

Multimedia systems and equipment — Colour measurement and management —

Part 6: Front projection displays

The European Standard EN 61966-6:2006 has the status of a
British Standard

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee EPL/100, Audio, video and multimedia systems and equipment, which has the responsibility to:

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**Multimedia systems and equipment -
Colour measurement and management
Part 6: Front projection displays
(IEC 61966-6:2005)**

Systèmes et appareils multimédia -
Mesure et gestion de la couleur
Partie 6: Ecrans de projection frontale
(CEI 61966-6:2005)

Multimediasysteme und -geräte -
Farbmessung und Farbmanagement
Teil 6: Elektronische Projektoren für
Aufprojektion
(IEC 61966-6:2005)

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CENELEC

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Foreword

The text of the International Standard IEC 61966-6:2005, prepared by IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the formal vote and was approved by CENELEC as EN 61966-6 on 2006-03-01 without any modification.

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Endorsement notice

The text of the International Standard IEC 61966-6:2005 was approved by CENELEC as a European Standard without any modification.

CONTENTS

INTRODUCTION.....	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Letters and symbols	7
5 Conditions	8
5.1 Environmental conditions	8
5.2 Conditions for measurements.....	8
5.3 Input digital data.....	10
6 Measurement equipment.....	10
6.1 Spectroradiometer	10
6.2 Colorimeter	11
7 Spectral characteristics and intensity of the primaries and white	11
7.1 Characteristics to be measured.....	11
7.2 Measurement conditions	11
7.3 Method of measurement	12
7.4 Presentation of results	12
8 Basic colorimetric characteristics	13
8.1 Characteristics to be measured.....	13
8.2 Method of measurement	13
8.3 Presentation of results	14
9 Tone characteristics	14
9.1 Characteristics to be measured.....	14
9.2 Measurement conditions	14
9.3 Method of measurement	15
9.4 Presentation of results	15
10 Other characteristics.....	18
10.1 Inter-channel dependency.....	18
10.1.1 Characteristics to be measured	18
10.1.2 Measurement conditions	19
10.1.3 Method of measurement.....	19
10.1.4 Presentation of results	21
10.2 Spatial non-uniformity	22
10.2.1 Characteristics to be measured	22
10.2.2 Measurement conditions	22
10.2.3 Method of measurement.....	22
10.2.4 Presentation of results	26
Annex ZA (normative) Normative references to international publications with their corresponding European publications.....	30
Bibliography	29

Figure 1 – Equipment arrangement for measurements (side view).....	9
Figure 2 – Size of colour patch.....	9
Figure 3 – Example of the spectral radiance distributions $r(\lambda), g(\lambda), b(\lambda)$	12
Figure 4 – Measured points and interpolated curves	16
Figure 5 – Measurement points for spatial non-uniformity (25 points)	22
Figure 6 – Measurement points for spatial non-uniformity (9points)	24
Figure 7 – Measurement points for spatial non-uniformity (13 points)	25
Table 1 – Input data for peak primaries and peak white	12
Table 2 – Example of reporting form for colours in maximum excitations	13
Table 3 – Example of reporting form.....	14
Table 4 – Example set of basic normalized data for tone characteristics.....	17
Table 5 – Digital driving levels to generate colour patches for measurement of interchannel dependency	19
Table 6 – Example of normalized tristimulus values (matrix A)	21
Table 7 – Example of reporting form.....	27
Table 8 – Example of reporting form.....	27
Table 9 – Example of reporting form.....	28

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.

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 ± 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.

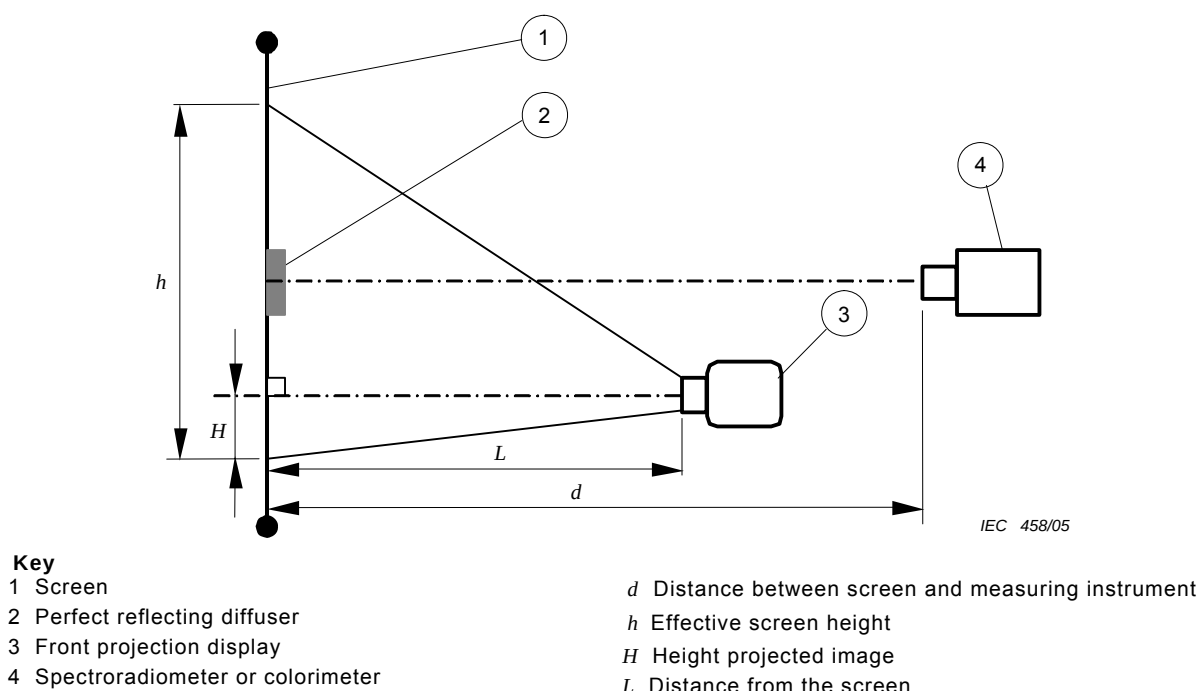


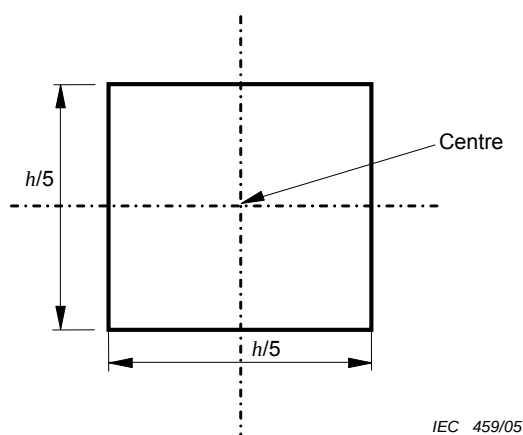
Figure 1 – Equipment arrangement for measurements (side view)

The instrument optical axis should be perpendicular to the screen. If another measurement angle is recommended by the manufacturer, it shall be reported together with the results of measurements. The distance d shall be $4h < d < 5,5h$.

A perfect reflecting diffuser shall be set on the centre of effective screen area.

The measured light shall be that reflected by a perfect reflecting diffuser.

Test signals applied to the red, green, and blue channels shall result in a colour patch of the size shown in Figure 2 on the screen. The positioning of the colour patch shall be referred to by the centre as in Figure 2. The background shall be black ($D_R = 0$, $D_G = 0$, $D_B = 0$), unless otherwise specified.



NOTE In the case where the appropriate relationship is confirmed, it is acceptable to measure luminous intensity direct instead of using the perfect reflecting diffuser.

Figure 2 – Size of colour patch