

Aerospace series - Anthropometric dimensioning of  
aircraft seats

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

See Eesti standard EVS-EN 4730:2018 sisaldab Euroopa standardi EN 4730:2018 ingliskeelset teksti.	This Estonian standard EVS-EN 4730:2018 consists of the English text of the European standard EN 4730:2018.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 28.11.2018.	Date of Availability of the European standard is 28.11.2018.
Standard on kättesaadav Eesti Standardikeskusest.	The standard is available from the Estonian Centre for Standardisation.

Tagasisidet standardi sisu kohta on võimalik edastada, kasutades EVS-i veebilehel asuvat tagasiside vormi või saates e-kirja meiliaadressile [standardiosakond@evs.ee](mailto:standardiosakond@evs.ee).

ICS 49.020, 97.140

Standardite reprodutseerimise ja levitamise õigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonsesse süsteemi või edastamine ükskõik millises vormis või millisel teel ilma Eesti Standardikeskuse kirjaliku loata on keelatud.

Kui Teil on küsimusi standardite autorikaitse kohta, võtke palun ühendust Eesti Standardikeskusega:  
Koduleht [www.evs.ee](http://www.evs.ee); telefon 605 5050; e-post [info@evs.ee](mailto:info@evs.ee)

The right to reproduce and distribute standards belongs to the Estonian Centre for Standardisation

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, without a written permission from the Estonian Centre for Standardisation.

If you have any questions about copyright, please contact Estonian Centre for Standardisation:

Homepage [www.evs.ee](http://www.evs.ee); phone +372 605 5050; e-mail [info@evs.ee](mailto:info@evs.ee)

English Version

## Aerospace series - Anthropometric dimensioning of aircraft seats

Série aérospatiale - Dimensionnement  
anthropométrique des sièges passagers d'avion

Luft- und Raumfahrt - Anthropometrische  
Dimensionierung von Flugzeugsitzen

This European Standard was approved by CEN on 19 February 2018.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

## Contents

	Page
European foreword.....	4
Introduction .....	5
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions .....	6
4 Engineering anthropometry .....	9
4.1 Anthropometric design.....	9
4.2 “Fit” and “Reach” problems .....	9
4.3 Percentiles and design limit.....	9
4.4 Means and procedure .....	10
5 Usage of anthropometric data .....	11
5.1 Identification of target group .....	11
5.2 Selection of data sets.....	11
5.2.1 Biases.....	11
5.2.2 International populations.....	11
5.3 Selection of relevant anthropometric measurements.....	12
5.4 Clothing and posture corrections.....	12
5.5 Clearances and margins.....	12
5.6 Compression of cushion.....	12
5.7 Integration and evaluation .....	12
5.8 Documentation.....	13
5.9 Examples .....	13
Annex A (informative) Statistical properties of anthropometrical measurements.....	17
A.1 Distribution parameters.....	17
A.2 Accuracy, validity and reliability.....	19
Annex B (informative) Estimates of missing anthropometric measurements .....	21
B.1 Ratio scaling.....	21
B.2 Proportionality constants .....	22
Annex C (informative) Estimates of updates .....	24
Annex D (informative) Estimates of percentile values (evaluation) .....	27
D.1 Normal distributed measurements .....	27
D.1.1 Estimate of percentiles with given mean and standard deviation .....	27
D.1.2 Estimate of accommodation rate.....	29
D.2 Skewed distributions (log-normal) .....	29
D.3 General approach.....	30
Annex E (informative) Example: Evaluation of anthropometric accommodation rates of an economy class aircraft seat .....	32
E.1 Seat geometry.....	32
E.2 Anthropometric data .....	32
E.3 Estimation of accommodation.....	35
E.3.1 Seat width between armrests .....	35

<b>E.3.2</b>	<b>Total seat width.....</b>	<b>35</b>
<b>E.3.3</b>	<b>Cushion height over floor .....</b>	<b>35</b>
<b>E.4</b>	<b>Documentation .....</b>	<b>36</b>
	<b>Bibliography .....</b>	<b>37</b>

This document is a preview generated by EVS

## European foreword

This document (EN 4730:2018) has been prepared by the Aerospace and Defence Industries Association of Europe — Standardization (ASD-STAN).

After enquiries and votes carried out in accordance with the rules of this Association, this Standard has received the approval of the National Associations and the Official Services of the member countries of ASD, prior to its presentation to CEN.

This document shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2019, and conflicting national standards shall be withdrawn at the latest by May 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Introduction

Flight passengers in commercial aviation spend the predominant part of their journey — which can take 12 hours or more — on their seats. Therefore, aircraft passenger seats are designed to minimize passengers' discomfort. This includes the consideration of body size and its variation within the target population.

This document gives guidance on the use of anthropometric data for the dimensioning of aircraft seats to accommodate specific populations as well as mixed populations including the world population. This document also gives advice on how to quantify seat comfort in terms of anthropometric accommodation rates.

## 1 Scope

This document describes the application of anthropometric data for the dimensioning of aircraft passenger seats. The focus is on the use of statistical parameters of anthropometrical measurements as given in CEN ISO/TR 7250-2 and similar sources. Even if methods described in this document might be applicable for feasibility and safety issues the scope of this document is design for comfort.

The aim of this document is to give advice to designers to include methods of human-centred design into the design of aircraft seats.

## 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.

EN 4723:2015, *Aerospace series — Standardized measurement methods for comfort and living space criteria for aircraft passenger seats*

EN ISO 15535:2012, *General requirements for establishing anthropometric databases (ISO 15535:2012)*

EN ISO 7250-1, *Basic human body measurements for technological design — Part 1: Body measurement definitions and landmarks*

CEN ISO/TR 7250-2, *Basic human body measurements for technological design — Part 2: Statistical summaries of body measurements from national populations*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

### 3.1 anthropometry

study and measurement of the physical dimensions and mass of the human body and its constituent (external) parts

Note 1 to entry: Taken from the Greek word *anthropos* (human being or Man) and *metron*, to measure.

[SOURCE: EN ISO 15535:2012, 3.6]

### 3.2 anthropometric data

dimensional measurements (such as heights, lengths, depths, breadths and circumferences) of the human body and its component parts

[SOURCE: EN ISO 15535:2012, 3.7]