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Prikazovalniki s tekočimi kristali - 6-2. del: Merilne metode za module prikazovalnikov s tekočimi kristali - Odsevni tip

Liquid crystal display devices - Part 6-2: Measuring methods for liquid crystal display modules - Reflective type

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Dispositifs d'affichage à cristaux liquides - Partie 6-2 : Méthodes de mesure pour les modules d'affichage à cristaux liquides - Type réfléchible

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ICS:

31.120	Elektronske prikazovalne naprave	Electronic display devices
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 61747-6-2

August 2011

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English version

**Liquid crystal display devices -
Part 6-2: Measuring methods for liquid crystal display modules -
Reflective type
(IEC 61747-6-2:2011)**

Dispositifs d'affichage à cristaux liquides -
Partie 6-2: Méthodes de mesure pour les
modules d'affichage à cristaux liquides -
Type réflexible
(CEI 61747-6-2:2011)

Flüssigkristall-Anzeige-Bauelemente -
Teil 6-2: Messverfahren für Flüssigkristall-
Anzeigemodule -
Reflektive Ausführung
(IEC 61747-6-2:2011)

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This European Standard was approved by CENELEC on 2011-07-15. 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 Central Secretariat or to any CENELEC member.

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CENELEC

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

Foreword

The text of document 110/281/FDIS, future edition 1 of IEC 61747-6-2, prepared by IEC TC 110, Flat panel display devices, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61747-6-2 on 2011-07-15.

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

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2012-04-15
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2014-07-15

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61747-6-2:2011 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:

- [19] IEC 61747-6 NOTE Harmonized as EN 61747-6
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- [20] ISO 9241-7 NOTE Harmonized as EN ISO 9241-7
- [21] ISO 13406-2 NOTE Harmonized as EN ISO 13406-2.
- [23] IEC 61747-1 NOTE Harmonized as EN 61747-1.
- [24] IEC 61747-5 NOTE Harmonized as EN 61747-5.
-

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

The following referenced documents are indispensable for the application 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.

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>	<u>EN/HD</u>	<u>Year</u>
ISO 11664-2	2007	Colorimetry - Part 2: CIE standard illuminants	EN ISO 11664-2	2011
CIE 15.2	-	CIE Recommendations on Colorimetry	-	-
CIE 17.4	-	International Lighting Vocabulary	-	-
CIE 38	-	Radiometric and photometric characteristics of- materials and their measurement	-	-
CIE 1931	-	CIE XYZ colour space	-	-
CIE 1976	-	CIE LAB colour space	-	-

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Edition 1.0 2011-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE



Liquid crystal display devices –
Part 6-2: Measuring methods for liquid crystal display modules – Reflective type
(standards.iteh.ai)

Dispositifs d'affichage à cristaux liquides –
Partie 6-2: Méthodes de mesure pour les modules d'affichage à cristaux liquides –
Type réfléchible
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIQUID CRYSTAL DISPLAY DEVICES –

**Part 6-2: Measuring methods for liquid crystal display modules –
Reflective type**

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.
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International Standard IEC 61747-6-2 has been prepared by IEC technical committee 110: Flat panel display devices.

This standard should be read together with the generic specification to which it refers.

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

FDIS	Report on voting
110/281/FDIS	110/299/RVD

Full information on the voting for the approval on 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 61747 series, under the general title *Liquid crystal display devices*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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INTRODUCTION

In order to achieve a useful and uniform description of the performance of these devices, specifications for commonly accepted relevant parameters are put forward. These fall into the following categories:

- a) general type specification (e.g. pixel resolution, diagonal, pixel layout);
- b) optical specification (e.g. contrast ratio, response time, viewing direction, crosstalk, etc.);
- c) electrical specification (e.g. power consumption, EMC);
- d) mechanical specification (e.g. module geometry, weight);
- e) specification of passed environmental endurance test;
- f) specification of reliability and hazard / safety.

In most of the above cases, the specification is self-explanatory. For some specification points however, notably in the area of optical and electrical performance, the specified value may depend on the measuring method.

It is assumed that all measurements are performed by personnel skilled in the general art of radiometric and electrical measurements as the purpose of this standard is not to give a detailed account of good practice in electrical and optical experimental physics. Furthermore, it must be assured that all equipment is suitably calibrated as is known to people skilled in the art and records of the calibration data and traceability are kept.

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LIQUID CRYSTAL DISPLAY DEVICES –

Part 6-2: Measuring methods for liquid crystal display modules – Reflective type

1 Scope

This part of IEC 61747 gives details of the quality assessment procedures, the inspection requirements, screening sequences, sampling requirements, and test and measurement procedures required for the assessment of liquid crystal display modules.

This standard is restricted to reflective liquid crystal display-modules using either segment, passive or active matrix and a-chromatic or colour type LCDs (see Note). Furthermore, the reflective modes of transfective LCD modules with backlights OFF and reflective LCD modules of front light type without its front-light-unit, are comprised in this standard. A reflective LCD module with combination of a touch-key-panel or a front-light-unit is out of the scope of this standard, because its measurements are frequently inaccurate. Its touch-key-panel or front-light-unit should be removed before it can be included in this scope.

NOTE Several points of view with respect to the preferred terminology on "monochrome", "achromatic", "chromatic", "colour", "full-colour", etc. can be encountered in the field amongst spectroscopists, (general-) physicists, colour-perception scientists, physical engineers and electrical engineers. In general, all LCDs demonstrate some sort of chromaticity (e.g. as function of viewing angle, ambient temperature or externally addressable means). Pending detailed official description of the subject, the pre-fix pertaining to the "chromaticity" of the display will be used so as to describe the colour capability of the display that is externally (and electrically) addressable by the user. This leads us to the following definitions (see also [19])

- SIST EN 61747-6-2:2011
0abcc8f1508a/sist-en-61747-6-2-2011
- a) a monochrome display has NO user-addressable chromaticity ("colours"). It may or may not be "black and white" or a-chromatic;
 - b) a colour display has at least two user-addressable chromaticities ("colours"). A 64-colour display has 64 addressable colours (often made using 2 bits per primary for 3 primaries), etc. A full-colour display has at least 6 bits per primary (≥ 260 thousand colours).

The purpose of this standard is to indicate and list the procedure-dependent parameters and to prescribe the specific methods and conditions that are to be used for their uniform numerical determination.

2 Normative references

The following referenced documents are indispensable for the application 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.

ISO 11664-2:2007, *Colorimetry – Part 2: CIE standard illuminants*

CIE 15.2, *CIE Recommendations on Colorimetry*

CIE 17.4, *International Lighting Vocabulary*

CIE 38, *Radiometric and photometric characteristics of materials and their measurement*

CIE 1931, *CIE XYZ colour space*

CIE 1976, *CIE LAB colour space*

3 Illumination and illumination geometry

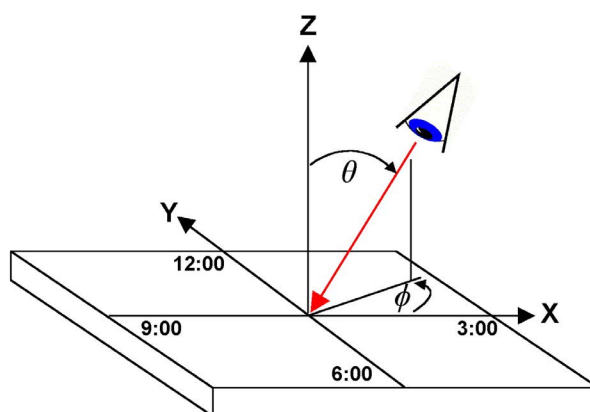
3.1 General comments and remarks on the measurement of reflective LCDs

Reflective LCDs make use of the ambient illumination to display visual information; often, they do not possess their own integrated source of illumination. It is difficult to achieve the required significance and reproducibility of the results of measurements because of the close coupling between the apparatus providing the illumination, the LMD (light measuring device) and the device under test (DUT). This dependence of results on the instrumentation implies that e.g. the contrast of reflective LCDs is not an intrinsic property of the device itself, but the contrast can only be evaluated under specific and well defined conditions for illumination and detection [3]¹, [4], [5], [6], [7], [8] ..[.].

This part describes a selection of different geometries suitable for measuring and characterizing reflective LCDs as a function of the direction of observation (i.e. viewing-direction = direction of measurement), as examples. The range of geometries for illumination of the DUT and detection of the light reflected from the DUT shall not be limited to the examples presented here. A set of parameters provides detailed specification of the conditions that are used for measurement of the electro-optical characteristics as listed below.

3.2 Viewing-direction coordinate system

The viewing-direction is the direction under which the observer looks at the spot of interest on the display. During the measurement the light-measuring device replaces the observer, looking from the same direction at a specified spot (i.e. measuring spot, measurement field) on the DUT. The viewing-direction is conveniently defined by two angles: the angle of inclination θ (related to the surface normal of the DUT) and the angle of rotation ϕ (also called azimuth angle) as illustrated in Figure 1. The azimuth angle is related with the directions on a watch-dial as follows: refer to $\phi = 0^\circ$ as the 3 o'clock direction ("right"), to $\phi = 90^\circ$ as the 12 o'clock direction ("top"), $\phi = 180^\circ$ as the 9 o'clock direction ("left") and to $\phi = 270^\circ$ as the 6 o'clock direction ("bottom").



IEC 951/11

Figure 1 – Representation of the viewing-direction (equivalent to the direction of measurement) by the angle of inclination, θ and the angle of rotation (azimuth angle), ϕ in a polar coordinate system

¹ Figures in square brackets refer to the bibliography.