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Maskinsäkerhet – Kroppsmått – Del 3: Anthropometriska data

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

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EUROPEAN STANDARD
NORME EUROPÉENNE
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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

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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of an identical text or by endorsement, at the latest by June 1997, and conflicting national standards shall be withdrawn at the latest by June 1997.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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

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

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.