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Part 62-12: Measurement methods for virtual-image type - Image Quality

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For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



110/1589/CD

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SECRETARIAT:

Japan

SECRETARY:

Mr Yoshi SHIBAHARA

OF INTEREST TO THE FOLLOWING COMMITTEES:

PROPOSED HORIZONTAL STANDARD:



Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.

FUNCTIONS CONCERNED:

☐ EMC

☐ ENVIRONMENT

☐ QUALITY ASSURANCE

☐ SAFETY

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TITLE:

3D displays - Part 62-12: Measurement methods for virtual-image type - Image Quality

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

3D DISPLAYS –

Part 62-12: Measurement methods for virtual-image type – Image Quality

FOREWORD

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- IEC 62629-62-12 has been prepared by IEC technical committee 110: Electronic displays. It is an International Standard.
- The text of this International Standard is based on the following documents:

Draft	Report on voting
XX/XX/FDIS	XX/XX/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.

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

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

- 125 • reconfirmed,
- 126 • withdrawn, or
- 127 • revised.

128

129 The National Committees are requested to note that for this document the stability date is 20XX.

130 THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE
131 PUBLICATION STAGE.

132

3D DISPLAYS –

Part 62-12: Measurement methods for virtual-image type – Image Quality

Scope

This part of IEC 62629 specifies the standard measuring conditions and measurement methods for determining image-quality properties of the image created by 3D display devices and virtual-image optics such as head-up displays. The virtual image refers to an image in which the 3D visual information is superimposed with the outside world. Eyewear displays are however beyond the scope of this document.

NOTE The scope of this standard does not intend to include eye-wear displays considering the difference between a head-up display and an eye-wear display in the aspect of eye box size and field-of-view. The eye-tracking function is disabled in the image-quality measurement of this standard.

Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 62629-1-2, *3D display devices – Part 1-2: Generic – Terminology and letter symbols*

IEC 62629-62-11, *3D display devices – Part 62-11: Measurement methods for virtual-image type – Optical*

Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62629-1-2 and the following apply.

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>

3.1.1

virtual image distance

distance from the centre between both eyes to the centre of a virtual-image

Note 1 to entry: The centre of both eyes corresponds to the point where the half of the binocular spacing is located.

3.1.2

field of view

angle subtending the area of the virtual image as observed from the centre between both eyes

Note 1 to entry: The FOV is determined by finding the location of the edge point in the test pattern without looking for the edge in IEC 62629-62-11. However, if the edge of the 3D virtual image is unclear, the edge for field-of-view measurement is assumed to be less than 50% of the center luminance value that is measured at the center position of the virtual image plane.

3.1.3

eye box

<3D display - virtual-image type> three-dimensional space within which the users place their both eyes and properly see the field of view

Note 1 to entry: The eye box size and filed-of-view are quite different between eyewear displays (< a few cm and about 100 degrees) and HUDs (tens of cm and about 10 - 20 degrees). A displacement by eye rotation is comparable to eye box size for eyewear displays whereas this is much smaller for HUDs. As a result, the effect of selection of rotation point of LMD is noticeable for eyewear displays but that is negligible for HUDs.

3.1.4

binocular misalignment

unintended differences in vertical and horizontal position of 3D virtual objects observed in the positions of the left and right eyes

Note 1 to entry: It is generally assumed that 3D virtual images reproduced using zero binocular disparity information should be displayed at the same location when observed with the left and right eyes, however, the position difference of 3D virtual images occurs due to factors such as manufacturing and design errors of HUD optical system. In this aspect, the definition of the 'binocular misalignment' is given in 3.1.4.

3.1.5

ghost image

unintended lower intensity duplication of an intended virtual image

Note 1 to entry: The term 'ghost image' is commonly used in automotive HUDs. It is extremely rare for multiple layers of ghost images to be observed in fact. The ghost image can be expressed as 'secondary image'. The measurement method introduced in this standard corresponds to the case where the secondary image is observed.

3.1.6

designed eye distance

the distance between the half mirror and a viewer that is considered at the design stage of a 3D display producing 3D virtual images such as 3D HUD

3.2 Abbreviated terms

FOV	field of view
HUD	head up display
IPD	inter pupillary distance
LMD	light measuring device

Light measuring device (LMD)

The effect of the uniform-illuminated-flat-background which affects virtual-image quality can be measured using a spectroradiometer-type spot LMD. The wavelength range shall be at least 380 nm to 780 nm and the wavelength accuracy shall be 0,3 nm or smaller. The spectral maximum bandwidth shall be 10 nm for broad spectrum with no sharp peaks or ≤ 5 nm for sharp spectral peaks.

The measurement of geometric information is required for quantifying the levels of the binocular misalignment and the ghost image in this standard. The geometric property of the 3D virtual image can be estimated using one imaging LMD with movement. The Annex C in the IEC 62629-62-11 provides the geometric calibration process for the imaging LMD. The specification items of an imaging LMD that should be reported are field of view, angular resolution, f number, the information related with stray light due to lens itself such as f23, f24, and f25 [1]. The appropriate aperture size is given in 4.1 of IEC 62629-62-11.

Measurement method of the uniform-illuminated-flat-background effect on the 3D virtual image

5.1 General

The virtual images of numbers, letters, or other symbols etc. in different depth conditions can be reproduced by the virtual-image type 3D display such as 3D HUD. The 3D virtual images are expected to be viewed against real-world environment that is very diverse from indoor to outdoor, i.e., mixed illuminations with different illuminance level and correlated colour temperature. There is however a limit to implement such diverse environment. A measurement method is therefore proposed to evaluate the effect of the uniform-illuminated-flat-background change on the virtual-image quality in Clause 0.