

# SVENSK STANDARD

## SS-EN 547-3

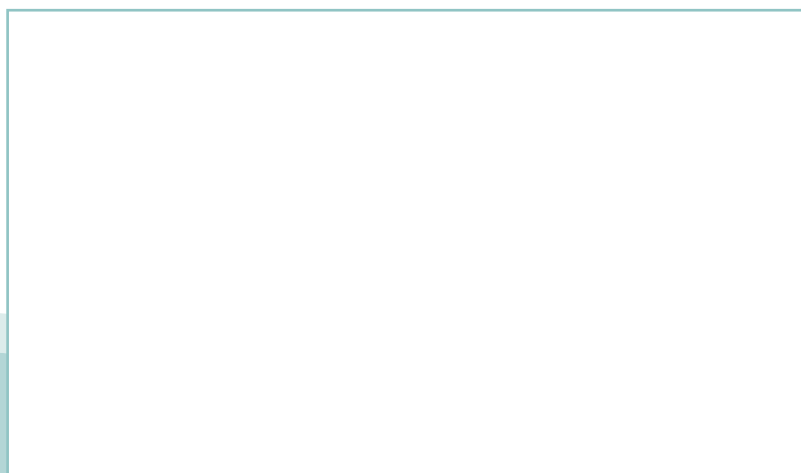


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### **Maskinsäkerhet – Kroppsmått – Del 3: Anthropometriska data**

### **Safety of machinery – Human body measurements – Part 3: Anthropometric data**



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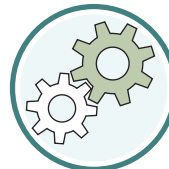
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The European Standard EN 547-3:1996 has the status of a Swedish Standard. This document contains the official English version of EN 547-3:1996.

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ICS 13.110; 13.180

Descriptors: Safety of machines, human factor engineering, accident prevention, measurements, anthropometric characteristics, computation, dimensions, ports:openings, orifices, human body

English version

## Safety of machinery — Human body measurements — Part 3: Anthropometric data

Sécurité des machines – Mesures du corps humain  
– Partie 3: Données anthropométriques

Sicherheit von Maschinen – Körpermaße des  
Menschen – Teil 3: Körpermaßdaten

This European Standard was approved by CEN on 1996-11-15. 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 Central Secretariat or to any CEN member.

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**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

**Central Secretariat: rue de Stassart 36, B-1050 Brussels**

## Foreword

This European Standard has been prepared by 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 June 1997, and conflicting national standards shall be withdrawn at the latest by June 1997.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

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## 0 Introduction

This European Standard is one of several ergonomics standards for the safety of machinery. EN 614-1 describes the principles designers should adopt in order to take account of ergonomic factors.

This standard has been prepared to be a harmonized standard in the sense of the Machinery Directive and associated EFTA regulations.

## 1 Scope

This European Standard specifies current requirements for human body measurements (anthropometric data) that are required by EN 547-1 and EN 547-2 for the calculation of access opening dimensions as applied to machinery.

The anthropometric data originate from static measurements of nude persons and do not take into account body movements, clothing, equipment, machinery operating conditions or environmental conditions.

The data are based on information from anthropometric surveys representative of population groups within Europe comprising at least three million people. Both men and women are taken into account.

Measurements are given, as required by EN 547-1 and EN 547-2, for the 5th, 95th and 99th percentiles of the relevant population group within Europe.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 547-1	<i>Safety of machinery — Human body measurements — Part 1: Principles for determining the dimensions required for openings for whole body access into machinery</i>
EN 547-2	<i>Safety of machinery — Human body measurements — Part 2: Principles for determining the dimensions required for access openings</i>
prEN 979	<i>Basic list of definitions of human body measurements for technical design</i>
EN 614-1	<i>Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles</i>

## 3 General requirements

Anthropometric measurements form the basis upon which minimum dimensions of access openings can be calculated. Where machinery requires access openings, then the provisions of EN 547-1 (for whole body access) and EN 547-2 (for access of parts of the body) shall be complied with.

Table 1 gives the human body measurements necessary to calculate the size of access openings taking account of the known range of body sizes within Europe.

The notation used in tables 1 and 2 are common to EN 547-1 and EN 547-2. Appropriate values from table 1 shall be substituted in the formulae in clause 4 of EN 547-1 and clause 4 of EN 547-2 in order to calculate the dimensions of particular access openings.

## 4 Anthropometric data

### 4.1 Human body measurements (anthropometric data from European surveys)

Table 1 shows the best approximation of currently available data from European surveys. The data estimate the values of the 5th, 95th and 99th percentiles for combined female and male populations.

Each of the anthropometric values in table 1 is established according to one of the following two methods.

I. National surveys with pooled female and male population: corresponding value of the 5th, 95th and 99th percentile is used.

II. National surveys with separate female and male percentiles: the mean of the female and male value of the 5th percentile (value of the 95th and 99th percentile respectively) is calculated.

NOTE. Although this is not statistically strictly accurate, it is a good practical approximation.

For the value of the 5th percentile the lower of these calculated values is chosen as the European value. For the values of the 95th and 99th percentiles the highest value is chosen.

**Table 1. Anthropometric data from European surveys**

Notation	Explanation	Value mm
$h_1$	Body height P95	1881
$h_1$	Body height P99	1944
$h_8$	Ankle height	96
$a_1$	Elbow-to-elbow breadth P95	545
$a_1$	Elbow-to-elbow breadth P99	576
$a_3$	Hand breadth with thumb P95	120
$a_4$	Hand breadth at metacarpals P95	97
$a_5$	Index finger breadth (proximal) P95	23
$a_6$	Foot breadth P95	113
$b_1$	Body depth P95	342
$b_2$	Grip reach (forward reach) P5	615
$b_2$	Grip reach (forward reach) P95	820
$b_2$	Grip reach (forward reach) P99	845
$b_3$	Hand depth at palm P95	30
$b_4$	Hand depth at thumb P95	35
$c_1$	Thigh length P95	687
$c_1$	Thigh length P99	725
$c_2$	Foot length P5	211
$c_2$	Foot length P95	285
$c_2$	Foot length P99	295
$c_3$	Head length from tip of nose P95	240
$d_1$	Upper arm diameter P95	121
$d_2$	Lower arm diameter P95	120
$d_3$	Fist diameter P95	120
$t_1$	Operating arm length P5	340
$t_2$	Forearm reach P5	170
$t_3$	Arm reach to the side P5	495
$t_4$	Hand length P5	152
$t_5$	Hand length to thumb P5	88
$t_6$	Index finger length P5	59

#### 4.2 Descriptions of human body measurements

The descriptions of the human body measurements presented in EN 547-1 and EN 547-2 are taken in part from prEN 979. Other human body measurements are produced by addition or subtraction of two measurements taken from prEN 979 or by the multiplication of a measurement by a determined factor. Fixed measurements are presented when the variation within the population of interest is minimal.

The specific measurements and descriptions are given in table 2.