SVENSK STANDARD
SS-EN 13861:2011

Fastställd/Approved: 2011-11-07
Publicerad/Published: 2011-11-16
Utgåva/Edition: 2
Språk/Language: engelska/English
ICS: 01.040.13; 12.010; 12.020; 12.030; 12.040; 12.050; 13.110; 13.180; 14.040

Maskinsäkerhet – Vägledning för tillämpning av ergonomistandarder för maskindesign

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

Standarder får världen att fungera

SIS (Swedish Standards Institute) är en fristående ideell förening med medlemmar från både privat och offentlig sektor. Vi är en del av det europeiska och globala nätverk som utarbetar internationella standarder. Standarder är dokumenterad kunskap utvecklad av framstående aktörer inom industri, näringsliv och samhälle och befrämjar handel över gränser, bidrar till att processer och produkter blir säkrare samt effektiviserar din verksamhet.

Delta och påverka
Som medlem i SIS har du möjlighet att påverka framtida standarder inom ditt område på nationell, europeisk och global nivå. Du får samtidigt tillgång till tidig information om utvecklingen inom din bransch.

Ta del av det färdiga arbetet
Vi erbjuder våra kunder allt som rör standarder och deras tillämpning. Hos oss kan du köpa alla publikationer du behöver – allt från enskilda standarder, tekniska rapporter och standard-paket till handböcker och onlinetjänster. Genom vår webbtjänst e-nav får du tillgång till ett lättnavigerat bibliotek där alla standarder som är aktuella för ditt företag finns tillgängliga. Standarder och handböcker är källor till kunskap. Vi säljer dem.

Utveckla din kompetens och lyckas bättre i ditt arbete
Hos SIS kan du gå öppna eller företagsinterna utbildningar kring innehåll och tillämpning av standarder. Genom vår närhet till den internationella utvecklingen och ISO får du rätt kunskap i rätt tid, direkt från källan. Med vår kunskap om standarders möjligheter hjälper vi våra kunder att skapa verklig nytta och lönsamhet i sina verksamheter.

Vill du veta mer om SIS eller hur standarder kan effektivisera din verksamhet är du välkommen in på www.sis.se eller ta kontakt med oss på tel 08-555 523 00.

Standards make the world go round

SIS (Swedish Standards Institute) is an independent non-profit organisation with members from both the private and public sectors. We are part of the European and global network that draws up international standards. Standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline your organisation.

Take part and have influence
As a member of SIS you will have the possibility to participate in standardization activities on national, European and global level. The membership in SIS will give you the opportunity to influence future standards and gain access to early stage information about developments within your field.

Get to know the finished work
We offer our customers everything in connection with standards and their application. You can purchase all the publications you need from us - everything from individual standards, technical reports and standard packages through to manuals and online services. Our web service e-nav gives you access to an easy-to-navigate library where all standards that are relevant to your company are available. Standards and manuals are sources of knowledge. We sell them.

Increase understanding and improve perception
With SIS you can undergo either shared or in-house training in the content and application of standards. Thanks to our proximity to international development and ISO you receive the right knowledge at the right time, direct from the source. With our knowledge about the potential of standards, we assist our customers in creating tangible benefit and profitability in their organisations.

If you want to know more about SIS, or how standards can streamline your organisation, please visit www.sis.se or contact us on phone +46 (0)8-555 523 00

Europastandarden EN 13861:2011 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN 13861:2011.

Denna standard ersätter SS-EN 13861, utgåva 1.

The European Standard EN 13861:2011 has the status of a Swedish Standard. This document contains the official version of EN 13861:2011.

This standard supersedes the Swedish Standard SS-EN 13861, edition 1.

Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.

Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.

Denna standard är framtagen av kommittén för Belastningsergonomi, SIS/TK 380/AG 1.

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på www.sis.se - där hittar du mer information.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13861

October 2011

ICS 13.110; 13.180

Supersedes EN 13861:2002

English Version

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

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

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

This European Standard was approved by CEN on 11 September 2011.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, 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: Avenue Marnix 17, B-1000 Brussels

Ref. No. EN 13861:2011: E

Contents

Page

Foreword

This document (EN 13861:2011) 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 April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13861:2002.

This document is intended to provide guidance for standardisers and manufacturers seeking to deal with the ergonomic requirements defined in EN ISO 12100:2010, 6.2.8, 6.3.2 and 5.3.2.

During the development of this document the Technical Committee has referred to the recommendations made within CEN/CENELEC Guide 6 to address the specific needs of older persons and persons with disabilities.

Annex A is normative; Annexes 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, Bulgaria, Croatia, 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 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 ISO 12100:2010, Clause 4). This includes knowledge and experience of the design, use, incidents, accidents and harm.

This European Standard elaborates EN ISO 12100:2010, Annex B as far as ergonomics are concerned. 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. To this end, Annex A shows a reference table with relation between hazards as described in EN ISO 12100:2010 and applicable B-standards related to ergonomics.

This European 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 (see Annex C for further information).

2 Normative references

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

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: Interactions between the design of machinery and work tasks*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

CEN Guide 414:2004, *Safety of machinery — Rules for the drafting and presentation of safety standards*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and the following apply:

3.1
ergonomics
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)

NOTE Adapted from prEN ISO 26800:2011.

3.2
machinery
machine
assembly, fitted with or intended to be fitted with a drive system consisting of linked parts or components, at least one of which moves, and which are joined together for a specific application

1) International Ergonomics Association.

NOTE 1 The term "machinery" also covers an assembly of machines which, in order to achieve the same end, are arranged and controlled so that they function as an integral whole.

NOTE 2 EN ISO 12100:2010, Annex A provides a general schematic representation of a machine.

[EN ISO 12100:2010, 3.1]

3.3
operator
person or persons installing, operating, adjusting, maintaining, cleaning, repairing or moving machinery

[Machinery Directive 2006/42/EC, Annex I, 1.1.1]

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 ISO 12100.

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 ISO 12100 provides a description of basic hazards, describes intrinsic design measures, and 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 (see Figure 1).

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 ISO 12100:2010, 5.4.

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'.

Specifying the limits of the machinery during the life cycle phases as described in EN ISO 12100:2010, 5.3, involves the following ergonomics aspects:

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

External preconditions (characteristics and restrictions)	Work tasks (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 — dust, fume or other nuisances	

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.