SLOVENSKI STANDARD

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Prikazalniški elementi s tekočimi kristali in polprevodniki – 6. del: Merilne metode za module s tekočimi kristali – Presojni tip (IEC 61747-6:2004)

Liquid crystal and solid-state display devices – Part 6: Measuring methods for liquid crystal modules – Transmissive type (IEC 61747-6:2004)

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Liquid crystal and solid-state display devices
Part 6: Measuring methods for liquid crystal modules – Transmissive type
(IEC 61747-6:2004)

Dispositifs d'affichage à cristaux liquides et à semiconducteurs
Partie 6: Méthodes de mesure pour les modules à cristaux liquides - Type transmissif
(CEI 61747-6:2004)

Flüssigkristall- und Halbleiter-Anzeige-Bauelemente
Teil 6: Messverfahren für Flüssigkristall-Module – Transmissive Ausführung
(IEC 61747-6:2004)

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

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Foreword

The text of document 110/13/FDIS, future edition 1 of IEC 61747-6, 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 on 2004-05-01.

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) 2005-02-01

– latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2007-05-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61747-6:2004 was approved by CENELEC as a European Standard without any modification.

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

Publication	Year	Title	EN/HD	Year
ISO 13406-1	1999	Ergonomic requirements for work with visual displays based on flat panels Part 1: Introduction	EN ISO 13406-1	1999
ISO 13406-2	2001	Part 2: Ergonomic requirements for flat panel displays	EN ISO 13406-2	2001

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Partie 6: Méthodes de mesure pour les modules à cristaux liquides – Type transmissif

Liquid crystal and solid-state display devices –

Part 6: Measuring methods for liquid crystal modules – Transmissive type

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIQUID CRYSTAL AND SOLID-STATE DISPLAY DEVICES –

Part 6: Measuring methods for liquid crystal modules – Transmissive type

FOREWORD

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

This part of IEC 61747 series completes the full revision of IEC 60747-5(1992) and its amendments.

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

FDIS	Report on voting
110/13/FDIS	110/19/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.

This standard should be read in conjunction with IEC 61747-1.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

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

LIQUID CRYSTAL AND SOLID-STATE DISPLAY DEVICES –

Part 6: Measuring methods for liquid crystal modules – Transmissive type

1 Scope and object

This part of IEC 61747 gives details of the quality assessment procedures, 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 transmissive liquid crystal display (LCD) modules using either segment, passive or active matrix and achromatic or colour type LCDs (see Clause 3, chromaticity and pixel definitions) that are equipped with their own integrated source of illumination or without their own source of illumination.

For both rear projection-display systems and front projection-display systems, optical performance on the screen is not only determined by the panel performance as described in this standard, but also by the lighting system, such as the projection lens, screen, light filter, etc. Therefore, this standard is not applicable to such projection-display systems. (Nevertheless, for the determination of "on the screen" optical performance of rear projection-display systems, this standard may be used as a guideline).

In order to achieve a useful and uniform description of the performance of the display devices covered in this standard, specifications for commonly accepted relevant parameters are provided and fall into the following categories:

a) general type (e.g. pixel resolution, diagonal, pixel layout);

b) optical (e.g. contrast ratio, response time, viewing direction, cross-talk, etc.);

c) electrical (e.g. power consumption, EMC);

d) mechanical (e.g. module geometry, weight);

e) passed environmental endurance test;

f) reliability and hazard/safety.

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

The object 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.

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, all equipment needs to be suitably calibrated by competent personnel, and records of the calibration data and traceability need to be kept.

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 13406-1:1999, *Ergonomic requirements for work with visual displays based on flat panels – Part 1: Introduction*

ISO 13406-2:2001, *Ergonomic requirements for work with visual displays based on flat panels – Part 2: Ergonomic requirements for flat panel displays*

3 Chromaticity and pixel definitions

Several points of view with respect to the preferred terminology concerning "monochrome", "achromatic", "chromatic", "colour", "full-colour", etc. can be encountered in the field amongst spectroscopists, physicists, colour-perception scientists, physical engineers and electrical engineers. In general, all LCDs demonstrate some sort of chromaticity (e.g. as a 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 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 ISO 13406-1, Chapter 3: Terminology):

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), etc. A full-colour display has at least 6 bits per primary (≥ 260 000 colours).

Within this document, the official definition of pixel is employed, which may or may not include a multitude of constituent dots.

4 Standard measuring conditions

4.1 Standard measurement equipment and setup

4.1.1 High resolution matrix displays (≥ 320 × 240 pixels)

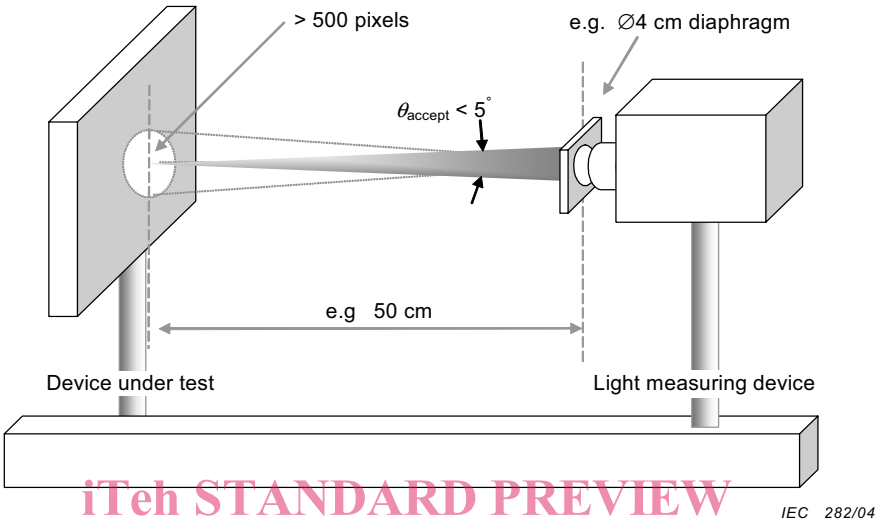

Figure 1 – Measuring system and its configuration

Three different instruments may be applied to the measurements of the light transmitted and/or reflected by the device under test (DUT): a luminance meter, tristimulus photometer or a spectro-radiometer. The optical system is schematically shown in Figure 1 and shall allow for measurement of well-defined spot sizes (field of view) on the DUT. When measuring matrix displays, these meters should be set to a circular or rectangular field of view that includes more than 500 pixels on the display under normal observation (the standard measurement direction). The total acceptance angle of detection by these meters, θ_{accept}, shall be less than 5° (see Figure 1). This can be obtained, for example, by use of a measuring distance between the meters and display area centre of 50 cm (recommended) and a diameter of the detector pupil of 4 cm; see Figure 1. If measuring segment displays, the field of view should be set to a single segment, and not include any of its surroundings.

Viewing direction and angle range are given by polar coordinates θ and φ as defined in Figure 2. $\theta_{\varphi} = 0$ is referred to as the 3 o'clock direction (the "right"), $\theta_{\varphi} = 90$ as the 12 o'clock direction ("upward"), $\theta_{\varphi} = 180$ as the 9 o'clock direction ("left") and $\theta_{\phi} = 270$ as the 6 o'clock ("bottom"). In the standard measurement direction, the photometer observes the DUT under vertical viewing angle ($\theta = 0°$). While scanning θ and/or φ, the centre of the measuring spot on the DUT shall stay fixed.