
**Ergonomija - Antropometrični podatki in podatki o telesni moči otrok v Evropi - 2.
del: Smernice za pravilno uporabo antropometričnih podatkov in podatkov o
telesni moči**

Ergonomics - Anthropometric and strength data of children in Europe - Part 2: Guidelines
for the correct application of anthropometric and strength data

Ergonomie - Anthropometrische und Kraftdaten von Kindern in Europa - Teil 2: Leitlinien
für die korrekte Anwendung von anthropometrischen und Kraftdaten

Ergonomie - Données anthropométriques et de force des enfants en Europe - Partie 2 :
Lignes directrices pour l'application correcte des données anthropométriques et de force

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13.180

Ergonomija

Ergonomics

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**Ergonomics - Anthropometric and strength data of
children in Europe - Part 2: Guidelines for the correct
application of anthropometric and strength data**

Ergonomie - Données anthropométriques et de force
des enfants en Europe - Partie 2 : Lignes directrices
pour l'application correcte des données
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Ergonomie - Anthropometrische und Kraftdaten von
Kindern in Europa - Teil 2: Leitlinien für die korrekte
Anwendung von anthropometrischen und Kraftdaten

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European foreword

This document (CEN/TS 18296-2:2026) has been prepared by Technical Committee CEN/TC 122 “Ergonomics”, the secretariat of which is held by DIN.

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The series on *Ergonomics — Anthropometric and strength data of children in Europe* consists of the following parts:

- *Part 1: Statistical summaries of the data* (CEN/TR 18296-1);
- *Part 2: Guidelines for the correct application of anthropometric and strength data* (CEN/TS 18296-2).

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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Introduction

These guidelines are the result of monitoring empirical work to update anthropometric and strength data of children in Europe. The European Committee for Standardization (CEN) has carried out, within CEN/TC 122 “Ergonomics” a project funded by the European Commission to acquire anthropometric and strength data of children in Europe, initiated by the lack of up-to-date published data. These data need to be current and reliable being the basis for the safety, comfort and usability of products used for, by or with children. From the economic point of view, they are the prerequisite for a successful position of European stakeholders on the international market.

The metric updating of the database was supported by an accompanying project that can assist users in utilising the new data in the context of ergonomic work on products and on processes in which the physical characteristics of children play a role, so that the above-mentioned objective leads to optimal results in practice. This assistance is particularly useful because in many cases an anthropometric database needs to be used to support application expertise in the increasingly complex manufacturing and assessment processes. With the development of a simplified toolbox, in which important implications for application situations are presented graphically, the guidelines pursue a user-driven approach.

Standards in the field of anthropometry fulfil a special task in overcoming the virtual distance between manufacturers of products and processes and their users. Databases with physical characteristics in a user population play a key role in this. They form the basis for planning and manufacturing products and processes that are safe and convenient to use. The physical characteristics as a whole are differentiated into anthropometric measurements, biomechanical and physiological correlations. Anthropometric data is generated when it is collected or updated in relation to a population through the application of measurement methods and visualisations defined in scientific discourse. If anthropometric data are then published in compressed form in standards, misinterpretation can occur in many situations due to the complex underlying anatomical, biomechanical and physiological relationships in a practical application situation. It is therefore very sensible and expedient to increase the quality of use and reliability of standardised anthropometric data by providing accompanying information and advice. Therefore, the publication of updated child data in Europe (published as part 1 of this series) is accompanied by these guidelines for the correct use of the anthropometric values. They will minimise the distance between manufacturers and users and thus raise the overall product and process level from an ergonomic perspective.

Furthermore, the guidelines also pursue an economic objective: by increasing safety in the correct application of anthropometric data in the area of comparative product testing, there is an indirect increase in the ergonomic quality of use overall, i.e. within a product group.

These transfer functions of the guidelines play a special role for children and products intended for them as well as consumer products children come in contact or interact with: these products and procedures not only focus on the anthropometric data of the children themselves, their diversity also has an impact on the ergonomic conditions for the adults appearing at the various interfaces with the products. It can therefore be very important to consider the variability of children’s measurements from the perspective of adults and to include them in the design, shaping and dimensioning of shared products and procedures.

1 Scope

This document provides guidelines for the correct application of anthropometric and strength data of children, in particular for all anthropometric data (body dimensions and physical strength) provided in CEN/TR 18296-1. To improve the user-friendliness, the document combines ergonomically relevant information with a summary of the updated anthropometric data (based on CEN/TR 18296-1 but with combined age groups and fewer statistical parameters).

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.

CEN/TR 18296-1:2025, *Ergonomics - Anthropometric and strength data of children in Europe - Part 1: Statistical summaries of the data*

3 Terms and definitions

For the purposes of this document, terms and definitions given in CEN/TR 18296-1 and the following apply.

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

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

3.1 Data types

NOTE Following the stakeholders' requirements for updating anthropometric data for children, it quickly becomes clear that an isolated publication of percentile tables does not fulfil expectations. These guidelines respond to this by means of a new macrostructure for data presentation. Three different data types are defined below:

- anthropometric core data
- transfer data:
- bio transfer data
- interface transfer data

The differentiation between these three types of data is based on the following experience: The use of data on body measurements and body forces in standards and other forms of publication poses major challenges for the publishing institutions or persons with regard to human biological reliability in the following anonymous application situations. The origin of the data is originally based on scientific rules. In this respect, the input into the databases is controlled and based on scientific ethics and professional expertise. Once the database has been published, the practical use of the figures is not subject to this control. In many cases, the use of anthropometric data is then in the hands of people from other specialised fields. There is a certain risk here that certain biological aspects are not recognisable to users or are ignored. For this reason, the core data is accompanied by transfer data in these guidelines.

3.1.1

core data

data on body measurements and strengths in children which include information about the population and subpopulations, definition of the measures, description of the measurements and statistical details and percentile tables

CEN/TS 18296-2:2026 (E)**3.1.2****Bio transfer data**

data which describe those influences, through which the measurement determined in a normalised standard position of the body show ergonomically significant changes due to anatomical, biomechanical and physiological states or processes

3.1.3**Interface transfer data**

data which describe those influences due to contact and/or interaction of the body or parts of the body with the technical environment with ergonomic relevant consequences for the safety and the comfort at the interface

4 Coding of percentile tables

Age: age group

y02: $2 \leq \text{years} < 3$

y07: $7 \leq \text{years} < 8$

y11: $11 \leq \text{years} < 12$

y13: $13 \leq \text{years} < 14$

<y1: $\text{years} < 1$

y1-3: $1 \leq \text{years} < 4$

y4-6: $4 \leq \text{years} < 7$

y7-9: $7 \leq \text{years} < 10$

y10-12: $10 \leq \text{years} < 13$

y13-15: $13 \leq \text{years} < 16$

NOTE 1 Practical anthropometric work with and on children is subject to particularly careful scrutiny with regard to the ethical aspects of the examinations and tests. Therefore, the percentile tables in the annex cannot be completely uniform and complete.

NOTE 2 The reasons for the differences in the age groups for which percentile values can be given in this document are as follows:

- Only children of age groups $y < 4$ years are able to maintain the right posture during the measuring procedure.
- All the body measurements for $y < 1$ and $y1-3$ are manual and the values are presented based on the number of children capable to maintain the right position during this measuring procedure.

Sex:

F: females.

M: males

U: unisex (males and females)

N: sample size considering only valid measurements.

Pxx: percentile (1, 5, 50, 95 and 99).

5 Implementing the needs of stakeholders and practical consequences

5.1 General

Stakeholder requirements were communicated across a very broad range of topics and areas of expertise. As anthropometric data play a role in the development and evaluation of a large number of products and processes, these guidelines provide a thematically independent overview of their correct application. The requirements for the guidelines have been developed from the following fields of work and areas of expertise:

5.2 Differentiation of stakeholders

The following areas contributed to the most comprehensive picture possible of needs:

- Standardisation of body measurements
- Design of products for active use by children (children's toys, children's vehicles, etc.)
- Design of products for use in children's physical environment (children's furniture, bedding)
- Transport and safety equipment for children (pushchairs, child seats in motor vehicles)
- Components for protecting health and life involving children (building regulations, architectural aspects)

5.3 Practical aspects of stakeholder demands

The interests of stakeholders with regard to future anthropometric standardisation work can be summarised as follows:

- The actualization of anthropometric database for children is welcomed across the board in the face of ever faster and larger markets.
- The practical situations for the application of anthropometric data (children and adults as a whole) in design and assessment tasks are becoming increasingly complex due to industrial planning tools. At the same time, there is no evidence that the comprehensive constructive and human biological expertise of standard users is growing. Consequently, the publication of the updated anthropometric data are accompanied by special information on their correct use with the aim of finding ergonomic solutions.
- Stakeholders pointed out that the speed of the development or evaluation of child-friendly industrial products shall not be reduced by overly extensive accompanying information. In the sense of a user-driven design for the document, these requirements have been incorporated into the macrostructure of the guidelines and have determined the content and form of the information on children's body measurements and forces.

6 General didactic information about the use of anthropometric databases

6.1 General

An optimal, ergonomically comfortable and safe design of products with the human – technical environment interface can only be achieved on the basis of a good adaptation of the designed environment to the metric and physiological diversity of the human body. An essential aspect of this is the values of measurements of the human body anthropometric data, in this case of children.

In all areas of life in industrial societies, people interact with products or in technical environments that are very rarely customised to the individual user. In practice, body measurements and measurements derived from them are used in a wide range of areas such as the design of production areas and other

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workspaces, public spaces (e.g. children's furniture, transport interiors, school equipment), footwear, technical medical products and many other areas. In addition, these measurements also form the basis for the development of computer-aided simulation systems (CAD systems, computer manikins). To ensure that the technical environment of children in Europe can be designed to be safe and comfortable, these guidelines are intended to show designers, production planners, inspectors, designers of technical environments and employees in standardisation committees how the correct application of measurements and forces of the human body can be achieved and how foreseeable misapplications can be minimised.

6.2 Basic information on the selection and use of an anthropometry database

The consideration of what is to be designed or standardised determines the extent to which body measurements of potential users shall be taken as a basis. The flow chart in the following figure shows the basic and general procedure that leads to the best possible application of anthropometric databases. At the same time, the diagram enables the reader to quickly access the system of influencing factors when a specific question arises in order to prevent possible misapplications.

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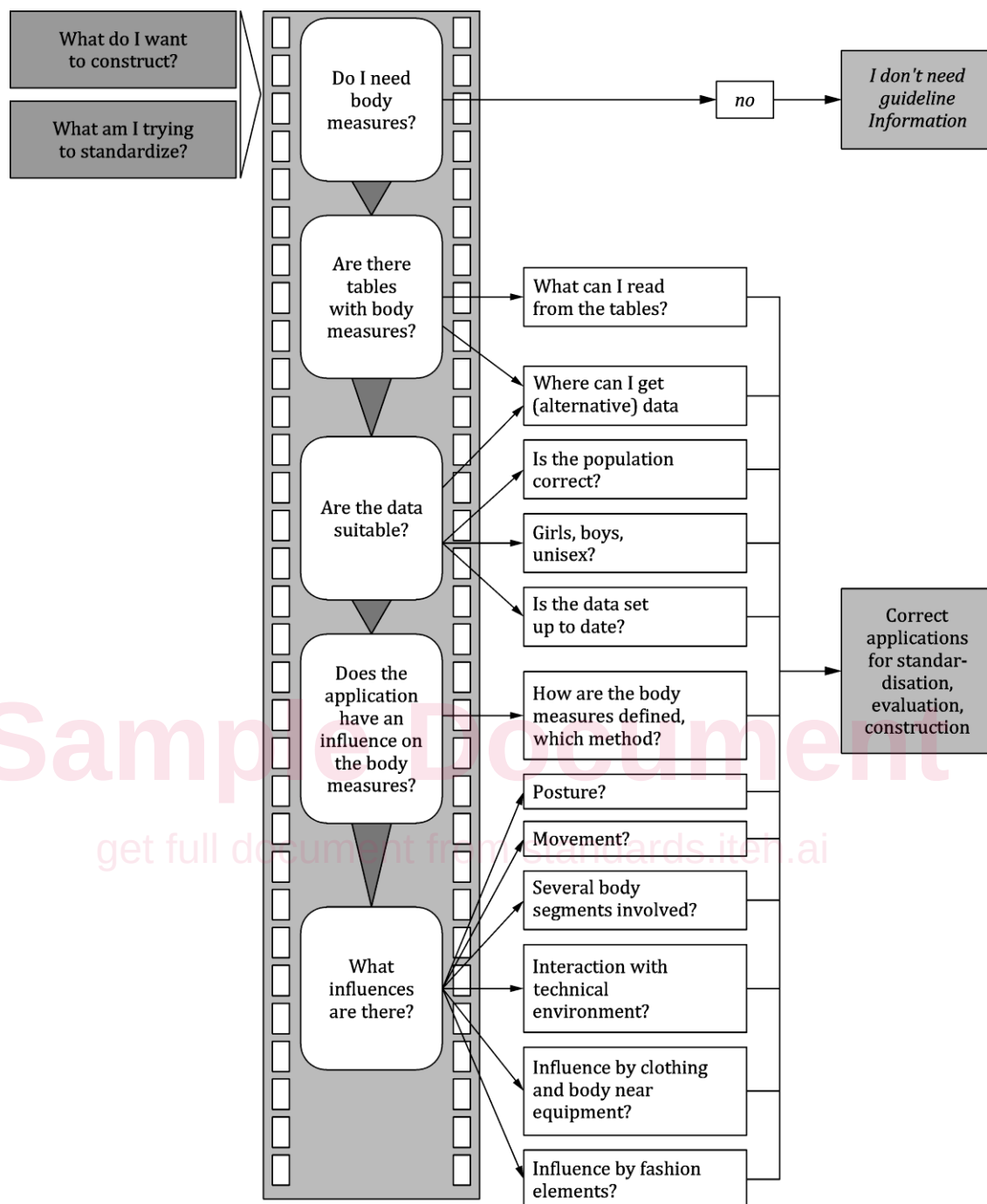


Figure 1 — Flowchart for decisions on the correct selection and application of an anthropometric database

Having chosen a suitable database, the next practical steps follow applying single data. The focus of these guidelines is primarily on solving and answering questions that can arise when using body measures and strengths at the interface between the child and the technical environment.

6.3 Independent use of the guidelines for users of anthropometric databases

These guidelines for the correct use of anthropometric data of children in Europe accompany the update of the corresponding database in part 1 of this series. In terms of content, they also retain their significance for other databases. However, before transferring them to anthropometric conditions in

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other populations or to databases that refer to studies from other time periods, it shall be checked for certainty whether exactly the same methodology was used when collecting the data for other databases. In individual cases, the examination shall include in particular the anatomical and biomechanical definition of the measured body part or body strength as well as a comparison of the measurement specifications.

After clarification of these requirements, the guidelines are in principle transferable to other applications of anthropometric databases.

7 Macrostructure of the guidelines

7.1 General

The Guidelines include the following elements to support users in the use of anthropometric data in all application situations:

— Core data

- Standardised designation of the individual body measurement from the series measurement for updating the anthropometric database for children in Europe
- Description of the body measurement
- Pictorial representation of the measurement distance for the body measurement

— Transfer data

- Definition of transfer data that support the user's understanding of table values in the application situation
- Toolbox with icons that indicate the effective influence of transfer data when using table values
- Assignment of icons from the didactic toolbox to the individual body and force measures at a glance.

7.2 Bio transfer data - overview and application aspects

The following overview of bio transfer data is based on a compilation of empirical values from interviews with stakeholders and practical experience in the project participant's consortium on the use of body measurements in the field of ergonomic issues and tests. The following bio transfer data have been derived from this area of practical experiences. They have been arranged in Table 1 according to the type of the body dimension (e.g., length point to point, circumference).

Table 1

Biomechanical and/or physiological cause	Effect on the body dimension in the application situation
Type of Measurements: point to point	
difference between measuring posture and application posture	This rather general note is more or less relevant in most application situations, many differences are ergonomically relevant.
body joint(s) within the measuring section	The body measure is a segment of a chain which can change due to joint positions in such a way that a simple recalculation would not be correct. EXAMPLE Addition of forearm and upper arm lengths in different positions of the segments in relation to each other)

Biomechanical and/or physiological cause	Effect on the body dimension in the application situation
body joint chain effective	The body angle chain, in which the body dimension is involved as a segment, does not allow certain angular changes without restriction. The positions of the segments have a considerable influence on each other. EXAMPLE Curvature of a finger through movement of individual phalanges, no isolated movement of the single segment possible)
Measurements for circumferences/depths	
soft tissues within the measuring section	A circumference measurement (for example the abdominal circumference) changes depending on the position of the soft tissues involved and the body posture.
muscles within the measuring section	A circumference measurement (for example the abdominal circumference) changes due to the tension (tone) of the muscles involved and depending on the body posture.
Measurements for circumferences/depths on the trunk	
Breathing movements	Depth and circumference measurements on the trunk in the chest and abdominal area are strongly influenced by breathing. Depending on the application situation, it can be necessary to reduce or increase the original measurement.
Nutritive and digestive states	Depth and circumference measurements on the trunk in the abdominal area can be influenced by the circadian nutritional status. Depending on the application situation, it can be necessary to reduce or increase the original value or provide for dynamic developments at the interface.

7.3 Interface transfer data – overview and application aspects

7.3.1 General

Interface transfer data provide users with information that can arise in the specific application situation about possible metric changes in the anthropometrically and methodically determined measurement due to constraints and influences from the environment close to the body.

7.3.2 Contacts with technical or natural elements

All contacts on the entire body surface with other technical or natural elements act as influencing factors. In the majority of applications for children, these are:

- clothing
- toys
- vehicles (also for transport, e.g. prams)

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- body protecting equipment
- body-supporting systems (furniture, seats and loungers)
- systems that secure the body and movement (belts, bars)

7.3.3 Individual style and fashion elements

In addition - as a **supplement to the bio transfer data** - all fashion elements with direct contact to the body surface, e.g.

- hairstyles
- fingernails
- jewellery

7.4 Effect on the body dimension in the application situations

In general, the following types of change in the anthropometric dimension can be expected in the application situation:

- Increase in body measure due to clothing (for babies also hygiene products such as nappies)
- Increase in body measure due to protective equipment (e.g. helmets)
- Increase in body measure due to functional elements close to the body (e.g. headphones)
- Reduction in body measure due to pressure exerted on the body surface at the interface with the environment
- Reduction in body measure due to pressure exerted on the body surface by the environment at the interface
- Increase in body measure due to displacement of muscle parts and soft tissue caused by pressure (effect of muscle activity or gravity)
- Effect on posture and/or body angle chain due to contact with the interface

In some postures or positions, there can also be a simultaneous increase in one measure and a reduction in another:

- Hip area in a lying person: Decrease in abdominal depth and increase in hip width due to the displacement of soft tissue by gravity
- Measure at the thigh: when sitting with hanging legs, reduce the height of the thigh and increase the width by compressing muscles and soft tissue

Users are informed of the "danger" posed by these biomechanical and physiological influences for the correct application of the table values for the core data, ideally via **the didactic icons** developed for this purpose (see Clause 8). The quantitative impact will be decided on a case-by-case basis. This decision will be based on the method description for the body dimension and then the possible cause of the effect will be identified, especially when ergonomically relevant for the interface.

8 Presentation of the icons of the didactic toolbox

8.1 General

In this clause, graphic elements from the didactic toolbox for creating awareness of the correct use of core data are presented. According to the feedback from the stakeholders, it is assumed that all users have very different levels of ergonomic competence. The didactic toolbox with its icons is intended to provide

relief in the correct use of anthropometric values and at the same time strengthening the effect of the information path and thus increasing expertise.

8.2 Notes on the design of the icons

The icons used in these guidelines have the external shape of a triangle. The triangular frame shape supports the didactically orientated technical information in the inner area through its appealing and warning character. Three frame shapes are used, each of which determines the affiliation of the icon to the defined type of transfer data:

Icon frame for bio transfer	
Icon frame for interface transfer (the double line indicates the two elements for the interaction between body part and technical elements at the interface)	
Icon frame for statistical aspects	

Figure 2 — Introduction of icon types for anthropometric data use (two transfer types, one for statistical purposes)

8.3 Icons – Definitions and connotations

The content of the individual icons is defined in Table 2 and Table 3. The presentation is organised according to the types introduced. For each icon, the function and effect of influences that can arise or are highly likely to arise in an application situation of the respective body dimension are resolved. The influence principally described in the icon that arises from the application situation for the body dimension in a design or assessment task shall be transferred to the relevant body segment (torso, head) or body part (legs, arms, fingers) in each individual case.

Table 2 — Bio transfer data

Icon	Causes and significance for the application
	Reduction of core data value due to the difference between measuring posture and application posture.
	Body joint chain effective: The biomechanical interaction of segment dimensions shall be taken into account during use. The position of the segment joint chain can be arbitrary (torso and legs at an angle to each other when standing up) or forced (phalanges when bending a finger).