IEC 63145-1-2

Edition 1.0 2022-07

INTERNATIONAL STANDARD

Eyewear display – Part 1-2: Generic – Terminology

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IEC 63145-1-2:2022
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IEC 63145-1-2:2022-07(en)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ICS 31.120

ISBN 978-2-8322-3983-4

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EYEWEAR DISPLAY –

Part 1-2: Generic – Terminology

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IEC 63145-1-2 has been prepared by IEC technical committee TC 110: Electronic displays. It is an International Standard.

The text of this International Standard is based on the following documents:

Draft	Report on voting
110/1432/FDIS	110/1443/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 63145 series, published under the general title *Eyewear display*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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EYEWEAR DISPLAY –

Part 1-2: Generic – Terminology

1 Scope

This part of IEC 63145 provides terms that are used in the field of eyewear displays for augmented reality, virtual-reality, mixed reality, and the image or video rendering on these displays.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

3.1 General

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

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ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

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3.2 Classification of terms

Terms for eyewear displays, their optical systems, and image rendering are classified as follows:

- display types (3.3)
- computer-generated visual environment (3.4)
- display optical system and related terms (3.5)
- optical performance related terms (3.6)
- performance characteristics (3.7)
- visual ergonomics (3.8)
- display electronics and related terms (3.9)
- terms related to image rendering (3.10)

3.3 Display types

3.3.1
eyewear display
EWD
display that is worn on the user's eye or worn close to the eye in order to provide dynamically addressable visual information to the user

Note 1 to entry: Detailed explanations are given in IEC TR 63145-1-1:2018, 4.1 [1]1.

Note 2 to entry: Eyewear displays include spectacle-mounted, head-mounted and contact lens displays.

Note 3 to entry: The head-mounted display is usually referred to as a headwear. In a few cases, HMD is used for "helmet-mounted display" or "head-mounted device".

Note 4 to entry: There are several mount types: head mount, helmet mount, headset, goggle, visor and devices with similar applications, etc. See IEC TR 63145-1-1:2018, Clause 4 [1].

3.3.2
contact lens display
eyewear display that is worn on the user's cornea in the same way as a contact lens

3.3.3
virtual-image display
device that optically or holographically forms a virtual-image

Note 1 to entry: In ISO 9241-302:2008 [4], 3.4.52, "virtual-image display" is defined as "device that optically or holographically forms a virtual-image"; however in this definition "a virtual-image" is ambiguous (see 3.5.1 "virtual-image optical system").

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[SOURCE: ISO 9241-302:2008 [4], 3.4.52, modified – a note has been added.]

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3.3.4
head-mounted display
HMD
eyewear display that is mounted on the user's head, using a mechanical support other than a spectacle frame

3.3.5
see-through
superimposition of an image(s) or a video onto the whole or part of the user's real-world field of view

Note 1 to entry: The superposition is achieved by means of a partially transmissive or reflective optical element.

[SOURCE: ISO 9241-302:2008 [4], 3.5.45, modified – "or a video", "the whole or part of" and "real-world" have been added to the definition and a note has been added.]

3.3.6
optical see-through display
transmission or projection virtual-image display that the user can see through in at least part of the user's real-world field of view

1 Numbers in square brackets refer to the Bibliography.

3.3.7
video see-through display
immersive HMD that provides a display that combines a video camera view of the real-world with overlaid computer-generated visual information

Note 1 to entry: See 3.4.7 for the meaning of “immersive”.

3.3.8
monocular display device
device in which the virtual-image is visible to a single eye

[SOURCE: ISO 9241-302:2008 [4], 3.5.38, modified – in the definition, the term “virtual” has been added and “one eye” has been replaced with “a single eye”.]

3.3.9
binocular display device
device in which different displays or parts of the display are presented to the left and right eyes via different optical axes

Note 1 to entry: In the context of eyewear displays, the term relates to virtual-image creation due to the close proximity of the source from the eye.

Note 2 to entry: The binocular display device is sometimes called a dual-view display device.

Note 3 to entry: The images displayed can be the same (as in a single-view binocular display device) or slightly different, e.g., to provide a stereoscopic view

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[SOURCE: ISO 9241-302:2008 [4], 3.5.5, modified – the sentence "a slightly different image of the same target is " is changed to "different displays or parts of the display are”, and the phrase "via different optical axes" and the notes have been added.]

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3.3.10
single-view binocular display device
device in which the same or slightly different virtual-images are presented to the left and right eyes via different optical systems

3.3.11
bi-ocular display device
device in which the same image is presented to the left and right eyes via optical axes split from a common one

3.3.12
waveguide display device
device that uses a transparent or semi-transparent substrate to observe the real-world and fully or partially guide the light by total internal reflection from the image display to the eyes of the viewer

3.3.13
image display
display device that outputs images or video information to the eyewear system

Note 1 to entry: The term “imager” is sometimes used for “image display”. However, that term is ambiguous as it is also used to mean “image sensors”, and therefore is to be avoided.

Note 2 to entry: The term “image source” is sometimes used for “image display”.

Note 3 to entry: Image displays include emissive type displays, such as OLED or micro-OLED, micro-LED and non-emissive types such as LCD, DLP and LCOS.

3.4 Computer-generated visual environment

3.4.1
virtual-reality
VR
3D computer-generated environment in which viewers are immersed and giving the sense of being in another space different from their real-world

Note 1 to entry: Only computer-generated visual environments similar to the real-world are considered here, though further sensations such as sound, touch, perception of odour or scent or similar can be involved.

Note 2 to entry: See 3.4.7.

3.4.2
augmented reality
AR
direct view of the real-world supplemented or modified by overlaying computer-generated visual graphics/video and/or other information or sensation

Note 1 to entry: Augmented reality comes with or without spatial registration of the virtual objects onto the real-world environment [2],[3]. In the case where there is no spatial registration, AR is referred to as "assisted reality" instead.

3.4.3
augmented virtuality
AV
environment in which images of real objects are inserted into a predominantly virtual computer-generated environment by means of real sensory inputs for implementing the virtual environment

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3.4.4
mixed reality
MR
continuum that encompasses virtual-reality (VR), augmented reality (AR), and augmented virtuality (AV)

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3.4.5
extended reality
XR
extension of human experiences related to various senses (e.g., existence, cognition) and interaction between machine and human in real and computer-generated virtual environments

Note 1 to entry: The 'X' in XR is simply a variable that can stand for A of the AR, the V of the VR, and the M of the MR.

3.4.6
hyper reality
XR with computer-modified vision, audio or other sensations of the real-world that provide information beyond the capability of the human senses, for example, x-ray vision or ultra-auditory sensing

3.4.7
immersive, adj.
state produced by a computer-generated image and/or sound that appears to surround the user in three-dimensions

Note 1 to entry: The state may include audio/hearing, haptics, smell, etc.

3.5 Display optical system and related terms

3.5.1
virtual-image optical system
optical system that collects focus points made by extensions of diverging rays from an object where the image is magnified

Note 1 to entry: For head-mounted and eyewear displays, an image display is applied instead of a real object.

Note 2 to entry: The word ”virtual” is frequently used when viewing by means of digital media, and in this case the meaning refers to EWD. See 3.4.1.

3.5.2
field of view
FOV
angular region as observed from the viewer’s eye point, subtended by the visible area of the displayed virtual-image (in AR, VR, and MR devices) and of the perceived real-world view in case of an optical see-through display

3.5.3
eye point
location where the centre of an eyewear device or the centre of the exit pupil of the EWD is positioned

Note 1 to entry: The eye point is generally located within the exit pupil of the eyewear display.

Note 2 to entry: The design eye point is often located at the centre of the device's exit pupil.

Note 3 to entry: In some designs, the apex of the cornea of the user is taken as reference instead of the eye pupil of the user.

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3.5.4
eye relief
distance from the cornea of the eye to the closest optical element of the virtual-image display

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Note 1 to entry: Refer to Note 2 and Note 3 in 3.5.3.

Note 2 to entry: In some designs the apex of the cornea of the user is taken as reference.

[SOURCE: ISO 9241-302:2008 [4], 3.5.21, modified – the notes have been added.]

3.5.5
eye rotation
<physiology> rotation of the eye by a coordinated action of the extra-ocular muscles to view the virtual-image displayed by the AR, VR or MR device

Note 1 to entry: For measurement purposes, the centre of rotation is considered to be about 13 mm behind the corneal apex, and about 10 mm behind the pupil.

3.5.6
eye rotation
<metrology> angular scanning method that simulates the natural rotation of the human eyeball about its centre when gazing over the visual field

Note 1 to entry: For measurement purposes, the centre of rotation is considered to be about 13 mm behind the corneal apex, and about 10 mm behind the pupil.

3.5.7
pupil rotation
<physiology> pivot motion about the eye's pupil for viewing the virtual-image display by the AR, VR, and MR