

Irish Standard I.S. EN 62629-22-1:2013

3D display devices -- Part 22-1: Measuring methods for autostereoscopic displays - Optical (IEC 62629-22-1:2013 (EQV))

© CENELEC 2013 No copying without NSAI permission except as permitted by copyright law.

Dublin 9

| Incorporating amendments/corrigenda issued since publication: | Incorporating amendments/corrigenda issued since publication: |  |  |  |
|---|---|--|--|--|
|   |   |  |  |  |
|   |   |  |  |  |
|   |   |  |  |  |
|   |   |  |  |  |
|   |   |  |  |  |
|   |   |  |  |  |
|   |   |  |  |  |

The National Standards Authority of Ireland (NSAI) produces the following categories of formal documents:

I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

| This document replaces:   | This document is<br>EN 62629-22-1:20                          |   | <i>hed:</i><br>y, 2013          |
|---|---|---|---------------------------------|
| This document was publish<br>under the authority of the<br>28 May, 2013 | ned<br>NSAI and comes into effect on:                         | ·   | ICS number:<br>31.120<br>31.260 |
| NSAI<br>1 Swift Square,<br>Northwood, Santry                            | T +353 1 807 3800<br>F +353 1 807 3838<br>E standards@nsai.ie | <b>Sales:</b><br>T +353 1 857 6730<br>F +353 1 857 6729 |                                 |

Údarás um Chaighdeáin Náisiúnta na hÉireann

W NSALie

W standards.ie

**EUROPEAN STANDARD** 

EN 62629-22-1

NORME EUROPÉENNE EUROPÄISCHE NORM

May 2013

ICS 31.120; 31.260

English version

# 3D display devices Part 22-1: Measuring methods for autostereoscopic displays Optical

(IEC 62629-22-1:2013)

Dispositifs d'affichage 3D -Partie 22-1 : Méthodes de mesure des écrans autostéréoscopiques -Optique (CEI 62629-22-1:2013) 3D-Anzeigen -Teil 22-1: Messverfahren für autostereoskopische Anzeigen -Optisch (IEC 62629-22-1:2013)

This European Standard was approved by CENELEC on 2013-03-13. CENELEC 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 CENELEC 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 CENELEC member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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

### **CENELEC**

European Committee for Electrotechnical Standardization Comité Européen de Normalisation Electrotechnique Europäisches Komitee für Elektrotechnische Normung

Management Centre: Avenue Marnix 17, B - 1000 Brussels

EN 62629-22-1:2013

- 2 -

#### **Foreword**

The text of document 110/428/FDIS, future edition 1 of IEC 62629-22-1, prepared by IEC/TC 110 "Electronic display devices" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 62629-22-1:2013.

The following dates are fixed:

| • | latest date by which the document has<br>to be implemented at national level by<br>publication of an identical national<br>standard or by endorsement | (dop) | 2013-12-13 |
|---|---|-------|------------|
| • | latest date by which the national standards conflicting with the document have to be withdrawn  | (dow) | 2016-03-13 |

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

#### **Endorsement notice**

The text of the International Standard IEC 62629-22-1:2013 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standards indicated:

| IEC 61747-6:2004   | NOTE | Harmonised as EN 61747-6:2004 (not modified).      |
|--------------------|------|--|
| IEC 62341-6-1:2009 | NOTE | Harmonised as EN 62341-6-1:2011 (not modified).    |
| ISO 9241-302:2008  | NOTE | Harmonised as EN ISO 9241-302:2008 (not modified). |
| ISO 9241-305:2008  | NOTE | Harmonised as EN ISO 9241-305:2008 (not modified). |
| ISO 9241-306:2008  | NOTE | Harmonised as EN ISO 9241-306:2008 (not modified). |

EN 62629-22-1:2013

### Annex ZA

(normative)

# Normative references to international publications with their corresponding European publications

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.

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

| <u>Publication</u> | <u>Year</u> | <u>Title</u>  | EN/HD           | <u>Year</u> |
|--------------------|-------------|---|-----------------|-------------|
| IEC 62629-1-2 1)   | -           | 3D Display devices -<br>Part 1-2: Generic - Terminology and letter<br>symbols | EN 62629-1-2 1) | -           |
| CIE 15             | 2004        | Colorimetry   | -               | -           |
| CIE 69             | 1987        | Methods of characterizing illuminance meters and luminance meters             | -               | -           |

\_

<sup>1)</sup> At draft stage.

This is a free page sample. Access the full version online.

I.S. EN 62629-22-1:2013

This page is intentionally left BLANK.

#### - 2 - 62629-22-1 © IEC:2013

### CONTENTS

| FO | REWO                                  | DRD      |   | 5  |  |
|----|---------------------------------------|----------|---|----|--|
| 1  | Scope7                                |          |   |    |  |
| 2  | Norm                                  | ative re | eferences   | 7  |  |
| 3  | Terms, definitions and abbreviations7 |          |   |    |  |
|    | 3.1                                   |          | and definitions   |    |  |
|    | 3.2                                   |          | /iations  |    |  |
| 4  | _                                     |          | easuring conditions   |    |  |
|    | 4.1                                   |          | ard environmental conditions  |    |  |
|    |                                       | 4.1.1    | Temperature, humidity and pressure conditions   |    |  |
|    |                                       | 4.1.2    | Illumination conditions   |    |  |
|    | 4.2                                   |          | neasuring device  |    |  |
|    |                                       | 4.2.1    | General   |    |  |
|    |                                       | 4.2.2    | Aperture size   |    |  |
|    | 4.3                                   |          | ring setup  |    |  |
|    |                                       | 4.3.1    | Designed viewing distance   |    |  |
|    |                                       | 4.3.2    | Measurement area  |    |  |
|    |                                       | 4.3.3    | Measuring layout  | 10 |  |
|    | 4.4                                   | Test si  | gnal  | 12 |  |
|    | 4.5                                   | Standa   | ard measuring points  | 13 |  |
| 5  | Meas                                  | suring m | nethod for two-view/multi-view displays   | 14 |  |
|    | 5.1                                   | Maxim    | um luminance direction  | 14 |  |
|    |                                       | 5.1.1    | General   | 14 |  |
|    |                                       | 5.1.2    | Measuring equipment   | 14 |  |
|    |                                       | 5.1.3    | Measuring conditions  | 15 |  |
|    |                                       | 5.1.4    | Measuring procedure   | 15 |  |
|    |                                       | 5.1.5    | Measurement report  | 15 |  |
|    | 5.2                                   | Lobe a   | ingle and lobe angle variation on screen  | 16 |  |
|    |                                       | 5.2.1    | General   | 16 |  |
|    |                                       | 5.2.2    | Measuring equipment   | 16 |  |
|    |                                       | 5.2.3    | Measuring conditions  | 16 |  |
|    |                                       | 5.2.4    | Measuring procedure   | 16 |  |
|    |                                       | 5.2.5    | Measurement report  | 16 |  |
|    | 5.3                                   | Lumina   | ance, screen luminance uniformity, and angular luminance variation                                    |    |  |
|    |                                       | 5.3.1    | Luminance and screen luminance uniformity   | 17 |  |
|    |                                       | 5.3.2    | Angular luminance variation   | 19 |  |
|    | 5.4                                   |          | chromaticity, white chromaticity uniformity on screen, and white aticity variation in angle           | 20 |  |
|    |                                       | 5.4.1    | White chromaticity and white chromaticity uniformity on screen  | 20 |  |
|    |                                       | 5.4.2    | White chromaticity angular variation  | 21 |  |
|    | 5.5                                   |          | sstalk (luminance components ratio), 3D crosstalk variation on screen, ) crosstalk variation in angle | 23 |  |
|    |                                       | 5.5.1    | 3D crosstalk (luminance components ratio) and 3D crosstalk variation on screen                        | 23 |  |
|    |                                       | 5.5.2    | 3D crosstalk angular variation  |    |  |
| 6  | Stand                                 | dard me  | easuring method for integral imaging displays (1-D/2-D)   |    |  |
|    | 6.1                                   | Genera   | al  | 26 |  |
|    | 6.2                                   | Lobe a   | ingle and lobe angle variation on screen  | 27 |  |

62629-22-1 © IEC:2013

- 3 -

| 6.3 Luminance, screen luminance uniformity, and angular luminance variatio                                      | n27 |
|---|-----|
| 6.3.1 Luminance and screen luminance uniformity   |     |
| 6.3.2 Angular luminance variation   | 27  |
| 6.4 White chromaticity, white chromaticity uniformity on screen, and white chromaticity variation in angle      | 27  |
| 6.4.1 White chromaticity and white chromaticity uniformity on screen  | 27  |
| 6.4.2 White chromaticity variation in angle   | 27  |
| Annex A (informative) Principle of autostereoscopic display   | 28  |
| Annex B (informative) Angular profile of luminance  | 32  |
| Bibliography  | 33  |
| Figure 1 – Measuring system   |     |
| Figure 2 – Measuring layout for centre point measurement  | 10  |
| Figure 3 – Measuring layout for multi-point measurement (side view)   | 11  |
| Figure 4 – Other measuring layout for multi-point measurement (side view)                                       | 11  |
| Figure 5 – Measuring layout for horizontal viewing direction dependency   | 12  |
| Figure 6 – Measuring layout for vertical viewing direction dependency   | 12  |
| Figure 7 – Two examples of the relation between pixel and lenslet in multi-view dis (number of views is N)      |     |
| Figure 8 – Measuring points for the centre and multi-point measurement  | 14  |
| Figure 9 – Example of <i>n</i> by <i>m</i> measuring points   | 14  |
| Figure 10 – Example of measurement results for angular luminance profile  | 15  |
| Figure 11 – Example of lobe angle measurement   | 17  |
| Figure 12 – Example of 3D crosstalk variation on screen   | 23  |
| Figure 13 – Example of acquired images in multi-view display  | 24  |
| Figure 14 – Spatial luminance data acquirement (left) and example of calculated spatial crosstalk graph (right) | 25  |
| Figure A.1 – Structure of two-view display  | 28  |
| Figure A.2 – Basic principle of two-view display  |     |
| Figure A.3 – Structure of multi-view display  | 29  |
| Figure A.4 – Basic principle of multi-view display  | 30  |
| Figure A.5 – Basic principle of integral imaging display  | 31  |
| Figure B.1 – Example of angular profile of luminance  |     |
| Table 1 – Example of reported specification of two dimensional LMD  | 9   |
| Table 2 – Example of measurement results for maximum luminance direction  | 16  |
| Table 3 – Example of measurement results for lobe angle variation on screen                                     | 17  |
| Table 4 – Example of measurement results for luminance and screen luminance no uniformity                       |     |
| Table 5 – Example of measurement results for angular luminance variation  | 20  |
| Table 6 – Example of measurement results for white chromaticity and white chromaticity uniformity on screen     | 21  |
| Table 7 – Example of measurement results for white chromaticity variation in angle                              |     |
| Table 8 – Example of measurement results for 3D crosstalk variation on screen                                   |     |
| Table 9 – Example of measurement results for 3D crosstalk angular variation                                     |     |

This is a free page sample. Access the full version online.

#### I.S. EN 62629-22-1:2013

| <b>-4-</b>                                 | 62629-22-1 © IEC:2013 |
|--|-----------------------|
| Table B.1 – Example of measurement results | 32                    |

62629-22-1 © IEC:2013

- 5 -

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

#### 3D DISPLAY DEVICES -

# Part 22-1: Measuring methods for autostereoscopic displays – Optical

#### **FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62629-22-1 has been prepared by IEC technical committee 110: Electronic display devices.

The text of this standard is based on the following documents:

| FDIS         | Report on voting |
|--------------|------------------|
| 110/428/FDIS | 110/455/RVD      |

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC 62629 series, under the general title 3D display devices, can be found on the IEC website.

**-6-**

62629-22-1 © IEC:2013

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- · reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

62629-22-1 © IEC:2013

**-7-**

#### 3D DISPLAY DEVICES -

## Part 22-1: Measuring methods for autostereoscopic displays – Optical

#### 1 Scope

This part of IEC 62629-22 specifies optical measuring methods for autostereoscopic display devices. It defines general measuring procedures for optical characteristics of two-view and multi-view displays and integral imaging displays.

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

CIE 15:2004, Colorimetry, 3rd Edition

CIE 69:1987, Methods of characterizing illuminance meters and luminance meters

#### 3 Terms, definitions and abbreviations

#### 3.1 Terms and definitions

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

#### 3.2 Abbreviations

For the purposes of this document, the following abbreviations apply.

| Abbreviation | Definition                          |
|--------------|-------------------------------------|
| CCD          | charge-coupled device               |
| DVD          | designed viewing distance           |
| FWHM         | full width half maximum             |
| FWTQM        | full width at three-quarter maximum |
| LMD          | light measuring device              |

-

<sup>1</sup> To be published.



**Product Page** 

- Dooking for additional Standards? Visit Intertek Inform Infostore
- Dearn about LexConnect, All Jurisdictions, Standards referenced in Australian legislation