

# INTERNATIONAL STANDARD

## NORME INTERNATIONALE

3D Display devices – **STANDARD PREVIEW**  
Part 12-1: Measuring methods for stereoscopic displays using glasses – Optical  
(standards.iteh.ai)

Dispositifs d'affichage 3D –  
Partie 12-1: Méthodes de mesure pour les écrans stéréoscopiques utilisant des  
lunettes – Optique

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## 3D DISPLAY DEVICES –

**Part 12-1: Measuring methods  
for stereoscopic displays using glasses –  
Optical**

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## 3D DISPLAY DEVICES –

### Part 12-1: Measuring methods for stereoscopic displays using glasses – Optical

#### 1 Scope

This part of IEC 62629 determines the following measuring methods for characterizing the performance of stereoscopic display devices using either active or passive glasses.

This standard focuses on the types of stereoscopic displays using glasses as follows:

The types of stereoscopic displays reproducing temporally interlaced images and applicable glasses are:

- displays representing temporally interlaced (high frame rate) images and active glasses (time dividing shutter glasses), and
- displays with front screen switchable polarizer representing temporally interlaced images and linear or circular polarizer passive glasses.

The types of stereoscopic displays reproducing spatially interlaced images and applicable glasses are:

- displays with patterned retarder representing spatially interlaced images and linear or circular polarizer passive glasses.

Some parts of these measuring methods may also be applied to other types of stereoscopic displays using glasses not listed above.

The measuring items for the sets of stereoscopic display and glasses are as follows:

- a) luminance,
- b) luminance uniformity,
- c) interocular luminous difference,
- d) dark-room contrast ratio,
- e) interocular contrast difference,
- f) colour gamut,
- g) white chromaticity,
- h) white chromatic uniformity,
- i) interocular chromatic difference,
- j) interocular crosstalk, and
- k) interocular crosstalk screen position dependency (interocular crosstalk uniformity).

The measuring parameters are as follows:

- l) viewing direction dependency,
- m) dependency on in-plane rotation of lens,
- n) dependency on tilt angle of lens, and
- o) viewing distance dependency.

The measuring items for the glasses are as follows:

- p) transmittance (open state),
- q) extinction ratio,
- r) colour shift (open state, on-state),
- s) interocular transmittance,
- t) interocular contrast difference,
- u) interocular chromatic difference,
- v) response time (open state to/from closed state) of active glasses, and
- w) uniformity of lens.

The measuring parameters are as follows:

- x) angular characteristic, and
- y) temperature dependency.

## 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.

IEC 60068-1, *Environmental testing – Part 1: General and guidance*

IEC 60107-1, *Methods of measurement on receivers for television broadcast transmissions – Part 1: General considerations – Measurements at radio and video frequencies*

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

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 62629-1-2, IEC 60068-1 and IEC 60107-1, as well as the following apply.

### 3.1

#### **active glasses**

glasses whose left and right lenses alternate their optical characteristics, synchronizing with displayed time-sequential images on a stereoscopic display (e.g. synchronizing to TV fields, TV frame, etc.) to separate the displayed images into left and right monocular views

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. The lenses need no function of focusing light.

### 3.2

#### **closed state of glass lens**

optical condition of a glass lens in the on-state of active glasses with the emitted left or right light of a stereoscopic display at the minimum light transmittance (a low light transmittance condition)

### 3.3

#### **designed viewing distance**

viewing distance recommended by the manufacturer of 3D display

Note 1 to entry: Measurements in this document are usually carried out from the designed viewing distance.

### 3.4

#### **extinction ratio of glass lens**

ratio of the transmittance at open and closed conditions of a glass lens

Note 1 to entry: Two stacked linear polarizer sheets show the maximum transmittance when the polarization axes are parallel and the minimum transmittance when they are orthogonal to each other.

### 3.5

#### **glasses**

eye attachment having a characteristic by which displayed images on a stereoscopic display are divided into left and right parallax images

Note 1 to entry: In this document the term “glasses” means special glasses for stereoscopic views and the term “ordinary glasses” is used for conventional glasses. See passive glasses and active glasses.

### 3.6

#### **head-still condition**

measurement configuration of glasses to measure some measuring points on a display screen, where the position and the angle between the glasses and the screen are kept at constant values and only the LMD (light measuring device) rotates and changes its position

Note 1 to entry: This condition simulates a whole screen observation at a glance or an area observation only using eye movement.

### 3.7

#### **head-turn condition**

measurement configuration of the glasses to measure some measuring points on a display screen, where the designed centre of the glasses is aligned to the optical axes of the LMD

Note 1 to entry: This condition simulates the point observation of some positions on a display screen or the area observation on a display screen using head movement.

### 3.8

#### **off-state of active glasses**

powered-off (not in busy) state of active glasses, where both lenses of the glasses are at a fixed light transmittance

Note 1 to entry: Typically, both lenses are set to the maximum light transmission (high transmittance condition).

### 3.9

#### **on-state of active glasses**

powered-on (in busy) state of active glasses, where each lens of the glasses is alternately changing the conditions from open to closed and closed to open, synchronizing to the displayed time-sequential images on a stereoscopic display

### 3.10

#### **open state of glass lens**

optical condition of a glass lens in the on-state of active glasses, at the maximum light transmittance through the lens for either the left or right image of a stereoscopic display (high light transmittance condition)

### 3.11

#### **passive glasses**

glasses whose left and right lenses have complementary but fixed optical characteristics to separate displayed images on a stereoscopic display into left and right monocular views

Note 1 to entry: Usually spatially divided left and right segmental images are displayed at the same time on a screen; each divided segment of the screen emits polarized light to display the images and the left and right segments have an opposite orientation of polarization. The left lens of the passive glasses has a polarization to pass the emitted light of the left images and to cut off that of the right images, while the right lens passes the right images and cuts off the left images.

## 4 Structure of measuring equipment

The system diagrams and/or driving conditions of the measuring equipment shall comply with the structure specified in each item.

## 5 Standard measuring conditions

### 5.1 Environmental conditions

Measurements shall be carried out under the standard environmental conditions, e.g. at a temperature of  $25\text{ °C} \pm 3\text{ °C}$ , a relative humidity of 45 % to 75 %, and a pressure of 86 kPa to 106 kPa. When different environmental conditions are used, these shall be noted in the report.

### 5.2 Set-up conditions

#### 5.2.1 Measurement distance and viewing direction

##### 5.2.1.1 General

The measurement distance  $\ell_M$  and viewing direction from the screen centre shall be the standard measurement distance and the standard measurement direction; if not, a designed viewing distance or a designed viewing direction is defined in the relevant specification. The measurement distance and the viewing direction applied to the measurement shall be noted in the report.

##### 5.2.1.2 Standard measurement distance and direction

The standard measurement distance  $\ell_{MS}$  is  $3V$ , where  $V$  is the height of the active area. The standard measurement direction from the screen centre is perpendicular to the screen. When a designed viewing distance is specified in the relevant specification, it shall be used as the measurement distance.

##### 5.2.1.3 Designed viewing distance and direction

A designed viewing distance can be defined in the relevant specification. Then the designed viewing distance shall be applied and the designed measurement distance shall be noted in the report.

A designed viewing direction can be defined in the relevant specification. Then the viewing direction shall be applied and the viewing direction shall be noted in the report.

### 5.2.2 Measuring layouts

#### 5.2.2.1 Standard measuring layout for a stereoscopic display and glasses

Measurements shall be carried out at the standard measuring layout; if not, a designed viewing distance or a designed viewing direction is defined in the relevant specification. The standard measuring layout is shown in Figure 1, Figure 2 and Figure 3, for a centre point measurement, a multi-point measurement with the head-still condition and a multi-point measurement with the head-turn condition, respectively. Figure 1, Figure 2 and Figure 3 are side views and show the vertical alignments of the layouts. The horizontal alignments are defined similarly. The configurations of the lens of the glasses and the light measuring device (LMD) in these multi-point measurements are shown in Figure 4. The aperture of the LMD shall be set at the observing point. The lens of the glasses shall be set at the front of the object lens of the LMD and parallel or at the designed direction to the object lens.

The use of the measuring layout shown in Figure 1, Figure 2 or Figure 3 is defined in each measuring item. When a measuring layout is required for some measuring items in the

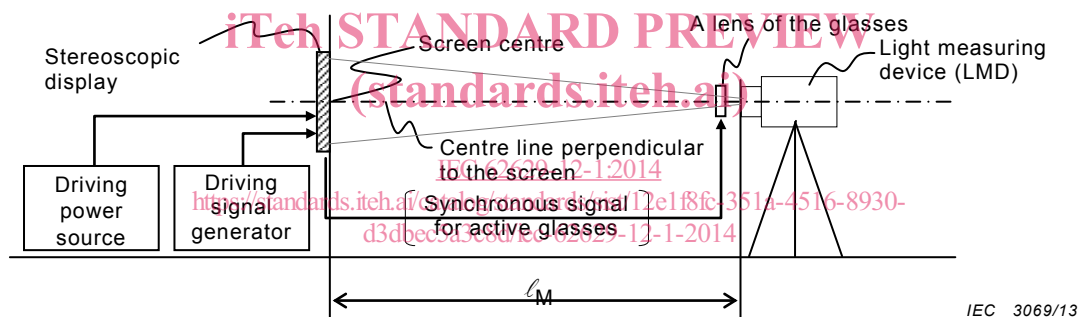
relevant specification, the required layout shall be used to the specified measuring items and the applied measuring layout shall be noted in the report.

When a multi-point measurement is carried out using a two-dimensional LMD, e.g. CCD type, the measuring layout shown in Figure 1 shall be applied and the lens of the glasses shall be set parallel or at the designed direction to the object lens of the LMD. In this case the measurement result shall be confirmed to be the same as that measured by the multi-point measurement with the head-still condition shown in Figure 2.

The multi-point measurement with head-turn condition shown in Figure 3 shall be applied when it is required in the relevant specification. In this case the measurement result may not be the same as that measured by the multi-point measurement with the head-still condition shown in Figure 2.

When the designed viewing point is not put on the centre line, the measuring layout shall be modified as in Figure 5. The position (the viewing distance, and the vertical and horizontal offset distance from the centre line or vertical and horizontal viewing directions) of the designed viewing point shall be noted in the report. The stereoscopic display can be tilted vertically or turned horizontally for the measurement. When a different measuring layout is used, the detail of the layout shall be noted in the report.

NOTE When the display module is set with some tilt and/or rotation, the horizontal and vertical axes defined in each measurement are parallel to the horizontal and vertical axes of the screen respectively.



#### Key

$l_M$ : measurement distance

NOTE The standard measuring layout is applied to the centre point measurement by the point-measurement LMD and the multi-point measurement by the two-dimensional LMD.

**Figure 1 – Standard measuring layout (side view, centre point measurement)**