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**BS EN ISO 9241-391:2016**



**BSI Standards Publication**

# **Ergonomics of human-system interaction**

Part 391: Requirements, analysis and compliance test methods for the reduction of photosensitive seizures (ISO 9241-391:2016)

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This British Standard is the UK implementation of EN ISO 9241-391:2016.

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.

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## Ergonomics of human-system interaction - Part 391: Requirements, analysis and compliance test methods for the reduction of photosensitive seizures (ISO 9241- 391:2016)

Ergonomie de l'interaction homme-système - Partie  
391: Exigences, analyses et méthodes d'essai de  
conformité pour la réduction des saisies  
photosensibles (ISO 9241-391:2016)

Ergonomie der Mensch-System-Interaktion - Teil 391:  
Anforderungen, Analysen und Prüfverfahren zur  
Konformität zur Verringerung epileptischer Anfälle  
ausgelöst durch photosensitive Reize (ISO 9241-  
391:2016)

This European Standard was approved by CEN on 19 December 2015.

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.

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COMITÉ EUROPÉEN DE NORMALISATION  
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**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## European foreword

This document (EN ISO 9241-391:2016) 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 September 2016, and conflicting national standards shall be withdrawn at the latest by September 2016.

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## Endorsement notice

The text of ISO 9241-391:2016 has been approved by CEN as EN ISO 9241-391:2016 without any modification.

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#).

The committee responsible for this document is 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 5: Workstation layout and postural requirements*
- *Part 6: Guidance on the work environment*
- *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*

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*

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- *Part 112: Principles for the presentation of information*<sup>1)</sup>
- *Part 129: Guidance on software individualization*
- *Part 143: Forms*
- *Part 151: Guidance on World Wide Web user interfaces*
- *Part 154: Interactive voice response (IVR) applications*
- *Part 161: Guidance on visual user-interface elements*
- *Part 171: Guidance on software accessibility*
- *Part 210: Human-centred design for interactive systems*
- *Part 220: Processes for enabling, executing and assessing human-centred design within organizations*<sup>1)</sup>
- *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 331: Optical characteristics of autostereoscopic displays* [Technical Report]
- *Part 391: Requirements, analysis and compliance test methods for the reduction of photosensitive seizures*
- *Part 392: Ergonomic recommendations for the reduction of visual fatigue from stereoscopic images*
- *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*
- *Part 910: Framework for tactile and haptic interaction*
- *Part 920: Guidance on tactile and haptic interactions*
- *Part 940: Evaluation of tactile and haptic interactions*<sup>1)</sup>
- *Part 960: Framework and guidance for gesture interactions*<sup>1)</sup>

The following parts are under preparation:

- *Part 125: Guidance on visual presentation of information*

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— *Part 333: Stereoscopic displays using glasses*

For the other parts under preparation, see [Annex A](#).



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## Introduction

Recent progress of technology enables us to watch high-definition images, some of which can be stereoscopic. When those images are projected onto the retina of both eyes and processed as visual information, undesirable biomedical effects, such as photosensitive seizures, visually induced motion sickness, and visual fatigue from stereoscopic images can be induced. These undesirable biomedical effects need to be reduced where feasible. The prevention of these undesirable biomedical effects on human health has been referred to as "image safety".

Image safety was first discussed by the ISO in the ISO/COPOLCO with respect to the users of image products. Then, in 2004, the ISO/International Workshop on Image Safety was held and resulted in the publication of ISO/IWA 3:2005 as the international workshop agreement.<sup>[1]</sup> Following those discussions, the study group (ISO/TC 159/SC 4/SG on Image Safety) continued to evaluate strategies of the international standardizations until 2009. The basic concept of Image Safety is common with ISO/IEC Guide 71:2014<sup>[18]</sup>, in which the idea is that accessibility to and usability of products and services should be available to all people.

This part of ISO 9241 will help promote the production of safer images by reducing the risk of photosensitive seizures, and thereby result in the wider distribution of images that are free from constraints on which consumers can view them. A small proportion of the population is susceptible to seizures and other neurological effects when watching motion picture and video content with certain display features. Since these reactions depend on individual susceptibility have been documented with programming viewed through cathode-ray tube (CRT) displays, there is as yet less experience with high-definition displays.

This part of ISO 9241 belongs to a family of human-system interaction standards. Readers who need guidance on other aspects of human-system interaction should refer to the ISO 9241-series.

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# Ergonomics of human-system interaction —

## Part 391:

# Requirements, analysis and compliance test methods for the reduction of photosensitive seizures

## 1 Scope

This part of ISO 9241 provides requirements and recommendations for reducing photosensitive seizures (PSS), while viewing images on electronic displays.

The requirements and recommendations in this part of ISO 9241 are designed to be applied to image contents. By image contents, reference is made to the images independent of the device or environment in which they are displayed.

The requirements and recommendations in this part of ISO 9241 are for the protection of the vulnerable individuals in the viewing population who are photosensitive and who are therefore liable to seizures triggered by flashing lights and regular patterns, including certain repetitive images.

NOTE 1 ITU considers the image safety issues in relation to broadcasting. Some of these are described in ITU-R BT.1702.[2]

NOTE 2 There are some related recommendations in ISO/IEC 40500:2012, *W3C Web Content Accessibility Guidelines (WCAG) 2.0*, for web contents accessibility.

NOTE 3 Photosensitive seizures and photosensitive epilepsy, that is, chronic conditions characterized by those repeated seizures are medical conditions. Clinical aspects of photosensitivity appear in [Annex C](#). Visually induced seizures are equivalent to PSS.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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*

## 3 Terms and definitions

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

### 3.1

#### **flash**

pair of opposing changes in relative luminance

Note 1 to entry: A “pair of opposing changes” is an increase followed by a decrease or a decrease followed by an increase.

### 3.2

#### **electroencephalogram**

#### **EEG**

record of electrical changes caused by neuronal activities in the brain through electrodes attached to the scalp