

# INTERNATIONAL STANDARD

# IEC 61947-2

First edition  
2001-09

---

---

## Electronic projection – Measurement and documentation of key performance criteria –

### Part 2: Variable resolution projectors

© IEC 2001 — 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 Geneva, Switzerland  
Telefax: +41 22 919 0300 e-mail: [inmail@iec.ch](mailto:inmail@iec.ch) IEC web site <http://www.iec.ch>



Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

PRICE CODE

X

*For price, see current catalogue*

## CONTENTS

FOREWORD .....	4
INTRODUCTION .....	6
1 Scope .....	7
2 Normative references .....	7
3 Definitions .....	8
4 General requirements .....	12
5 Light output measurement and specification .....	13
5.1 Light output specifications .....	14
5.1.1 Light output specification for projectors with a separate screen .....	14
5.1.2 Full-black light level specification .....	15
5.1.3 Luminance specification for devices with an integral screen .....	15
5.2 Light output uniformity .....	15
5.2.1 Example of a uniformity specification .....	15
5.3 Contrast ratio .....	15
5.4 Blanking measurement and specification .....	15
5.5 Effective blanking time .....	16
5.6 Blanking specification .....	16
6 Variable resolution projector characteristics .....	17
6.1 Visual resolution measurement and specification .....	17
6.1.1 Description and general requirements .....	17
6.1.2 Horizontal resolution .....	17
6.1.3 Vertical resolution .....	18
6.1.4 Procedure .....	18
6.2 Video frequency response specifications .....	20
6.2.1 Frequency response specifications .....	20
6.3 Viewing angle (half/gain) specification for devices with an integral screen .....	20
6.4 Input signal format compatibility .....	20
6.5 Response time .....	20
6.6 Colour measurements .....	21
6.6.1 Colour chromaticity .....	21
6.6.2 Colour uniformity .....	21
6.7 Keystone correction .....	22
7 Range of focus and image size .....	22
8 Audio characteristics .....	22
9 Light source specification .....	22
10 Noise: maximum sound level .....	23
11 Power consumption .....	23
12 Weight .....	23
13 Dimensions .....	23
14 Recommended practices .....	23
14.1 Recommended practice 1 – Sync hierarchy .....	23
14.2 Recommended practice 2 – DC restoration .....	23
14.3 Recommended practice 3 – Sync .....	24
14.4 Recommended practice 4 – Scan range labelling .....	24

Annex A (normative) Figures .....	25
Annex B (normative) Pattern generator specifications .....	29
Annex C (informative) Considerations in formulating this standard .....	30
C.1 General.....	30
C.2 Light output measurement.....	30
C.3 Visual resolution measurement.....	31
C.4 Possible causes for measurement errors .....	31
C.5 Input signal levels .....	31
Annex D (normative) Complete sample specification .....	33
Annex E (informative) Other issues, outside the scope of this standard, that may affect picture clarity.....	35
Annex F (informative) Possible causes of photometric measurement errors.....	36
F.1 Size of measured spot.....	36
F.2 Colour measurement.....	36
Annex G (normative) Alternative method for measuring resolution using the NIDL grille contrast method.....	37
Annex H (informative) Photometer precision and veiling glare .....	39
H.1 Photometer precision .....	39
H.2 Integration time .....	39
H.3 Veiling glare .....	39
Annex I (informative) Light measuring devices .....	41
Annex J (informative) Figure of merit for projection display colour gamut.....	42
Bibliography .....	44
Figure A.1 – Test patterns/measurements set-up .....	25
Figure A.2 – Thirteen-point measuring grid .....	26
Figure A.3 – Contrast measurement.....	26
Figure A.4 – Vertical alternating lines.....	26
Figure A.5 – Horizontal alternating lines.....	27
Figure A.6 – Resolution equipment set-up/depth of modulation measurement.....	27
Figure A.7 – Sync and blanking timing .....	28
Figure C.1 – Simulation of lowered resolution .....	32

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**ELECTRONIC PROJECTION –  
MEASUREMENT AND DOCUMENTATION  
OF KEY PERFORMANCE CRITERIA –**

**Part 2: Variable resolution projectors**

**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.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 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 61947-2 has been prepared by subcommittee 100C: Audio, video and multimedia subsystems and equipment, of 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
100/268/FDIS	100/418/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.

Annexes A, B, D, and G form an integral part of this standard.

Annexes C, E, F, H, I and J are for information only.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2004. At this date, the publication will be

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

## INTRODUCTION

This standard was developed to ensure a common, meaningful description of key performance parameters for variable resolution projectors (for example, CRT or laser projectors). The measurement methods and test signals correlate closely to typical uses involving computer-generated text and graphics displays. These measurements evaluate the actual viewable image that emanates from variable resolution projectors. The resulting performance specifications are conservative in nature and allow any display device to be used beyond its rated specifications with degraded performance. The point at which this degraded performance is no longer useful is highly subjective and strongly affected by the environment and the application.

This standard is designed to specify a means of measuring and quantifying the performance of variable resolution projectors and is not intended to provide design goals for manufacturers of such equipment.

# ELECTRONIC PROJECTION – MEASUREMENT AND DOCUMENTATION OF KEY PERFORMANCE CRITERIA –

## Part 2: Variable resolution projectors

### 1 Scope

This part of IEC 61947 specifies requirements for measuring and documenting key performance parameters for CRT and laser-based projectors and other variable resolution projectors that are capable of multiple variable resolutions and in which the image is raster-scanned.

The provisions of this standard are designed to codify the measurement of the performance of variable resolution projectors and are not intended to provide design goals for manufacturers of such equipment.

This standard is intended for variable resolution projectors (including projection displays that are capable of multiple variable resolutions) that are designed for use with primarily discrete colour (RGB) raster-scanned video, text, and graphics signals generated by computer equipment.

NOTE These devices may also accept composite or component television video signals encoded to NTSC/RS170A, PAL, SECAM, or future HDTV, or ATV standards, which are fully described in their respective documentation and are not within the scope of this part of IEC 61947. In this part of IEC 61947, all of these signals are referred to as television video (TV video) (see IEC 60107-1 [27]).

Displays with fixed resolutions (i.e. individual pixel light sources or matrix displays such as liquid crystal, DMD, plasma, or electroluminescent panels), are not fully addressed by this standard, and reference should be made to IEC 61947-1.

Factors outside the scope of this standard that may have a bearing on projector performance are listed in annex E. A discussion of considerations informing the development of standard appears in annex C.

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 61947. 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 IEC 61947 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*

IEC 61947-1, *Electronic projection – Measurement and documentation of key performance criteria – Part 1: Fixed resolution projectors<sup>1)</sup>*

---

<sup>1)</sup> To be published.

ISO 3741:1999, *Acoustics – Determination of sound power levels of noise sources using sound pressure – Precision methods for reverberation rooms*

ISO 7779:1999, *Acoustics – Measurement of airborne noise emitted by information technology and telecommunications equipment*