

# INTERNATIONAL STANDARD

**IEC**  
**61966-5**

First edition  
2000-10

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## Multimedia systems and equipment – Colour measurement and management –

### Part 5: Equipment using plasma display panels

*Systèmes et appareils multimédia –  
Mesure et gestion de la couleur –*

*Partie 5:  
Appareils utilisant des afficheurs à plasma*

*IEC 61966-5:2000*

*<https://standards.iteh.ai/en/standards/iec/61966-5:2000>*



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For graphical symbols, and letter symbols and signs approved by the IEC for general use, readers are referred to publications IEC 60027: *Letter symbols to be used in electrical technology*, IEC 60417: *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets* and IEC 60617: *Graphical symbols for diagrams*.

\* See web site address on title page.

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Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

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**INTERNATIONAL ELECTROTECHNICAL COMMISSION**

**MULTIMEDIA SYSTEMS AND EQUIPMENT –  
COLOUR MEASUREMENT AND MANAGEMENT –**

**Part 5: Equipment using plasma display panels**

**FOREWORD**

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The 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 the 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 National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 61966-5 has been prepared by IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

FDIS	Report on voting
100/148/FDIS	100/166/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 3.

Annex A is for information only.

IEC 61966 consists of the following parts, under the general title: Multimedia systems and equipment – Colour measurement and management:

Part 1: General

Part 2-1: Colour management – Default RGB colour space – sRGB

Part 3: Equipment using cathode ray tubes

Part 4: Equipment using liquid crystal display panels



# MULTIMEDIA SYSTEMS AND EQUIPMENT – COLOUR MEASUREMENT AND MANAGEMENT –

## Part 5: Equipment using plasma display panels

### 1 Scope

A series of methods and parameters for colour measurements and management for use in multimedia systems and equipment is applicable to the assessment of colour production and reproduction. This part of IEC 61966 deals with equipment using plasma display panels (PDP) to display colour images for use in multimedia applications.

The methods of measurement standardized in this part of IEC 61966 are designed to make possible the objective performance assessment and characterization of colour reproduction of PDP displays which accept red – green – blue analogue or digital signals from electrical input terminals and output colour images on PDP display screens. For PDP displays to which analogue signals are applicable, the corresponding digital signals are taken into account. The measured results are intended to be used for the purpose of equipment specific colour control in order to attain colour management in open multimedia systems.

This part of IEC 61966 defines input test signals, measurement conditions, methods of measurement and reporting of the measured data, so as to make possible the colour management and comprehensive comparison of the results of measurements.

Colour control within equipment is outside the scope of this part of IEC 61966. It does not specify limiting values for various parameters.

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of 61966. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of 61966 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050-845:1987, *International Electrotechnical Vocabulary (IEV) – Chapter 845: Lighting* / CIE 17.4: 1987, *International Lighting Vocabulary (joint IEC/CIE publication)*

IEC 61966-3:2000, *Multimedia systems and equipment – Colour measurement and management – Part 3: Equipment using cathode ray tubes*

ISO 5-4:1995, *Photography – Density measurements – Part 4: Geometric conditions for reflection density*

ISO 9241-8:1997, *Ergonomic requirements for office work with visual display terminals (VDTs) – Part 8: Requirements for displayed colours*

ISO/CIE 10526:1999, *CIE standard illuminants for colorimetry*

ISO/CIE 10527:1991, *CIE standard colorimetric observers*

CIE 15.2:1986, *Colorimetry*



### 3 Terms and definitions

For the purpose of this part of IEC 61966, the definitions of IEC 60050-845/CIE 17.4, as well as the following definitions, apply.

#### 3.1

##### **background**

image on a screen of the PDP display other than the interested area of a colour patch

#### 3.2

##### **colour control**

effort to convert equipment dependent colour image data to equipment independent data for a specific colour space including tone characteristics

#### 3.3

##### **colour patch, test area**

square colour image on a screen of the PDP display subject to be measured for colour reproduction, in which input data for the red, green and blue channels are kept constant within the image area

#### 3.4

##### **CRT**

colorimetrically well-controlled equipment using cathode ray tubes to present colour images with digital inputs for reference

#### 3.5

##### **PDP display**

any multimedia equipment using plasma display panels to present colour images

#### 3.6

##### **effective screen height**

vertical dimension of the effective screen area

#### 3.7

##### **effective screen area**

area where a picture can be produced

#### 3.8

##### **normalized (image) signal**

input signal normalized by its full scale value, whose level is of interest in calculation and evaluation of colour control function within PDP display, see also equation (1)

#### 3.9

##### **uncertainty (of measurement)**

parameter, associated with the result of a measurement, that characterizes the dispersion of the values that could reasonably be attributed to the particular quantity subject to measurement

See also [16]<sup>1)</sup>.

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<sup>1)</sup> Figures in square brackets refer to the bibliography.

## 4 Letters and symbols

The notations consistently adopted in this part of IEC 61966 are summarized below.

$A$	display area ratio
$N$	number of bits in digital data for each channel
$M$	maximum integer for non-negative $N$ -bit system; $M = 2^{N-1}$
$D_R$	digital data applied to red channel
$D_G$	digital data applied to green channel
$D_B$	digital data applied to blue channel
$R$	normalized input level to red channel
$G$	normalized input level to green channel
$B$	normalized input level to blue channel
$X$	one of measured raw data using spectroradiometers and colorimeters corresponding to tristimulus values
$Y$	one of measured raw data using spectroradiometers and colorimeters corresponding to tristimulus values in candela per square metre
$Z$	one of measured raw data using spectroradiometers and colorimeters corresponding to tristimulus values
$R'$	linearized data for red channel taking into account the tone characteristics of the channel
$G'$	linearized data for green channel taking into account the tone characteristics of the channel
$B'$	linearized data for blue channel taking into account the tone characteristics of the channel
$X'$	one of the tristimulus values normalized by $Y_n$ (candela per square metre) for peak white
$Y'$	one of the tristimulus values normalized by $Y_n$ (candela per square metre) for peak white
$Z'$	one of the tristimulus values normalized by $Y_n$ (candela per square metre) for peak white

## 5 Conditions

### 5.1 Environmental conditions

All measurements specified in this standard shall be carried out in a dark room. Particular attention should be paid to reflected illumination caused by the ambient objects (desktop, wall, etc.) and to direct illumination from light-emitting indicators of measuring instruments.

A 1 h warm-up time should precede the measurements in 7.2, 9.2, 10.2, 11.2 and 14.2, if not specified by the manufacturer of the equipment.

The mains voltage and frequency shall be at the rated values specified by the manufacturer of a PDP display. When the mains voltage fluctuates, a regulated power supply should be used to maintain the supply voltage within  $\pm 5\%$  of the rated value.

Other environmental conditions such as room temperature and relative humidity shall be reported together with the results of the measurements.

If additional environmental conditions are described in the manufacturer's specifications, these should also be taken into account.

## 5.2 Conditions of measurements

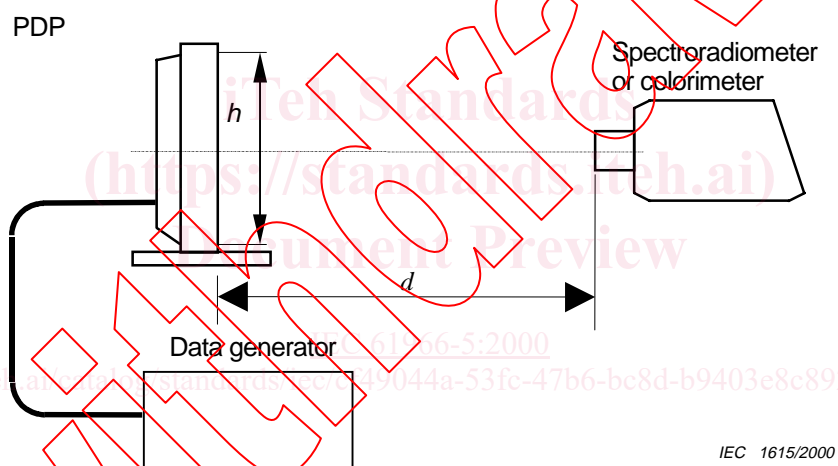
Contrast, brightness and additional adjustments shall be set to the preset positions specified by the manufacturer of the PDP display under measurement. When the adjustment is set to a position other than the preset, the position or corresponding value should be reported with the results of the measurements.

The equipment arrangement for non-contact measurements should be as shown in figure 1. It incorporates a spectroradiometer or a non-contact colorimeter, depending on the characteristics to be measured. The instrument optical axis should be normal to the centre of the surface of the PDP display.

The distance  $d$  between the faceplate of the PDP display and the measuring instrument shall be  $4h$  or larger, where  $h$  is the effective screen height of the display.

NOTE 1 It is recommended to take precautions so that the measurement is not influenced by vibration and that there are no missing picture elements within the field of view of the measuring instrument.

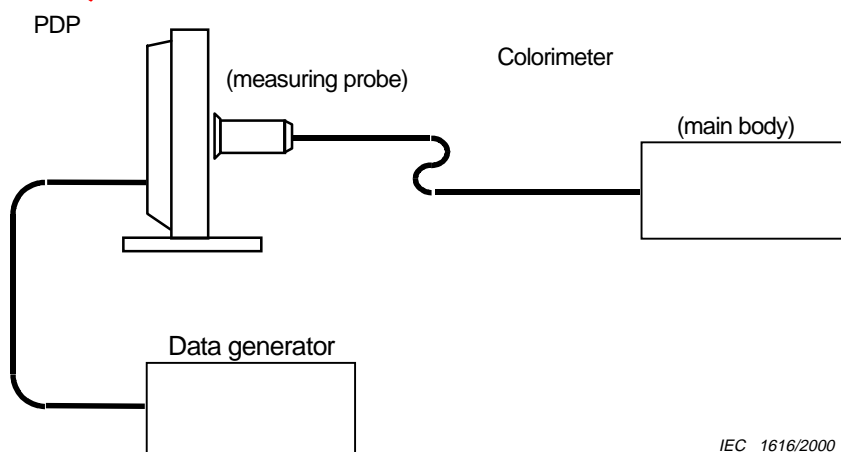
NOTE 2 The measurement area in the colour patch should include more than 500 picture elements.



IEC 1615/2000

Figure 1 – Equipment arrangement for non-contact measurements

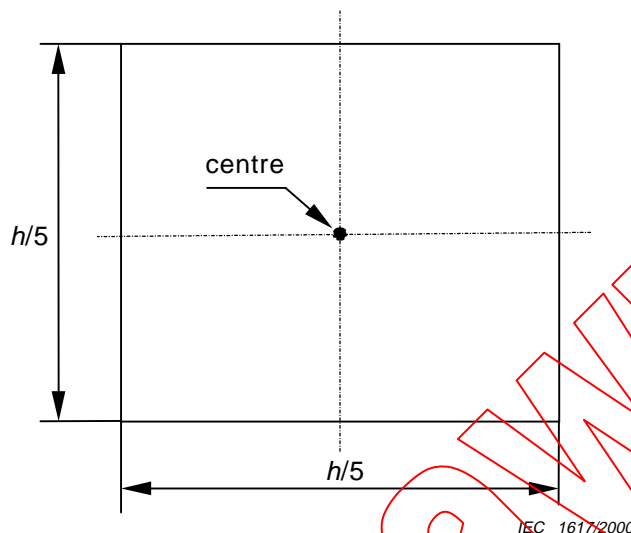
The equipment arrangement for contact measurements should be as shown in figure 2, where a measurement probe is placed on the faceplate of the PDP display.



IEC 1616/2000

Figure 2 – Equipment arrangement for contact measurements

Test signals applied to red, green and blue channels shall result in a colour patch of the size shown in figure 3 on the PDP display. The positioning of the colour patch shall be referred to by the centre as in figure 3. The background shall be black, unless otherwise specified.



$h$  the effective screen height

Figure 3 – Size of a colour patch

The area for measurement shall be circular, centred on the colour patch, with a diameter between  $0,05 h$  and  $0,15 h$ .

### 5.3 Input digital data

The relationship between input digital data,  $D_R$ ,  $D_G$ ,  $D_B$ , of  $N$  bits and corresponding normalized signal level for calculation shall be

$$\begin{aligned}
 R_i &= \frac{D_{R_i}}{2^N - 1} \\
 G_i &= \frac{D_{G_i}}{2^N - 1} \\
 B_i &= \frac{D_{B_i}}{2^N - 1}
 \end{aligned}
 \tag{1}$$

where an index  $i$  denotes the  $i$ -th measurement step.

NOTE When the input signal is applicable in analogue voltage, the signal level normalized by the maximum input voltage should correspond to the signal level for each step defined in equation (1).