

**Ergonomics of human-system interaction -
Part 171: Guidance on software accessibility**

Ergonomics of human-system interaction - Part 171:
Guidance on software accessibility

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-EN ISO 9241-171:2008 sisaldab Euroopa standardi EN ISO 9241-171:2008 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 18.08.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 15.07.2008.

Standard on kättesaadav Eesti standardiorganisatsioonist.

This Estonian standard EVS-EN ISO 9241-171:2008 consists of the English text of the European standard EN ISO 9241-171:2008.

This standard is ratified with the order of Estonian Centre for Standardisation dated 18.08.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

Date of Availability of the European standard text 15.07.2008.

The standard is available from Estonian standardisation organisation.

ICS 13.180

Võtmesõnad:

Standardite reprodutseerimis- ja levitamisoigus kuulub Eesti Standardikeskusele

Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:
Aru 10 Tallinn 10317 Eesti; www.evs.ee; Telefon: 605 5050; E-post: info@evs.ee

ICS 13.180

English Version

**Ergonomics of human-system interaction - Part 171: Guidance
on software accessibility (ISO 9241-171:2008)**

Ergonomie de l'interaction homme-système - Partie 171:
Lignes directrices relatives à l'accessibilité aux logiciels
(ISO 9241-171:2008)

Ergonomie der Mensch-System-Interaktion - Teil 171:
Leitlinien für die Zugänglichkeit von Software (ISO 9241-
171:2008)

This European Standard was approved by CEN on 28 June 2008.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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

Foreword

This document (EN ISO 9241-171:2008) has been prepared by Technical Committee ISO/TC 159 "Ergonomics" in collaboration with 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 January 2009, and conflicting national standards shall be withdrawn at the latest by January 2009.

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.

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, 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.

Endorsement notice

The text of ISO 9241-171:2008 has been approved by CEN as a EN ISO 9241-171:2008 without any modification.

Contents

Page

Foreword	iv
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Rationale and benefits of implementing accessibility	8
5 Principles for designing accessible software	8
6 Sources of variation in user characteristics	9
7 How to use this part of ISO 9241	10
7.1 General.....	10
7.2 Conformance.....	10
8 General guidelines and requirements	11
8.1 Names and labels for user-interface elements.....	11
8.2 User preference settings.....	14
8.3 Special considerations for accessibility adjustments.....	16
8.4 General control and operation guidelines.....	17
8.5 Compatibility with assistive technology.....	21
8.6 Closed systems.....	26
9 Inputs	26
9.1 Alternative input options.....	26
9.2 Keyboard focus.....	28
9.3 Keyboard input.....	29
9.4 Pointing devices.....	35
10 Outputs	39
10.1 General output guidelines.....	39
10.2 Visual output (displays).....	39
10.3 Text/fonts.....	40
10.4 Colour.....	41
10.5 Window appearance and behaviour.....	42
10.6 Audio output.....	45
10.7 Text equivalents of audio (captions).....	47
10.8 Media.....	47
10.9 Tactile output.....	48
11 On-line documentation, “Help” and support services	48
11.1 Documentation and “Help”.....	48
11.2 Support services.....	49
Annex A (informative) Overview of the ISO 9241 series	51
Annex B (informative) List of requirements	55
Annex C (informative) Sample procedure for assessing applicability and conformance	57
Annex D (informative) Activity limitation issues	68
Annex E (informative) Access features	74
Annex F (informative) Accessibility and usability	83
Bibliography	85

Introduction

The purpose of this part of ISO 9241 is to provide guidance on the design of the software of interactive systems so that those systems achieve as high a level of accessibility as possible. Designing human-system interactions to increase accessibility promotes increased effectiveness, efficiency and satisfaction for people having a wide variety of capabilities and preferences. Accessibility is therefore strongly related to the concept of usability (see ISO 9241-11).

The most important approaches to increasing the accessibility of a human-system interface are

- adopting a human-centred approach to design (see ISO 13407),
- following a context-based design process,
- providing the capacity for individualization (see ISO 9241-110), and
- offering individualized user instruction and training.

It is important to incorporate accessibility goals and features into the design as early as possible, when it is relatively inexpensive compared to the cost of modifying products to make them accessible once they have been designed. As well as providing guidance for achieving that, this part of ISO 9241 addresses the increasing need to consider social and legislative demands for ensuring accessibility by the removal of barriers that prevent people from participating in life activities such as the use of environments, services, products and information.

This part of ISO 9241 is applicable to software that forms part of interactive systems used in the home, in leisure activities, in public situations and at work. Requirements and/or recommendations are provided for system design, appearance and behaviour, as well as specific accessibility issues, thereby complementing International Standards ISO 9241-11, ISO 9241-12, ISO 9241-13, ISO 9241-14, ISO 9241-15, ISO 9241-16 and ISO 9241-17, ISO 9241-110 and ISO 14915, as well as reflecting the goals outlined in ISO Guide 71 [60]. Conforming with the aforementioned International Standard is also important if the goal of accessibility is to be achieved.

NOTE 1 While the requirements and recommendations of this part of ISO 9241 are generally applicable to all software application domains, additional detailed guidance on the accessibility of Web content (including Web applications) is available from the Web Content Accessibility Guidelines (WCAG) [53].

This part of ISO 9241 is based on the current understanding of the characteristics of individuals who have particular physical, sensory and/or cognitive impairments. However, accessibility is an issue that affects many groups of people. The intended users of interactive systems are consumers or professionals — people at home, at school, engineers, clerks, salespersons, Web designers, etc. The individuals in such target groups vary significantly as regards physical, sensory and cognitive abilities and each target group will include people with different abilities. Thus, people with disabilities do not form a specific group that can be separated out and then disregarded. The differences in capabilities can arise from a variety of factors that serve to limit the capability to engage in the activities of daily living, and are a “universal human experience” [50]. Therefore, accessibility addresses a widely defined group of users including

- people with physical, sensory and cognitive impairments present at birth or acquired during life,
- elderly people who can benefit from new products and services but who experience reduced physical, sensory and cognitive capacities,
- people with temporary disabilities, such as a person with a broken arm or someone who has forgotten his/her glasses, and
- people who experience difficulties in particular situations, such as a person who works in a noisy environment or has both hands occupied by other activities.

When designing and evaluating interactive systems there are other terms that are often associated with accessibility. In Europe, the expression *design for all* or, in North America, *universal design* [9], address the goal of enabling maximum access to the maximum number and diversity of users, irrespective of their skill level, language, culture, environment or disability. This does not mean that every product will be usable by every consumer. There will always be a minority of people with severe or multiple disabilities who will need adaptations or specialized products. Accessibility as defined in this part of ISO 9241 emphasizes the goals of maximizing the number of users and striving to increase the level of usability that these users experience.

This part of ISO 9241 recognizes that some users of software will need assistive technologies in order to use a system. In the concept of designing software to be accessible, this includes the capability of a system to provide connections to, and enable successful integration with, assistive technologies, in order to increase the number of people who will be able to use the interactive system. Guidance is provided on designing software that integrates as effectively as possible with common assistive technologies. It is important to note that accessibility can be provided by a combination of both software and hardware controlled by software. Assistive technologies typically provide specialized input and output capabilities not provided by the system. Software examples include on-screen keyboards that replace physical keyboards, screen-magnification software that allows users to view their screens at various levels of magnification, and screen-reading software that allows blind users to navigate through applications, determine the state of controls, and read text via text-to-speech conversion. Hardware examples include head-mounted pointing devices instead of mice and Braille output devices instead of a video display. There are many others. When users employ add-on assistive software and/or hardware, usability is enhanced to the extent that systems and applications integrate with those technologies. For this reason, platforms (including operating systems) must provide programming services to allow software to operate effectively with add-on assistive software and hardware as specified in this part of ISO 9241. If systems do not provide support for assistive technologies, the probability increases that users will encounter problems with compatibility, performance and usability.

This part of ISO 9241 serves the following types of users:

- designers of user-interface development tools and style guides to be used by interface designers;
- user-interface designers, who will apply the guidance during the development process;
- developers, who will apply the guidance during the design and implementation of system functionality;
- those responsible for implementing solutions to meet end-user needs;
- buyers, who will reference this part of ISO 9241 during product procurement;
- evaluators, who are responsible for ensuring that products are in accordance with this part of ISO 9241.

NOTE 2 In this document the term “developers” is used as shorthand for *all those involved in the development of software design and creation*, which sometimes can span different collaborating or contracting organizations.

The ultimate beneficiary of this part of ISO 9241 will be the end-user of the software. Although it is unlikely that end-users will read this part of ISO 9241, its application by designers, developers, buyers and evaluators ought to provide user interfaces that are more accessible. This part of ISO 9241 concerns the development of software for user interfaces. However, those involved in designing the hardware aspects of user interfaces may also find it useful when considering the interactions between software and hardware aspects.

ISO 9241 was originally developed as a seventeen-part International Standard on the ergonomics requirements for office work with visual display terminals. As part of the standards review process, a major restructuring of ISO 9241 was agreed to broaden its scope, to incorporate other relevant standards and to make it more usable. The general title of the revised ISO 9241, “Ergonomics of human-system interaction”, reflects these changes and aligns the standard with the overall title and scope of Technical Committee ISO/TC 159, SC 4. The revised multipart standard is structured as series of standards numbered in the “hundreds”: the 100 series deals with software interfaces, the 200 series with human-centred design, the 300 series with visual displays, the 400 series with physical input devices, and so on.

See Annex A for an overview of the entire ISO 9241 series.

Ergonomics of human-system interaction —

Part 171: Guidance on software accessibility

1 Scope

This part of ISO 9241 provides ergonomics guidance and specifications for the design of accessible software for use at work, in the home, in education and in public places. It covers issues associated with designing accessible software for people with the widest range of physical, sensory and cognitive abilities, including those who are temporarily disabled, and the elderly. It addresses software considerations for accessibility that complement general design for usability as addressed by ISO 9241-110, ISO 9241-11 to ISO 9241-17, ISO 14915 and ISO 13407.

This part of ISO 9241 is applicable to the accessibility of interactive systems. It addresses a wide range of software (e.g. office, Web, learning support and library systems).

It promotes the increased usability of systems for a wider range of users. While it does not cover the behaviour of, or requirements for, assistive technologies (including assistive software), it does address the use of assistive technologies as an integrated component of interactive systems.

It is intended for use by those responsible for the specification, design, development, evaluation and procurement of software platforms and software applications.

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 any amendments) applies.

ISO 9241-11:1998, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 11: Guidance on usability*

ISO 9241-12:1998, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 12: Presentation of information*

ISO 9241-13:1998, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 13: User guidance*

ISO 9241-14:1997, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 14: Menu dialogues*

ISO 9241-15:1997, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 15: Command dialogues*

ISO 9241-16:1999, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 16: Direct manipulation dialogues*

ISO 9241-17:1998, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 17: Form filling dialogues*

ISO 9241-110:2006, *Ergonomics of human-system interaction — Part 110: Dialogue principles*

ISO 13407:1999, *Human-centred design processes for interactive systems*

ISO 14915 (all parts), *Software ergonomics for multimedia user interfaces*

3 Terms and definitions

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

3.1

accelerator keys

shortcut keys

key combinations which invoke a menu option without displaying the menu on which the option appears or intermediate menus

[ISO 9241-14:1997]

3.2

accessibility

⟨interactive system⟩ usability of a product, service, environment or facility by people with the widest range of capabilities

NOTE 1 The concept of accessibility addresses the full range of user capabilities and is not limited to users who are formally recognized as having a disability.

NOTE 2 The usability-orientated concept of accessibility aims to achieve levels of effectiveness, efficiency and satisfaction that are as high as possible considering the specified context of use, while paying particular attention to the full range of capabilities within the user population.

3.3

accessibility feature

feature (etc.) that is specifically designed to increase the usability of products for those experiencing disabilities

3.4

activation

internal state with differential degrees of mental and physical functional efficiency

[ISO 10075:1991]

3.5

assistive technology

AT

hardware or software added to, or incorporated within, a system that increases accessibility for an individual

EXAMPLE Braille display, screen reader, screen magnification software, eye tracking devices.

3.6

chorded key-press

keyboard key or pointing-device button presses where more than one button is held down simultaneously to invoke an action

NOTE This includes both uses of modifier keys with other (non-modifier) keys as well as use of multiple non-modifier keys to enter data or invoke an action.

3.7

closed system

system that does not allow user connection or installation of assistive technology that would have programmatic access to the full user interface