

# INTERNATIONAL STANDARD

**IEC**  
**61966-6**

First edition  
2005-03

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

**Part 6:  
Front projection displays**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

**Part 6: Front projection displays**

**FOREWORD**

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International Standard IEC 61966-6 has been prepared by technical area 2: Colour measurement and management, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

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

| CDV         | Report on voting |
|-------------|------------------|
| 100/835/CDV | 100/915/RVC      |

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.

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 2-2: Colour management – Extended RGB colour space – scRGB

Part 3: Equipment using cathode ray tubes

Part 4: Equipment using liquid crystal display panels

Part 5: Equipment using plasma display panels

Part 6: Front projection displays

Part 7-1: Colour printers – Reflective prints – RGB inputs

Part 7-2: Colour printers - Reflective prints - CMYK inputs (under consideration)

Part 8: Multimedia colour scanners

Part 9: Digital cameras

Part 10: Quality assessment - Colour image in network systems (under consideration)

Part 11: Quality assessment - Impaired video in network systems (under consideration)

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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;
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- replaced by a revised edition, or
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A bilingual version of this publication may be issued at a later date.

## INTRODUCTION

The IEC 61966 series of standards defines methods and parameters for colour measurements and colour management for use in multimedia systems and equipment, applicable to colour production and reproduction. Part 6 deals with front projection displays.

The methods of measurement standardized in this part are designed to make possible the objective characterization of colour reproduction of front projection displays which accept red-green-blue analogue and/or digital signals from electrical input terminals and output light corresponding to the intended colour. 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 and should generally be adequate for this purpose. However, in some cases, it may be necessary to consider additional factors not addressed in this part of IEC 61966, such as the actual environment in which the front projection display will be used, to achieve the desired colour reproduction.

Readers of this standard are also encouraged to review IEC 61947-1 and IEC 61947-2, which apply to the measurement and documentation of key performance criteria for multimedia projectors.

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# MULTIMEDIA SYSTEMS AND EQUIPMENT – COLOUR MEASUREMENT AND MANAGEMENT –

## Part 6: Front projection displays

### 1 Scope

This part of IEC 61966 defines input test signals, measurement conditions, methods of measurement and reporting of the measured data, to be used for colour characterization and colour management of front projection displays in multimedia systems.

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

### 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.

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

IEC 61947 (all parts), *Electronic projection – Measurement and documentation of key performance criteria*

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

CIE 15.2:1986, *Colorimetry*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050-845 and CIE 17.4, as well as the following, apply.

#### 3.1 background

data corresponding to an image surrounding the target colour patch to be measured

#### 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 virtual screen of the front projection 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 effective screen height

vertical dimension of the effective screen area

### 3.6 effective screen area

area where a picture can be produced

### 3.7 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 front projection display (see also equation (1) in 5.3)

### 3.8 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 the IEC Guide to the expression of uncertainty in measurement, 1995)

### 3.9 virtual screen

perfect reflecting diffuser-to-image input data

## 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 $N$ -bits system; $M = 2^N - 1$   |
| $D_R$ | digital data applied for red channel   |
| $D_G$ | digital data applied for green channel   |
| $D_B$ | digital data applied for 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 document shall be carried out in a dark room. Particular attention should be paid to prevent reflected illumination caused by the ambient objects (desktop, wall, etc.) and direct illumination from light-emitting indicators of measuring instruments.

An hour warm-up time should precede this measurement, if not specified by the manufacturer of the equipment.

The mains voltage and frequency shall be at the rated value specified by the manufacturer. If the mains voltage fluctuates, a regulated power supply shall be used to maintain the supply voltage to 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 measurements.

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

### 5.2 Conditions for measurements

Contrast, brightness and additional adjustments shall be set to the preset positions specified by the manufacturer. If the adjustment is set to another position than the preset, the position or corresponding value shall be reported with the results of measurements.

Geometrical adjustment shall be set to default position.

The arrangement of equipment for measurements shall be as shown in Figure 1. It incorporates a spectroradiometer or a non-contact colorimeter, depending on the characteristics to be measured.

The diagonal image size on the screen shall be set to the preset size specified by the manufacturer. If no size is specified, it shall be set to 102 cm.

The height of front projection display ( $H$ ) and the distance between the screen and the head of the front projection display ( $L$ ) shall be set to the preset positions specified by the manufacturer. They depend on the screen size.