

**Masinate ohutus. Ergonoomia põhimõtted  
projekteerimisel. Osa 1: Terminoloogia ja  
üldised põhimõtted**

Safety of machinery - Ergonomic design principles -  
Part 1: Terminology and general principles

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 614-1:2006 sisaldab Euroopa standardi EN 614-1:2006 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 29.06.2006 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 614-1:2006 consists of the English text of the European standard EN 614-1:2006.</p> <p>This document is endorsed on 29.06.2006 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--	---

<p><b>Käsitlusala:</b></p> <p>This European Standard establishes the ergonomic principles to be followed during the process of design of machinery. This European Standard applies to the interactions between operators and machinery when installing, operating, adjusting, maintaining, cleaning, dismantling, repairing or transporting equipment, and outlines the principles to be followed in taking the health, safety and well-being of the operator into account.</p>	<p><b>Scope:</b></p> <p>This European Standard establishes the ergonomic principles to be followed during the process of design of machinery. This European Standard applies to the interactions between operators and machinery when installing, operating, adjusting, maintaining, cleaning, dismantling, repairing or transporting equipment, and outlines the principles to be followed in taking the health, safety and well-being of the operator into account.</p>
---	---

ICS 13.110, 13.180

Võtmesõnad:

English Version

**Safety of machinery - Ergonomic design principles - Part 1:  
Terminology and general principles**

Sécurité des machines - Principes ergonomiques de  
conception - Partie 1: Terminologie et principes généraux

Sicherheit von Maschinen - Ergonomische  
Gestaltungsgrundsätze - Teil 1: Begriffe und allgemeine  
Leitsätze

This European Standard was approved by CEN on 9 March 2006.

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.

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 Central Secretariat has the same status as the official versions.

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



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

## Contents

Page

Foreword .....	3
Introduction .....	4
1 Scope .....	5
2 Normative references .....	6
3 Terms and definitions .....	6
4 General principles .....	9
4.1 General .....	9
4.2 Accessible design for people with special requirements .....	9
4.3 Taking account of people's body dimensions, postures, body movements, and physical strength .....	10
4.4 Taking account of people's mental abilities .....	13
4.5 Taking account of the influence of the physical work environment on people .....	14
5 Incorporating ergonomic principles into the design process of machinery .....	15
5.1 General .....	15
5.2 Ergonomics tasks to be performed during the design process of machinery .....	16
Annex A (informative) Guidelines for the use of the 3-zone rating system .....	20
A.1 Introduction .....	20
A.2 Definition and use of the 3-zone rating system .....	20
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC, amended by 98/79/EC .....	22
Bibliography .....	23

## Foreword

This European Standard (EN 614-1:2006) 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 October 2006, and conflicting national standards shall be withdrawn at the latest by October 2006.

This European Standard supersedes EN 614-1:1995.

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 European 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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## Introduction

Ergonomically designed work systems enhance safety, improve human working and living conditions and counteract adverse effects on human health. Also they usually improve the operator-machine system performance and reliability. In this European Standard the term "ergonomics" refers to a multidisciplinary field of science and its application. Applying ergonomics to the design of work systems, especially where the design of machinery is concerned, ensures that human capabilities, skills, limitations and needs are taken into account.

The work system includes operators, job design, work equipment (e.g. machinery), work space, work environment, work process and the interactions between them. It can vary in complexity from a workshop with a single operator using hand held equipment to a process plant and its operators. Good design takes into account how the operator is expected to interact with the work equipment and how the work equipment fits into the system as a whole. This is particularly important the more the work equipment is interdependent on other components of the system. In its whole complexity, the working system is described in generic standards (e.g. EN ISO 6385).

Compliance with harmonised standards prepared by CEN/CENELEC enables manufacturers and suppliers to meet requirements of European legislation. EN ISO 12100-1 and EN ISO 12100-2 contain the concepts and general principles to guide designers in achieving safety for machinery for occupational and private purposes. Ergonomic principles can be incorporated into the design process by following this standard. In this way both the technical design and ergonomic principles are considered at the same time. The aim to enhance the health, safety and well-being of workers is reached by systematically minimising the risks according to EN 1050. EN 13861 provides information concerning applicable ergonomic B-type standards related to specific hazards.

This standard is one of the European Standards covering specific topics identified in EN ISO 12100-1 and EN ISO 12100-2 as important to the safety of machinery.

## 1 Scope

This European Standard establishes the ergonomic principles to be followed during the process of design of machinery.

This European Standard applies to the interactions between operators and machinery when installing, operating, adjusting, maintaining, cleaning, dismantling, repairing or transporting equipment, and outlines the principles to be followed in taking the health, safety and well-being of the operator into account. This European Standard provides a framework within which the range of more specific ergonomics standards and other related standards relevant to machinery design should be applied.

The ergonomic principles given in this European Standard apply to all ranges of human abilities and characteristics to ensure safety, health and well-being and overall system performance. Information will need to be interpreted to suit the intended use.

**NOTE** Although the principles in this European Standard are orientated towards machinery for occupational use, they are also applicable to equipment and machinery for private use.

## 2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 894-3, *Safety of machinery — Ergonomics requirements for the design of displays and control actuators — Part 3: Control actuators*

EN 1050, *Safety of machinery — Principles for risk assessment*

EN ISO 12100-1, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

## 3 Terms and definitions

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

### 3.1

#### **allocation of functions**

process of deciding how system functions shall be implemented, by humans, by equipment and/or hardware and/or software

[EN ISO 6385:2004, 2.1]

### 3.2

#### **design population**

designated group of workers delimited as a percentile range of the general population, defined according to relevant characteristics, e.g. gender, age, skill level, etc.

[EN ISO 6385:2004, 2.2]

### 3.3

#### **ergonomics**

#### **study of human factors**

scientific discipline concerned with the understanding of interactions among human and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance

[EN ISO 6385:2004, 2.3]

### 3.4

#### **job**

organization and sequence in time and space of an individual's work tasks or the combination of all human performance by one worker within a work system

[EN ISO 6385:2004, 2.4]

### 3.5

#### **system function**

broad category of activity performed by a system

[EN ISO 6385:2004, 2.5]