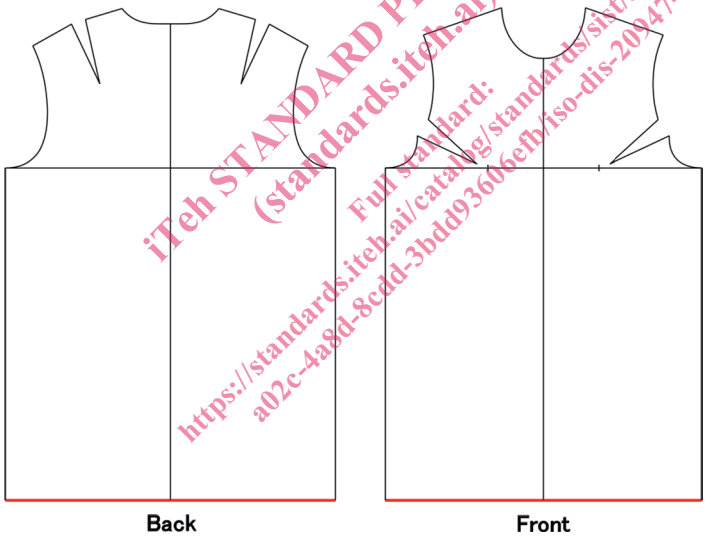

Figure 8 — Hemline

3.8.2.9
Sleeve crown ~~cap~~ seam line
Line of the garment pattern of sleeve along which the sleeve and front bodice or sleeve and back bodice are stitched together. See Figure 9. Length of right or left sleeve crown seam line is measured.