

This is a preview of "BS EN ISO 9241-303:2...". Click here to purchase the full version from the ANSI store.

BS EN ISO 9241-303:2011



BSI Standards Publication

Ergonomics of human-system interaction

Part 303: Requirements for electronic visual displays (ISO 9241-303:2011)

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW

raising standards worldwide™



This is a preview of "BS EN ISO 9241-303:2...". [Click here to purchase the full version from the ANSI store.](#)

This British Standard is the UK implementation of EN ISO 9241-303:2011. It supersedes BS EN ISO 9241-303:2008 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PH/9, Applied ergonomics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© BSI 2011

ISBN 978 0 580 74193 7

ICS 13.180; 35.180

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 December 2011.

Amendments issued since publication

Date	Text affected
------	---------------

This is a preview of "BS EN ISO 9241-303:2...". Click here to purchase the full version from the ANSI store.

EUROPÄISCHE NORM

November 2011

ICS 13.180; 35.180

Supersedes EN ISO 9241-303:2008

English Version

Ergonomics of human-system interaction - Part 303: Requirements for electronic visual displays (ISO 9241-303:2011)

Ergonomie de l'interaction homme-système - Partie 303:
Exigences relatives aux écrans de visualisation
électroniques (ISO 9241-303:2011)

Ergonomie der Mensch-System-Interaktion - Teil 303:
Anforderungen an elektronische optische Anzeigen (ISO
9241-303:2011)

This European Standard was approved by CEN on 10 November 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

This is a preview of "BS EN ISO 9241-303:2...". [Click here to purchase the full version from the ANSI store.](#)

Foreword

This document (EN ISO 9241-303:2011) 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 May 2012, and conflicting national standards shall be withdrawn at the latest by May 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 ISO 9241-303:2008.

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.

Endorsement notice

The text of ISO 9241-303:2011 has been approved by CEN as a EN ISO 9241-303:2011 without any modification.

This is a preview of "BS EN ISO 9241-303:2...". Click here to purchase the full version from the ANSI store.

Contents

Page

Foreword	v
Introduction.....	viii
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Guiding principles	1
5 Ergonomic requirements and recommendations	2
5.1 Viewing conditions.....	2
5.1.1 General	2
5.1.2 Design viewing distance.....	2
5.1.3 Design viewing direction	3
5.1.4 Gaze and head tilt angles	4
5.1.5 Displays for virtual images.....	4
5.2 Luminance.....	4
5.2.1 General	4
5.2.2 Illuminance	4
5.2.3 Display luminance	4
5.2.4 Luminance balance and glare	5
5.2.5 Luminance adjustment	5
5.3 Special physical environments.....	5
5.3.1 General	5
5.3.2 Vibration	5
5.3.3 Wind and rain	6
5.3.4 Excessive temperatures	6
5.4 Visual artefacts	6
5.4.1 General	6
5.4.2 Luminance non-uniformity	6
5.4.3 Colour non-uniformity.....	6
5.4.4 Contrast uniformity	7
5.4.5 Geometric distortions	8
5.4.6 Screen and faceplate defects	8
5.4.7 Temporal instability (flicker)	8
5.4.8 Spatial instability (jitter).....	9
5.4.9 Moiré effects	9
5.4.10 Other instabilities	10
5.4.11 Unwanted reflections	10
5.4.12 Unintended depths effects	10
5.5 Legibility and readability	11
5.5.1 General	11
5.5.2 Luminance contrast	11
5.5.3 Image polarity	11
5.5.4 Character height	11
5.5.5 Text size constancy.....	12
5.5.6 Character stroke width.....	13
5.5.7 Character width-to-height ratio.....	13
5.5.8 Character format.....	13
5.5.9 Between-character spacing.....	13
5.5.10 Between-word spacing	13
5.5.11 Between-line spacing.....	13

This is a preview of "BS EN ISO 9241-303:2...". Click here to purchase the full version from the ANSI store.

5.6	Legibility of information coding	14
5.6.1	General.....	14
5.6.2	Luminance coding	14
5.6.3	Blink coding	14
5.6.4	Colour coding.....	14
5.6.5	Geometrical coding	14
5.7	Legibility of graphics.....	14
5.7.1	General.....	14
5.7.2	Monochrome and multicolour object size.....	14
5.7.3	Contrast for object legibility	15
5.7.4	Colour considerations for graphics.....	15
5.7.5	Background and surrounding image effects	16
5.7.6	Number of colours	16
5.8	Fidelity	17
5.8.1	General.....	17
5.8.2	Colour gamut and reference white.....	17
5.8.3	Gamma and grey scale.....	17
5.8.4	Rendering of moving images	18
5.8.5	Image formation time (IFT).....	19
5.8.6	Spatial resolution.....	19
5.8.7	Raster modulation or fill factor	19
5.8.8	Pixel density.....	20
6	Conformance.....	20
Annex A	(informative) Overview of the ISO 9241 series.....	21
Annex B	(informative) Attractivity, or subject visual quality	22
Annex C	(informative) Usability aspects of installation	23
Annex D	(normative) Basic concepts of visual perception for contrast and luminance of electronic displays	25
Annex E	(informative) Virtual display — Performance objectives	33
Annex F	(informative) Electronic visual display accessibility — Selected bibliography.....	40
Bibliography	42

This is a preview of "BS EN ISO 9241-303:2...". Click here to purchase the full version from the ANSI store.

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 2.

The main task of technical committees is to prepare International Standards. 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.

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

ISO 9241-303 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

This second edition cancels and replaces the first edition (ISO 9241-303:2008), of which it constitutes a minor revision. Together with ISO 9241-302 and ISO 9241-305, ISO 9241-303:2008 cancelled and replaced ISO 9241-8, and together with ISO 9241-302, ISO 9241-305 and ISO 9241-307, it cancelled and replaced ISO 9241-7 and ISO 13406-2, and partially replaced ISO 9241-3:

- terms and definitions related to electronic visual displays were transferred to, and collected in, ISO 9241-302;
- while the areas previously covered in ISO 9241 and by ISO 13406 remained essentially unchanged, test methods and requirements were updated to account for advances in science and technology;
- all generic ergonomic requirements were incorporated into ISO 9241-303;
- the application of those requirements to different display technologies, application areas and environmental conditions — including test methods and pass/fail criteria — is specified in ISO 9241-307.

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 4: Keyboard requirements*
- *Part 5: Workstation layout and postural requirements*
- *Part 6: Guidance on the work environment*
- *Part 9: Requirements for non-keyboard input devices*
- *Part 11: Guidance on usability*

This is a preview of "BS EN ISO 9241-303:2...". Click here to purchase the full version from the ANSI store.

— *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*

ISO 9241 also consists of the following parts, under the general title *Ergonomics of human-system interaction*:

— *Part 20: Accessibility guidelines for information/communication technology (ICT) equipment and services*

— *Part 100: Introduction to standards related to software ergonomics [Technical Report]*

— *Part 110: Dialogue principles*

— *Part 129: Guidance on software individualization*

— *Part 143: Forms*

— *Part 151: Guidance on World Wide Web user interfaces*

— *Part 171: Guidance on software accessibility*

— *Part 210: Human-centred design for interactive systems*

— *Part 300: Introduction to electronic visual display requirements*

— *Part 302: Terminology for electronic visual displays*

— *Part 303: Requirements for electronic visual displays*

— *Part 304: User performance test methods for electronic visual displays*

— *Part 305: Optical laboratory test methods for electronic visual displays*

— *Part 306: Field assessment methods for electronic visual displays*

— *Part 307: Analysis and compliance test methods for electronic visual displays*

— *Part 308: Surface-conduction electron-emitter displays (SED) [Technical Report]*

— *Part 309: Organic light-emitting diode (OLED) displays [Technical Report]*

— *Part 310: Visibility, aesthetics and ergonomics of pixel defects [Technical Report]*

— *Part 400: Principles and requirements for physical input devices*

— *Part 410: Design criteria for physical input devices*

— *Part 411: Evaluation methods for the design of physical input devices [Technical Specification]*

— *Part 420: Selection of physical input devices*

This is a preview of "BS EN ISO 9241-303:2...". [Click here to purchase the full version from the ANSI store.](#)

— *Part 910: Framework for tactile and haptic interaction*

— *Part 920: Guidance on tactile and haptic interactions*

The following parts are under preparation:

— *Part 154: Interactive voice response (IVR) applications*

Human-centred design and evaluation methods, optical characteristics of autostereoscopic displays, and requirements, analysis and compliance test methods for the reduction of photosensitive seizures are to form the subjects of future parts 230, 331 and 391.

This is a preview of "BS EN ISO 9241-303:2...". [Click here to purchase the full version from the ANSI store.](#)

Introduction

This part of ISO 9241 addresses a large range of technologies, tasks and environments.

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, Subcommittee 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.

This is a preview of "BS EN ISO 9241-303:2...". Click here to purchase the full version from the ANSI store.

Ergonomics of human-system interaction —

Part 303: Requirements for electronic visual displays

1 Scope

This part of ISO 9241 establishes image-quality requirements, as well as providing guidelines, for electronic visual displays. These are given in the form of generic — independent of technology, task and environment — performance specifications and recommendations that will ensure effective and comfortable viewing conditions for users with normal or adjusted-to-normal eyesight.

This part of ISO 9241 does not address issues of accessibility for people with disabilities. However, it does take into account aspects of the eyesight of older people and could be of value to people dealing with issues of visual impairment in certain cases: the specification of essential characteristics for normal viewing can be used to gauge the severity of different visual abnormalities so that appropriate solutions can be identified.

NOTE In addition to the Bibliography, Annex F gives a selected bibliography of documents addressing the needs of people with disabilities, including people with poor, deteriorating or no eyesight.

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 9241-302, *Ergonomics of human-system interaction — Part 302: Terminology for electronic visual displays*

ISO 9241-307, *Ergonomics of human-system interaction — Part 307: Analysis and compliance test methods for electronic visual displays*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in ISO 9241-302 apply.

4 Guiding principles

For a satisfying human–display interaction, a number of different requirements have to be met at the same time in an appropriate balance. For the purposes of this part of ISO 9241, these requirements have been grouped into the following eight major areas:

- viewing conditions;
- luminance;
- special physical environments;