

## **3-D scanning methodologies for internationally compatible anthropometric databases**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 20685:2010 sisaldab Euroopa standardi EN ISO 20685:2010 ingliskeelset teksti.</p> <p>Standard on kinnitatud Eesti Standardikeskuse 30.09.2010 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 15.06.2010.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 20685:2010 consists of the English text of the European standard EN ISO 20685:2010.</p> <p>This standard is ratified with the order of Estonian Centre for Standardisation dated 30.09.2010 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.</p> <p>Date of Availability of the European standard text 15.06.2010.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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English Version

### 3-D scanning methodologies for internationally compatible anthropometric databases (ISO 20685:2010)

Méthodologies d'exploration tridimensionnelles pour les  
bases de données anthropométriques compatibles au plan  
international (ISO 20685:2010)

3-D-Scanverfahren für international kompatible  
anthropometrische Datenbanken (ISO 20685:2010)

This European Standard was approved by CEN on 12 June 2010.

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## Foreword

This document (EN ISO 20685:2010) has been prepared by Technical Committee ISO/TC 159 "Ergonomics" in collaboration with Technical Committee CEN/TC 122 "Ergonomics" the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by December 2010, and conflicting national standards shall be withdrawn at the latest by December 2010.

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This document supersedes EN ISO 20685:2005.

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### Endorsement notice

The text of ISO 20685:2010 has been approved by CEN as a EN ISO 20685:2010 without any modification.

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## Introduction

Anthropometric measures are key to many International Standards. These measures can be gathered using a variety of instruments. An instrument with relatively new application to anthropometry is a three-dimensional (3-D) scanner. 3-D scanners generate a 3-D point cloud of the outside of the human body that can be used for clothing and automotive design, engineering and medical applications. There are currently no standardized methods for using 3-D point clouds in the design process. As a result, many users extract one-dimensional (1-D) data from 3-D point clouds. This International Standard concerns the application of 3-D scanners to the collection of one-dimensional anthropometric data for use in design.

There are a number of different fundamental technologies that underlie commercially available systems. These include stereophotogrammetry, ultrasound and light (laser light, white light and infrared). Further, the software that is available to process data from the scan varies in its methods. Additionally, software to extract dimensions similar to traditional dimensions varies markedly in features and capabilities.

As a result of differences in fundamental technology, hardware and software, extracted measurements from several different systems can be markedly different for the same individual. Since 3-D scanning can be used to gather measurements, such as lengths and circumferences, it was important to develop an International Standard that allows users of such systems to judge whether the 3-D system is adequate for these needs.

The intent of ISO 20685 is to ensure comparability of body measurements as specified by ISO 7250-1 but measured with the aid of 3-D body scanners rather than with traditional anthropometric instruments such as tape measures and callipers. It is further intended that by conformance with this International Standard any data extracted from scans will be suitable for inclusion in international databases such as those described in ISO 15535.

# 3-D scanning methodologies for internationally compatible anthropometric databases

## 1 Scope

This International Standard addresses protocols for the use of 3-D surface-scanning systems in the acquisition of human body shape data and measurements defined in ISO 7250-1 that can be extracted from 3-D scans. It does not apply to instruments that measure the location and/or motion of individual landmarks.

While mainly concerned with whole-body scanners, it is also applicable to body-segment scanners (head scanners, hand scanners, foot scanners).

The intended audience is those who use 3-D scanners to create 1-D anthropometric databases and the users of 1-D anthropometric data from 3-D scanners. Although not necessarily aimed at the designers and manufacturers of those systems, scanner designers and manufacturers will find it useful in meeting the needs of clients who build and use 1-D anthropometric databases.

## 2 Normative references

The following referenced documents are indispensable for the application 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 7250-1:2008, *Basic human body measurements for technological design — Part 1: Body measurement definitions and landmarks*

## 3 Terms and definitions

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

**NOTE** In the case of definitions of terms for skeletal landmarks, when there is a separate term for the skin overlying the landmark and another for the landmark itself, the skin landmark term is used. Where there is no separate term, the skeletal term is used and assumed to refer to the skin overlying the landmark.

### 3.1

#### three-dimensional

#### 3-D

pertaining to the use of three orthogonal scales on which the three coordinates,  $x$ ,  $y$  and  $z$ , can be measured to give the precise position of any relevant anatomical point in the considered space

**NOTE** Many anthropometric distances can be calculated from the coordinates of anatomical landmarks. Some additional points may be necessary to obtain circumferences.

### 3.2

#### 3-D body scanner

hardware and software system that creates digital data representing a human form, or parts thereof, in three dimensions