

# **Multimedia systems and equipment - Colour measurement and management Part 6: Front projection displays**

Multimedia systems and equipment - Colour  
measurement and management Part 6: Front  
projection displays

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 61966-6:2006 sisaldab Euroopa standardi EN 61966-6:2006 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 22.09.2006 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 61966-6:2006 consists of the English text of the European standard EN 61966-6:2006.</p> <p>This document is endorsed on 22.09.2006 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
--	---

<p><b>Käsitlusala:</b></p> <p>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.</p>	<p><b>Scope:</b></p> <p>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.</p>
--	--

**ICS** 17.180.20, 33.160.60

**Võtmesõnad:**

**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)

This European Standard was approved by CENELEC on 2006-03-01. 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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

**CENELEC**

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

**Central Secretariat: rue de Stassart 35, B - 1050 Brussels**

## 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.

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) 2007-03-01
- latest date by which the national standards conflicting  
with the EN have to be withdrawn (dow) 2009-03-01

Annex ZA has been added by CENELEC.

---

## Endorsement notice

The text of the International Standard IEC 61966-6:2005 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:

IEC 61966-2-1	NOTE Harmonized as EN 61966-2-1:2000 (not modified).
IEC 61966-3	NOTE Harmonized as EN 61966-3:2000 (not modified).
ISO 9241-8	NOTE Harmonized as EN ISO 9241-8:1997 (not modified).

## 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>
IEC 60050-845	1987	International Electrotechnical Vocabulary (IEV) Chapter 845: Lighting	-	-
IEC 61947	Series	Electronic projection - Measurement and documentation of key performance criteria	EN 61947	Series
ISO/CIE 10527	1991	CIE standard colorimetric observers	-	-
CIE 15.2	1986	Colorimetry	-	-

# INTERNATIONAL STANDARD

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

First edition  
2005-03

---

---

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

**Part 6:  
Front projection displays**



Reference number  
IEC 61966-6:2005(E)

## Publication numbering

As from 1 January 1997 all IEC publications are issued with a designation in the 60000 series. For example, IEC 34-1 is now referred to as IEC 60034-1.

## Consolidated editions

The IEC is now publishing consolidated versions of its publications. For example, edition numbers 1.0, 1.1 and 1.2 refer, respectively, to the base publication, the base publication incorporating amendment 1 and the base publication incorporating amendments 1 and 2.

## Further information on IEC publications

The technical content of IEC publications is kept under constant review by the IEC, thus ensuring that the content reflects current technology. Information relating to this publication, including its validity, is available in the IEC Catalogue of publications (see below) in addition to new editions, amendments and corrigenda. Information on the subjects under consideration and work in progress undertaken by the technical committee which has prepared this publication, as well as the list of publications issued, is also available from the following:

- **IEC Web Site** ([www.iec.ch](http://www.iec.ch))

- **Catalogue of IEC publications**

The on-line catalogue on the IEC web site ([www.iec.ch/searchpub](http://www.iec.ch/searchpub)) enables you to search by a variety of criteria including text searches, technical committees and date of publication. On-line information is also available on recently issued publications, withdrawn and replaced publications, as well as corrigenda.

- **IEC Just Published**

This summary of recently issued publications ([www.iec.ch/online\\_news/justpub](http://www.iec.ch/online_news/justpub)) is also available by email. Please contact the Customer Service Centre (see below) for further information.

- **Customer Service Centre**

If you have any questions regarding this publication or need further assistance, please contact the Customer Service Centre:

Email: [custserv@iec.ch](mailto:custserv@iec.ch)  
Tel: +41 22 919 02 11  
Fax: +41 22 919 03 00

# INTERNATIONAL STANDARD

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

First edition  
2005-03

---

---

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

### Part 6: Front projection displays

© IEC 2005 — Copyright - all rights reserved

No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Electrotechnical Commission, 3, rue de Varembé, PO Box 131, CH-1211 Geneva 20, Switzerland  
Telephone: +41 22 919 02 11 Telefax: +41 22 919 03 00 E-mail: [inmail@iec.ch](mailto:inmail@iec.ch) Web: [www.iec.ch](http://www.iec.ch)



Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

PRICE CODE

**U**

*For price, see current catalogue*



## CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope .....	7
2 Normative references .....	7
3 Terms and definitions .....	7
4 Letters and symbols .....	8
5 Conditions.....	9
5.1 Environmental conditions.....	9
5.2 Conditions for measurements.....	9
5.3 Input digital data.....	11
6 Measurement equipment.....	11
6.1 Spectroradiometer .....	11
6.2 Colorimeter .....	12
7 Spectral characteristics and intensity of the primaries and white .....	12
7.1 Characteristics to be measured.....	12
7.2 Measurement conditions .....	12
7.3 Method of measurement .....	13
7.4 Presentation of results.....	13
8 Basic colorimetric characteristics .....	14
8.1 Characteristics to be measured.....	14
8.2 Method of measurement .....	14
8.3 Presentation of results.....	15
9 Tone characteristics .....	15
9.1 Characteristics to be measured.....	15
9.2 Measurement conditions .....	15
9.3 Method of measurement .....	16
9.4 Presentation of results.....	16
10 Other characteristics.....	19
10.1 Inter-channel dependency.....	19
10.1.1 Characteristics to be measured .....	19
10.1.2 Measurement conditions .....	20
10.1.3 Method of measurement.....	20
10.1.4 Presentation of results .....	22
10.2 Spatial non-uniformity .....	23
10.2.1 Characteristics to be measured .....	23
10.2.2 Measurement conditions .....	23
10.2.3 Method of measurement.....	23
10.2.4 Presentation of results .....	27
Bibliography .....	30
Figure 1 – Equipment arrangement for measurements (side view).....	10
Figure 2 – Size of colour patch.....	10

Figure 3 – Example of the spectral radiance distributions $r(\lambda), g(\lambda), b(\lambda)$ .....	13
Figure 4 – Measured points and interpolated curves .....	17
Figure 5 – Measurement points for spatial non-uniformity (25 points) .....	23
Figure 6 – Measurement points for spatial non-uniformity (9points) .....	25
Figure 7 – Measurement points for spatial non-uniformity (13 points) .....	26
Table 1 – Input data for peak primaries and peak white .....	13
Table 2 – Example of reporting form for colours in maximum excitations .....	14
Table 3 – Example of reporting form.....	15
Table 4 – Example set of basic normalized data for tone characteristics.....	18
Table 5 – Digital driving levels to generate colour patches for measurement of interchannel dependency .....	20
Table 6 – Example of normalized tristimulus values (matrix A) .....	22
Table 7 – Example of reporting form.....	28
Table 8 – Example of reporting form.....	28
Table 9 – Example of reporting form.....	29

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

# MULTIMEDIA SYSTEMS AND EQUIPMENT – COLOUR MEASUREMENT AND MANAGEMENT –

## Part 6: Front projection displays

### 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.
- 2) The formal decisions or agreements of 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

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

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.

# 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