

**SLOVENSKI STANDARD**  
**oSIST prEN ISO 9241-333:2016**  
**01-maj-2016**

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**Ergonomija medsebojnega vpliva človek-sistem - 333. del: Stereoskopski zasloni z uporabo očal (ISO/DIS 9241-333:2016)**

Ergonomics of human-system interaction - Part 333: Stereoscopic displays using glasses (ISO/DIS 9241-333:2016)

Ergonomie der Mensch-System-Interaktion - Teil 333: Stereoskopische Displays unter Verwendung von Brillen (ISO/DIS 9241-333:2016)

Ergonomie de l'interaction homme-système - Partie 333: (ISO/DIS 9241-333:2016)

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**Ta slovenski standard je istoveten z: prEN ISO 9241-333**

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**ICS:**

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

**oSIST prEN ISO 9241-333:2016**

**en,fr,de**



# DRAFT INTERNATIONAL STANDARD

## ISO/DIS 9241-333

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### Ergonomics of human-system interaction —

### Part 333:

### Stereoscopic displays using glasses

*Ergonomie de l'interaction homme-système*

ICS: 13.180; 35.180

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#### ISO/CEN PARALLEL PROCESSING

This draft has been developed within the International Organization for Standardization (ISO), and processed under the **ISO lead** mode of collaboration as defined in the Vienna Agreement.

This draft is hereby submitted to the ISO member bodies and to the CEN member bodies for a parallel three month enquiry.

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.



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## 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.

In exceptional circumstances, when a technical committee has collected data of a different kind from that which is normally published as an International Standard ("state of the art", for example), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

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/TR 9241-333 was prepared by Technical Committee ISO/TC 159, *Ergonomics*, Subcommittee SC 4, *Ergonomics of human-system interaction*.

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 9: Requirements for non-keyboard input devices*
- *Part 11: Guidance on usability*
- *Part 12: Presentation of information*
- *Part 13: User guidance*
- *Part 14: Menu dialogues*
- *Part 15: Command dialogues*

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— *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 110: Dialogue principles*

— *Part 129: Guidance on software individualization*

— *Part 151: Software ergonomics for 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: Pixel defects — Visibility, aesthetics and ergonomics [Technical Report]*

— *Part 331: Optical characteristics of autostereoscopic displays [Technical Report]*

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

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

— *Part 420: Selection procedures for physical input devices*

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

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

For the other parts under preparation, see Annex A.



## Introduction

Recently, due to the improvement of display technologies, users can easily experience stereoscopic displays using glasses, such as TVs with large screen, personal computers, and so on. The displays are used not only in the field of leisure, but also in the field of business, education and medical applications. ISO 9241-333 presents the requirements for visual display units (VDUs) with stereoscopic displays using glasses.

The visual experience of users is affected by both display hardware and image contents. Regarding the display hardware aspect, ISO/TC 159/SC 4 has developed ISO 9241-303 "Ergonomics of human-system interaction – Part 303: Requirements for electronic visual displays", in which basic requirements for head mounted displays (HMDs) are described within its Annex E "Virtual display – Performance objectives". ISO/TC 159/SC 4 has also developed ISO/DTR 9241-331 "Ergonomics of human-system interaction – Part 331: Optical characteristics of autostereoscopic displays". Those documents are closely related with stereoscopic displays using glasses, but are not directly applicable to them, because whether the special glasses are required or not is an important factor in ergonomics. The visual factors of HMDs are also ergonomically different from those of other displays. ISO 9241-333 is not included in the current ISO 9241-300 series for 2D displays, because stereoscopic display has unique features. The separated documents will be better for understanding.

Regarding the image contents aspect ISO/WA3:2005 has been published. This document describes the international agreement on image safety issues for reducing the incidence of undesirable biomedical effects caused by visual image sequences. Visual fatigue caused by stereoscopic images (VFSI) is contained as one of these undesirable effects. In order to develop the guidelines for image contents, ISO/TC 159/SC 4 established WG 12. The activities are closely related with the standard for stereoscopic displays using glasses.

For ensuring effective and comfortable viewing, and for reducing VFSI, the standards should deal with both display hardware and the displayed contents. However, as the first step, ISO 9241-333 focuses on the display hardware aspect in order to simplify the discussions.

ISO 9241-333 is drafted in accordance with the rules given in the ISO/IEC Directives, Part 2. Requirements, measuring methods, compliance test methods for conformity are provided.

The first clause of this document describes the scope, defining applicability of the descriptions of this document.

Normative references are described in the second clause.

The third clause provides a comprehensive list of the terminology for stereoscopic displays using glasses. These terms are needed to specify requirements and measurements in the other clauses.

Guiding principles and performance requirements in the fourth and fifth clause are presented to remind document users of the foundations of the work.

The sixth clause provides optical measurement methods which can be used for predicting the performance of stereoscopic displays using glasses against the ergonomics requirements.

The seventh clause covers the compliance test methods for conformity.



# Ergonomics of human-system interaction — Part 333: Stereoscopic displays using glasses

## 1 Scope

This part of ISO 9241 provides ergonomic requirements for stereoscopic displays using glasses. These requirements are stated as performance specifications, aimed at ensuring effective and comfortable viewing conditions for users, and at reducing visual fatigue caused by stereoscopic images on stereoscopic display using glasses. Test methods and metrology, yielding conformance measurements and criteria, are provided for design evaluation.

This part of ISO 9241 is applicable to temporally or spatially interlaced type. These are implemented by flat-panel displays, projection displays, etc.

Stereoscopic displays using glasses can be applied to many contexts of use. However, this part focuses on business and home leisure applications (i.e., observing moving images, games, and so on). Only dark environments are specified in the current version of this part.

## 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 9241-300, Ergonomics of human-system interaction — Part 300: Introduction to electronic visual display requirements

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

ISO 9241-303, Ergonomics of human-system interaction — Part 303: Requirements for electronic visual displays

ISO 9241-305, Ergonomics of human-system interaction — Part 305: Optical laboratory test methods for electronic visual displays

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

ISO 9241-331, Ergonomics of human-system interaction — Part 331: Optical characteristics of autostereoscopic displays [Technical Report]

ISO 9241-392, Ergonomics of human-system interaction — Part 392: Ergonomic recommendations for the reduction of visual fatigue from stereoscopic images

## ISO/DIS 9241-333:2016(E)

### 3 Terms and definitions

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

#### 3.1 General terms

##### 3.1.1

##### **stereoscopic display**

3D display where depth perception is induced by binocular parallax

NOTE 1 to entry: See ISO 9241-331, 2.1.2, "stereoscopic display".

NOTE 2 to entry: See ISO 9241-302:2008, 3.5.5 "binocular display device".

##### 3.1.2

##### **stereoscopic display using glasses**

stereoscopic display using glasses to provide binocular parallax

NOTE 1 to entry: See 3.1.1 stereoscopic display.

NOTE 2 to entry: See 3.1.5 glasses.

##### 3.1.3

##### **temporally interlaced type**

##### **temporally multiplexed type**

##### **temporally multiplexed display**

##### **temporally multiplexed stereoscopic display**

stereoscopic display that shows each of stereoscopic images sequentially

##### 3.1.4

##### **spatially interlaced type**

##### **spatially multiplexed type**

##### **spatially multiplexed display**

##### **spatially multiplexed stereoscopic display**

stereoscopic display that shows each of stereoscopic images divided in the screen

NOTE 1 to entry: As a result, each of stereoscopic images is shown simultaneously.

##### 3.1.5

##### **glasses**

eye attachment for dividing stereoscopic images into each eye from a stereoscopic display not mounted on the user

##### 3.1.6

##### **active glasses**

glasses whose lenses differently change their optical properties synchronizing with the stereoscopic display

NOTE 1 to entry: Usually left and right images are displayed alternately on a screen. When a left image is displayed, the left lens of active glasses is turned on to transmit the image and the right lens is turned off to cut off the image.

##### 3.1.7

##### **passive glasses**

glasses whose lenses have differently fixed optical properties

##### 3.1.8

##### **stereoscopic images**

set of images with parallax shown on a stereoscopic display

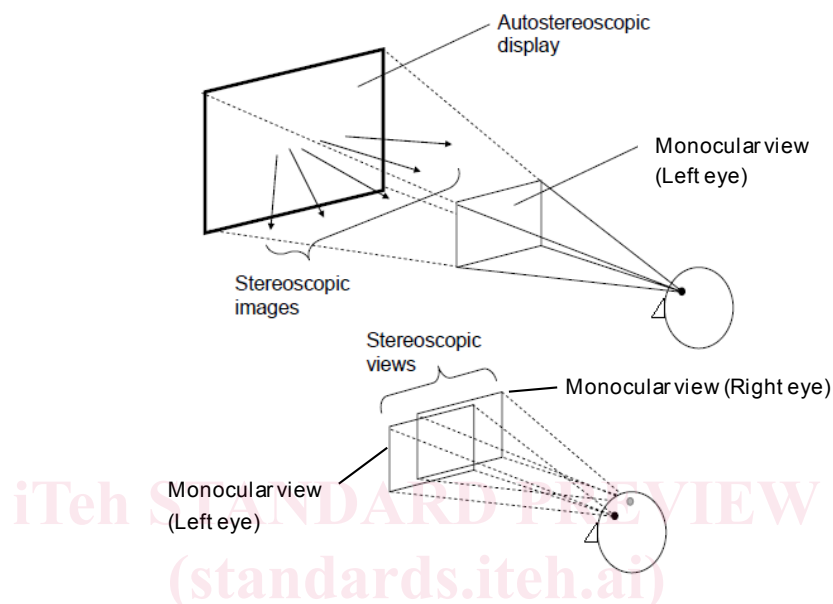
NOTE 1 to entry: See ISO 9241-331, 2.1.7, “stereoscopic images”.

### 3.1.9

#### **stereoscopic views**

pair of sights provided by a stereoscopic display, which induce stereopsis,

NOTE 1 to entry: See ISO 9241-331, 2.1.8, “stereoscopic view s”.



**Figure 1 — Relation between stereoscopic images, stereoscopic views and monocular view**

### 3.1.10

#### **monocular view**

one of stereoscopic views

NOTE 1 to entry: See ISO 9241-331, 2.1.9, “monocular view”.

## 3.2 Human factors

### 3.2.1

#### **binocular parallax**

apparent difference in the direction of a point as seen separately by one eye and by the other, while the head remains in a fixed position

NOTE 1 to entry: See ISO/WA3:2005, 2.15.

NOTE 2 to entry: Binocular parallax is equivalent to the optic angle between the visual axes of both eyes, when they are fixated to a single point.

### 3.2.2

#### **visual fatigue**

eyestrain or asthenopia, which shows a wide range of visual symptoms, including tiredness, headache, and soreness of the eyes, caused by watching images in a visual display

NOTE 1 to entry: See ISO/WA3:2005, 2.13.

NOTE 2 to entry: See ISO 9241-302:2008, 3.5.3.