SLOVENSKI STANDARD
SIST EN 13861:2003

01-julij-2003

Varnost strojev - Navodila za uporabo ergonomskih standardov pri oblikovanju strojev

Safety of machinery - Guidance for the application of ergonomics standards in the design of machinery

Sicherheit von Maschinen - Leitfaden für die Anwendung von Ergonomie-Normen bei der Gestaltung von Maschinen

Sécurité des machines - Guide pour l' application des normes relatives a l'ergonomie dans la conception des machines

Ta slovenski standard je istoveten z: **EN 13861:2002**

ICS:

13.110	Varnost strojev	Safety of machinery
13.180	Ergonomija	Ergonomics

SIST EN 13861:2003 **en**

EUROPEAN STANDARD

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This European Standard was approved by CEN on 23 October 2002.

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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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
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Contents

Foreword

This document (EN 13861:2002) 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of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

This document is intended to provide guidance for standardisers and manufacturers seeking to deal with the ergonomic requirements defined in EN 292-2:1991, Annex 1, 1.1.2 (d).

Annexes A, B, C and D are informative.

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

Introduction

The designer of machinery is under an obligation to assess the risks during all phases of the life cycle of the machinery (see EN 292-1:1991, Clause 5). This includes knowledge and experience of the design, use, incidents, accidents and harm.

This European standard elaborates EN 1050:1996, Annex A, especially Clause 8 'neglecting ergonomic principles'. This standard refers to European and international ergonomics standards in the various relevant fields.

The standards for ergonomic design of machinery, as referred to in this document, can help to avoid or reduce numerous hazards and risks, as assessed at the design stage, whilst considering the intended use, the expected use and the foreseeable misuse of the machinery.

1 Scope

This European standard provides a methodology to achieve a coherent application of various ergonomics standards for the design of machinery. This standard presents a step model calling upon specific standards. This standard can only be used in combination with other relevant ergonomics standards.

This European standard provides guidance where no relevant or suitable ergonomics clauses in C-type standards are available.

This European standard may also be used for incorporating ergonomics in the drafting of C-type standards.

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 (including amendments).

EN 292-1:1991, *Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology.*

EN 414:2000, *Safety of machinery – Rules for the drafting and presentation of safety standards*

EN 614-1, *Safety of machinery – Ergonomic design principles – Part 1: Terminology and general principles.*

EN 614-2, *Safety of machinery – Ergonomic design principles – Part 2:Interaction between the design of machinery and work tasks.*

EN 1070:1998, *Safety of machinery – Terminology.*

3 Terms and definitions

For the purposes of this standard the terms and definitions given in EN 1070:1998 apply, together with the following:

3.1
ergonomics (or human factors)
scientific discipline concerned with the understanding of the 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. (IEA[1)] , 2000).It seeks to safeguard safety, health and well-being whilst optimizing efficiency and performance (in accordance with prEN ISO 6385, under preparation)

3.2
machine/machinery
assembly of linked parts or components, at least one of which moves, with the appropriate machine actuators, control and power circuits, etc., joined together for a specific application, in particular for the processing, treatment, moving or packaging of a material. The term machinery also covers an assembly of machines which, in order to achieve one and the same end, are arranged and controlled so that they function as an integral whole (see EN 292-1:1991, 3.1)

4 Application of ergonomics standards in the design of machinery

4.1 Introduction

This standard provides a step by step approach for the application of ergonomics standards in the design of machinery. Users of this standard should select and use a C-type standard for that particular machine. For issues related to ergonomics the described step model may be used as guidance through the process of selecting the appropriate B-type ergonomics standards, whilst carrying out a risk assessment according to EN 1050.

4.2 Process for guidance to the appropriate ergonomics standards

4.2.1 General

The guidance process is based on the general procedures for dealing with safety clauses. EN 292-1 provides a description of basic hazards, EN 292-2 describes intrinsic design measures, and EN 1050 gives a list of examples for hazards, hazardous situations, and hazardous events that occur when using machinery. In order to meet the essential health and safety requirements, the machinery shall be designed in accordance with EN 614-1 and EN 614-2.

The following step model gives a methodology to achieve a coherent application of various ergonomics standards.

4.2.2 Step 1: Hazard analysis and risk estimation

— Specify the limits of the machine with respect to ergonomics.

— Identify the hazards present at the machine during all modes of operation and at each stage in life of the machine by following the guidance in EN 292-1:1991, Clause 5.

Ergonomic aspects of machinery can only be assessed, evaluated and verified when all intended interchangeable equipment of the machinery are known. Ergonomics requirements are necessary when considering 'the operator' and 'the exposed persons'. In this European standard the same definition will be used as in EN 292-1:1991, 3.21.

1) International Ergonomics Association

Specifying the limits of the machinery during the life cycle phases as described in EN 292-1:1991, Clause 5, involves the following ergonomics aspects:

Table 1 — Ergonomic aspects for specifying the limits of the machinery

External preconditions (characteristics and restrictions)	Worktasks (man/machine interface)
— Use limits (user groups)	— Intended and expected types of jobs
— Space limits	— Expected use of personal protective equipment
— Time limits • Duration • frequency	— Foreseeable misuse
— Environmental conditions • climate • noise, lighting • vibration	

Annex B provides a checklist for listing the limits of the machinery.

4.2.3 Step 2: Investigation of applicability of standards

— Specify if a specific C-type standard exists.

— Check in the relevant C-type standard if the hazards generated by neglecting ergonomics principles and related risks are dealt with.

— Check which B-type standards may be used instead of or in addition to the relevant C-type standard.

If a relevant C-type standard is found, this should be followed first. Where appropriate, these C-type standards refer to A- and B-type standards for reduction of risks, which are likely to occur with the machinery involved. If no suitable C-type standard is available, or if the C-type standard concerned does not cover ergonomics related risks sufficiently, see Annex A for relevant B-type standards.

4.2.4 Step 3: Evaluation of the risks using relevant ergonomics standards

— Assess the remaining risks related to ergonomics.

— Check whether these risks are relevant.

— Consider the ergonomics standards mentioned in relation to the relevant risks (see Annex A).

— Check if these standards have been used to optimize the design of machinery.

In order to carry out the risk evaluation, the respective horizontal B-type standards on general and specific ergonomics related risks shall be considered. These standards are classified in Annex A.

Ergonomics related risks are significant if a human being and the machinery are part of a common work system (man machine interface). This interaction involves a mutual role as an interface as a tool, a fixture, an energy source or a link in a safety chain. See EN 614-1 and EN 614-2.

4.2.5 Step 4: Risk reduction using the various standards

Use one of the following alternatives:

— a solution as described in a C-type standard which refers to B-type standards for ergonomics where relevant;

— relevant B-type standards for ergonomics where no C-type standard is available;

— other (additional) references, related to ergonomics.

All the relevant and significant risks shall be reduced. However, there may be one or more reasons why some risks cannot be dealt with, e.g. there is no information available or the standard is restricted to some specific items.

If the use of personal protective equipment (PPE) has to be taken into account when designing the machine, an additional risk assessment shall be carried out in order to check that all essential health and safety requirements, including ergonomics, have been satisfied.

4.2.6 Step 5: Verification

— Check if all relevant and significant ergonomic related risks have been removed or reduced with the help of applicable standards.

— Check if there are significant risks that are not covered by any standard or other technical specification. In that case, (re)design the man machine interface in accordance with EN 614-1 and EN 614-2.

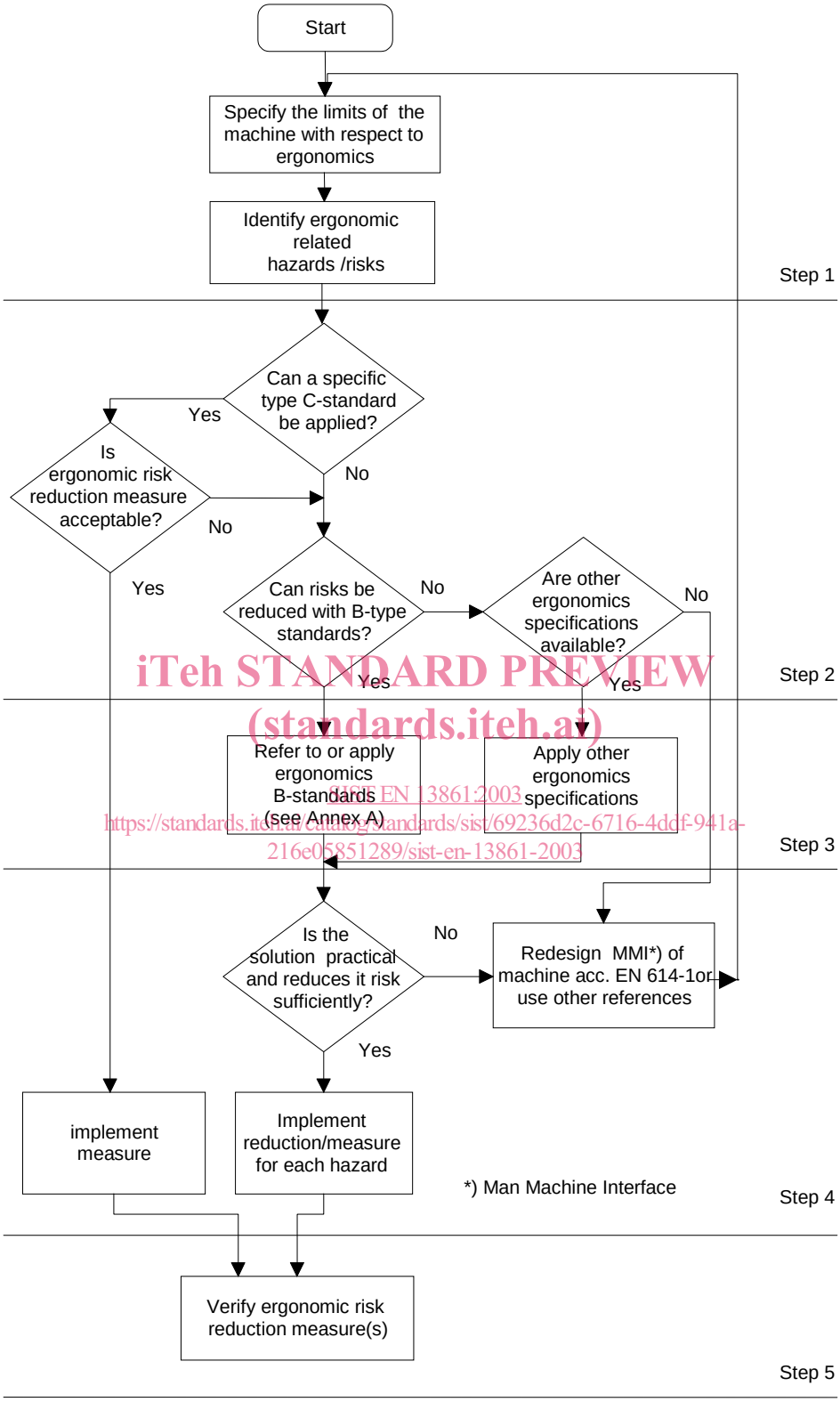

Figure 1 — Flowchart of the step model

5 Information for use

All residual ergonomics risks, which cannot be reduced sufficiently with help of specific C-type standards, horizontal B-type standards or other technical specifications, shall be dealt with in the user instructions for the machinery or in the chapter dealing with user instructions of the relevant C-type standard as stated in EN 414:2000, 6.10.

Any limitation in the use of the machinery shall be mentioned in these specifications. In addition, safety signs or pictograms may be prescribed.

Annex A
(informative)

Inventory of selected hazards from EN 1050 with list of applicable B-standards

NOTE Only the clauses relating to ergonomics standards are included.

Table A.1

Number of EN 1050:1996, Annex A	Hazards (EN 1050:1996, Annex A)	Type-B standards in the fields of ergonomics			
		Definition	**Requirements/ design process**	**Measures**	**Verification or testing methods**
3	**Thermal hazards**				
3.1	Burns and scalds by a possible contact of persons, by flames or explosions and also by the radiation of heat sources	EN 563 prEN ISO 13732-3	EN 563 prEN ISO 13732-3	EN 13202	EN 563 prEN ISO 13732-3
3.2	Health damaging affects by hot or cold work environment	EN ISO 13731	EN 27243 EN ISO 7730 ENV ISO 11079		EN 12515 EN 27726 EN 28996
4	**Hazards generated by noise**				
4.1	Hearing loss (deafness), other physiological disorders	EN 1746	EN ISO 11688-1 EN ISO 11688-2 EN ISO 11690-1 ISO 1999[a]	EN ISO 11688-1 EN ISO 11688-2 EN ISO 11690-2	EN ISO 11200 EN ISO 11201 EN ISO 11204 EN ISO 3744 EN ISO 4871