



**SLOVENSKI STANDARD
SIST EN ISO 9241-6:2002**

01-januar-2002

**Ergonomske zahteve za pisarniško delo s slikovno zaslonsko opremo - 6. del:
Navodila za delovno okolje (ISO 9241-6:1999)**

Ergonomic requirements for office work with visual display terminals (VDTs) - Part 6:
Guidance on the work environment (ISO 9241-6:1999)

Ergonomische Anforderungen für Bürotätigkeiten mit Bildschirmgeräten - Teil 6:
Leitsätze für die Arbeitsumgebung (ISO 9241-6:1999)

Exigences ergonomiques pour travail de bureau avec terminaux a écrans de
visualisation (TEV) - Partie 6: Guide général relatif a l'environnement de travail (ISO
9241-6:1999)

<https://standards.iteh.ai/catalog/standards/sist/23c739b9-cd48-492a-a99e-b1a365860f5e/sist-en-iso-9241-6-2002>

Ta slovenski standard je istoveten z: EN ISO 9241-6:1999

ICS:

13.180	Ergonomija	Ergonomics
35.180	Terminalska in druga periferna oprema IT	IT Terminal and other peripheral equipment

SIST EN ISO 9241-6:2002

en

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 9241-6:2002](https://standards.iteh.ai/catalog/standards/sist/23c739b9-cd48-492a-a99e-b1a365860f5e/sist-en-iso-9241-6-2002)

<https://standards.iteh.ai/catalog/standards/sist/23c739b9-cd48-492a-a99e-b1a365860f5e/sist-en-iso-9241-6-2002>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 9241-6

December 1999

ICS 13.180; 35.180

English version

Ergonomic requirements for office work with visual display
terminals (VDTs) - Part 6: Guidance on the work environment
(ISO 9241-6:1999)

Exigences ergonomiques pour travail de bureau avec
terminaux à écrans de visualisation (TEV) - Partie 6: Guide
général relatif à l'environnement de travail (ISO 9241-
6:1999)

This European Standard was approved by CEN on 30 October 1999.

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, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Page 2
EN ISO 9241-6:1999

Foreword

The text of the International Standard ISO 9241-6:1999 has been prepared by Technical Committee ISO/TC 159 "Ergonomics" in collaboration with CEN/CS.

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 2000, and conflicting national standards shall be withdrawn at the latest by June 2000.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

NOTE FROM CEN/CS: The foreword is susceptible to be amended on reception of the German language version. The confirmed or amended foreword, and when appropriate, the normative annex ZA for the references to international publications with their relevant European publications will be circulated with the German version.

ITih STANDARD PREVIEW
(standards.itih.ai)

Endorsement notice

The text of the International Standard ISO 9241-6:1999 was approved by CEN as a European Standard without any modification.

[SIST EN ISO 9241-6:2002
https://standards.itih.ai/catalog/standards/sist/23c739b9-cd48-492a-a99e-b1a365860f5e/sist-en-iso-9241-6-2002](https://standards.itih.ai/catalog/standards/sist/23c739b9-cd48-492a-a99e-b1a365860f5e/sist-en-iso-9241-6-2002)

INTERNATIONAL STANDARD

ISO
9241-6

First edition
1999-12-01

Ergonomic requirements for office work with visual display terminals (VDTs) —

Part 6: Guidance on the work environment

iTeh STANDARD PREVIEW
*Exigences ergonomiques pour travail de bureau avec terminaux à écrans
de visualisation (TEV) —*
(standards.iteh.ai)

Partie 6: Guide général relatif à l'environnement de travail

[SIST EN ISO 9241-6:2002](#)

<https://standards.iteh.ai/catalog/standards/sist/23c739b9-cd48-492a-a99e-b1a365860f5e/sist-en-iso-9241-6-2002>



Reference number
ISO 9241-6:1999(E)

ISO 9241-6:1999(E)

Contents

1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 General guiding principles	5
5 Guidance on natural and artificial lighting.....	5
6 Guidance on sound and noise	8
7 Guidance on mechanical vibrations	9
8 Guidance on electromagnetic fields and static electricity	10
9 Guidance on thermal environment	12
10 Guidance on space organization and workplace layout.....	13
Annex A (informative) Lighting.....	15
Annex B (informative) Methods for measuring and evaluating sound	23
Annex C (informative) Measurements, evaluation and assessment of whole-body vibrations	28
Annex D (informative) Thermal environment.....	29
Bibliography	31

iTeh STANDARD PREVIEW

(standards.iteh.ai)

https://standards.iteh.ai/catalog/standards/sist/23c739b9-cd48-492a-a99e-
65860f5e/sist-en-iso-9241-6-2002

© ISO 1999

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

Printed in Switzerland

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9241-6 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*, Working Group WG 3, *Control, workplace and environmental requirements*.

ISO 9241 consists of the following parts, under the general title *Ergonomic requirements for office work with visual display terminals (VDTs)*:

- Part 1: General introduction
- Part 2: Guidance on task requirements
- Part 3: Visual display requirements
- Part 4: Keyboard requirements
- Part 5: Workstation layout and postural requirements
- Part 6: Guidance on the work environment
- Part 7: Requirements for display with reflections
- Part 8: Requirements for displayed colours
- Part 9: Requirements for non-keyboard input devices
- Part 10: Dialogue principles
- Part 11: Guidance on usability
- Part 12: Presentation of information
- Part 13: User guidance
- Part 14: Menu dialogues
- Part 15: Command dialogues
- Part 16: Direct manipulation dialogues
- Part 17: Form filling dialogues

Annexes A to D of this part of ISO 9241 are for information only.

Introduction

This part of ISO 9241 applies to work systems as defined in ISO 6385 with visual display terminals (VDTs) as described in ISO 9241-1. Office work with VDTs can be performed in various environments. These environments can influence both the comfort and performance of the user. In addition, the work environment can be influenced by specific characteristics of the VDTs and related equipment (for example, printers, computers).

This part of ISO 9241 has been prepared to give guidance on the determination of environmental conditions which enhance user comfort and performance. Enhancing the interaction between users and environments often requires a well-balanced trade-off. For this reason, this part of ISO 9241 provides guiding principles as generic goals, basic aspects for each item (for example, lighting, noise) and gives guidance on developing integrated solutions under given circumstances (for example, methods of controlling the acoustic environment for a given task and a given environment).

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 9241-6:2002](https://standards.iteh.ai/catalog/standards/sist/23c739b9-cd48-492a-a99e-b1a365860f5e/sist-en-iso-9241-6-2002)

<https://standards.iteh.ai/catalog/standards/sist/23c739b9-cd48-492a-a99e-b1a365860f5e/sist-en-iso-9241-6-2002>

Ergonomic requirements for office work with visual display terminals (VDTs) —

Part 6: Guidance on the work environment

1 Scope

This part of ISO 9241 provides guidance on basic principles for the ergonomic design of the work environment and the workstation, taking into account lighting, effects of noise and mechanical vibrations, electrical and magnetic fields and static electricity, thermal environment, space organization and workplace layout.

This part of ISO 9241 is applicable to the work environment and workstation in those work systems where a visual display terminal (VDT) is used for office work.

However, this part of ISO 9241 does not specify the technical characteristics of the equipment needed to satisfy those equipment-related guidelines associated with the work environment.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 9241. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 9241 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 1996-1, *Acoustics — Description and measurement of environmental noise — Part 1: Basic quantities and procedures*.

ISO 2631-1, *Evaluation of human exposure to whole-body vibration — Part 1: General requirements*.

ISO 2631-2, *Evaluation of human exposure to whole-body vibration — Part 2: Continuous and shock-induced vibration in buildings (1 to 80 Hz)*.

ISO 5349, *Mechanical vibration — Guidelines for the measurement and the assessment of human exposures to hand-transmitted vibration*.

ISO 6385, *Ergonomic principles in the design of work systems*.

ISO 7730:1994, *Moderate thermal environments — Determination of the PMV and PPD indices and specification of the conditions for thermal comfort*.

ISO 8995:1989, *Principles of visual ergonomics — The lighting of indoor work systems*.

ISO 9241-3:1992, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 3: Visual display requirements.*

ISO 9241-7, *Ergonomic requirements for office work with visual display terminals (VDTs) — Part 7: Requirements for display with reflections.*

ISO 9612, *Acoustics — Guidelines for the measurement and assessment of exposure to noise in a working environment.*

ISO 11690-1:1996, *Acoustics — Recommended practice for the design of low-noise workplaces containing machinery — Part 1: Noise control strategies.*

IEC 61000-4-2:1995, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 2: Electrostatic discharge immunity test.*

IEC 61000-4-8:1993, *Electromagnetic compatibility (EMC) — Part 4: Testing and measurement techniques — Section 8, Power frequency magnetic field immunity test.*

3 Terms and definitions

For the purposes of this part of ISO 9241, the terms and definitions given in ISO 6385, ISO 1996-1, ISO 11690-1 and the following apply.

3.1 adaptation, visual

process by which the state of the visual system is modified by previous and present exposure to stimuli that may have various luminances, spectral distributions and angular subtenses

[IEC 60050(845):1987, IEC 845-02-07]

3.2 clothing insulation

resistance of a clothing ensemble to dry heat loss from the body (convection, radiation, conduction)

NOTE Adapted from ISO 9920:1995.

3.3 colour rendering

effect of an illuminant on the colour appearance of objects by conscious or subconscious comparison with the appearance under a reference illuminant

[IEC 60050(845):1987, IEC 845-02-59]

3.4 colour rendering index R_a

mean of the CIE 1974 special colour rendering indices for a specified set of eight test colour samples

[IEC 60050(845):1987, IEC 845-02-63]

3.5 colour temperature

the temperature of a Planckian radiator whose radiation has the same chromaticity as that of a given stimulus

[IEC 60050(845):1987, IEC 845-03-49]

3.6 draught rating

percentage of people predicted to be bothered with draught

[ISO 7730:1994]

3.7 flicker

impression of unsteadiness of visual sensation induced by a light stimulus whose luminance or spectral distribution fluctuates with time

[IEC 60050(845):1987, IEC 845-02-49]

3.8 general lighting

substantially uniform lighting of an area without provision for special local requirements

[IEC 60050(845):1987, IEC 845-09-06]

NOTE General lighting can be thought of as the lighting of a room to achieve approximately the same visual conditions at all places in the room.

3.9 glare

condition of vision in which there is discomfort or a reduction in the ability to see details or objects, caused by an unsuitable distribution or range of luminance, or to extreme contrasts

[IEC 60050(845):1987, IEC 845-02-52]

3.10 glare by reflection

glare produced by reflections, particularly when reflected images appear in the same or nearly the same direction as the object viewed

[IEC 60050(845):1987, IEC 845-02-54]

3.11 illuminance

(at a point of a surface), the quotient of the luminous flux ($d\Phi_v$) incident on an element of the surface containing the point, by the area (dA) of that element

[IEC 60050(845):1987, IEC 845-01-38]

3.12 lighting, localized

lighting designed to illuminate an area with a higher illuminance at certain specified positions, for instance those at which work is carried out

[IEC 60050(845):1987, IEC 845-09-08]

3.13 luminance balance

ratio between the luminances of the displayed image and its adjacent surround, or sequentially viewed surfaces

NOTE Adapted from the definition of "luminance" given in IEC 60050(845):1987, IEC 845-01-35.

3.14 mean radiant temperature

uniform temperature of an imaginary enclosure in which radiant heat transfer from the human body is equal to the radiant heat transfer in the actual non-uniform enclosure

[ISO 7726:1998]

3.15 operative temperature

uniform temperature of a radiantly black enclosure in which an occupant would exchange the same amount of heat by radiation plus convection as in the natural non-uniform environment

NOTE Adapted from ISO 7726:1998.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN ISO 9241-6:2002

<https://standards.iteh.ai/catalog/standards/sist/25c75769-cd48-492a-a99c-b1a365860f5e/sist-en-iso-9241-6-2002>

3.16 predicted mean vote PMV

index that predicts the mean value of the votes of a large group of persons on a 7-point thermal sensation scale

[ISO 7730:1994]

3.17 predicted percentage of dissatisfied PPD

index that predicts the mean value of the thermal votes of a large group of people exposed to the same environment as a quantitative prediction of the number of thermally dissatisfied people

NOTE Adapted from ISO 7730:1994.

3.18 radiant temperature asymmetry

difference between the plane radiant temperature of the two opposite sides of a small plane element

[ISO 7726:1998]

3.19 rating level LAR

equivalent continuous A-weighted sound pressure level during a specified time interval plus adjustment for tonal character and impulsiveness

NOTE Adjustment for tonal character $DL_T = 0,5$ dB according to subjective assessments. Impulsiveness is specified only if $DL_I = L_{IAeq} - L_{Aeq} > 2$ dB, both according to ISO 11690-1.

3.20 relative humidity

ratio between the partial pressure of water vapour in humid air and the water vapour saturation pressure at the same temperature and the same total pressure

[ISO 7726:1998]

3.21 reverberation

continuation of a sound in an enclosed space after the source has stopped; a result of reflections from the boundary surfaces of the room

3.22 turbulence intensity

ratio of the standard deviation of the local air velocity to the local mean air velocity

[ISO 7730:1994]

3.23 workplace

arrangement of workstations allocated to one person to complete a work task

[ISO 9241-5:1998]

3.24 workstation

assembly comprising display equipment with or without a central processing unit, which may be provided with a keyboard and/or input device and/or software determining the operator/machine-interface, optional accessories, peripherals and the immediate work environment

[ISO 9241-5:1998]

4 General guiding principles

Improving the ergonomic properties of the design of workstation, work equipment and work environment, will help to improve user performance, reduce errors and discomfort, and will help to improve their overall well-being.

Environmental design should incorporate adequate control by the individuals over their environmental conditions.

The interference of environmental factors with the relevant characteristics of the equipment should be kept as low as possible. The unwanted influence of the equipment on the work environment should also be minimized.

NOTE "Interference" in this sense means that the function of a given device is impaired by the influence of a specific environmental factor.

The characteristics of the work equipment and the work environment are considered under the following headings:

- natural and artificial lighting;
- sound and noise;
- mechanical vibrations;
- electromagnetic fields and static electricity;
- thermal environment;
- space organization and workplace layout.

NOTE This part of ISO 9241 does not address any potential health effects associated with electromagnetic radiation emissions from equipment and environment.

5 Guidance on natural and artificial lighting

<https://standards.iteh.ai/catalog/standards/sist/23c739b9-cd48-492a-a99e-b1a365860f5e/sist-en-iso-9241-6-2002>

5.1 General

Visual tasks associated with work with most visual displays differ primarily in three ways from the visual tasks related to traditional office work.

- The main visual object, the visual display unit, is in a vertically oriented position.
- The main visual object can be environment dependent (for example, because of reflections, loss of contrast and colour information caused by ambient light) to a high degree.
- The elevated line-of-sight increases the importance of the consideration of the characteristics of the visual environment.

5.2 Basic aspects

5.2.1 Visual tasks

In regard to the type of office work performed with a visual display terminal, a basic distinction should be made between two types of visual tasks:

- a) assimilation of data presented on the display screen (for example, reading texts, viewing graphs, observing processes or perceiving and distinguishing symbols on the VDT screen);
- b) assimilation of data presented on passive media (for example, reading texts or viewing graphs on paper or perceiving and distinguishing symbols on the VDT keyboard).