
Mechanical safety of cathode ray tubes (IEC 61965:2003)

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EUROPEAN STANDARD

EN 61965

NORME EUROPÉENNE

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Mechanical safety of cathode ray tubes
(IEC 61965:2003)

Sécurité mécanique
des tubes cathodiques
(CEI 61965:2003)

Mechanische Sicherheit
von Kathodenstrahlröhren
(IEC 61965:2003)

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This European Standard was approved by CENELEC on 2003-10-01. 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and 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 document 39364/FDIS, future edition 2 of IEC 61965, prepared by IEC TC 39, Electronic tubes, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61965 on 2003-10-01.

This European Standard supersedes EN 61965:2001.

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) 2004-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-10-01

The main change with respect to EN 61965:2001 is the inclusion of the requirements for cathode ray tubes with film attached to the face plate.

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annex ZA is normative and annexes A and B are informative.

Annex ZA has been added by CENELEC.

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The text of the International Standard IEC 61965:2003 approved by CENELEC as a European Standard without any modification.

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Annex ZA
(normative)

**Normative references to international publications
with their corresponding European publications**

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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 60065 (mod)	2001	Audio, video and similar electronic apparatus - Safety requirements	EN 60065	2002
IEC 60068-1 + corr. October + A1	1988 1988 1992	Environmental testing Part 1: General and guidance	EN 60068-1	1994
IEC 60216-1	2001	Electrical insulating materials - Properties of thermal endurance Part 1: Ageing procedures and evaluation of test results	EN 60216-1	2001
ISO 527-1 + corr. 1	1993 1994	Plastics - Determination of tensile properties Part 1: General principles	EN ISO 527-1	1996
ISO 527-3	1995	Part 3: Test conditions for films and sheets	EN ISO 527-3	1995
ISO 8510-1	1990	Adhesives - Peel test for a flexible-bonded-to-rigid test specimen assembly Part 1: 90 degree peel	EN 28510-1	1993

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INTERNATIONAL STANDARD

IEC 61965

Second edition
2003-07

Mechanical safety of cathode ray tubes

Sécurité mécanique des tubes cathodiques

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International Electrotechnical Commission, 3, rue de Varembe, 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 Web: www.iec.ch



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International Electrotechnical Commission
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

MECHANICAL SAFETY OF CATHODE RAY TUBES

FOREWORD

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International Standard IEC 61965 has been prepared by IEC technical committee 39: Electronic tubes.

This second edition cancels and replaces the first edition published in 2000. This second edition constitutes a technical revision.

The main change with respect to the previous edition is the inclusion of the requirements for cathode ray tubes with film attached to the face plate.

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

FDIS	Report on voting
39/264/FDIS	39/265/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 2.

The committee has decided that the contents of this publication will remain unchanged until 2005. At this date, the publication will be

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

INTRODUCTION

This International Standard sets forth test methods and limits for cathode ray tubes (CRTs). Originally, the only IEC standard for the mechanical safety of CRTs had been contained within Clause 18 of the equipment standard IEC 60065. Whereas that standard had been accepted and used by many countries, many others were not able to implement its requirements because of differing local needs. IEC 61965 was therefore published in 2000 with the aim of providing the basis for wider acceptance and use and reflecting the current IEC policy of producing separate component standards to which equipment standards can refer.

This 2nd edition covers the requirements for the CRTs with film attached to the faceplate as part of the safety implosion protection system.

Many years of experience had been built up in the use of both the IEC 60065 test and the other commonly used national alternatives. During the development of IEC 61965, extensive test programmes and ballistic and statistical calculations were carried out to verify that the requirements of the standard give protection for users of CRTs when the tubes are mounted in the equipment for which they are intended. This was also done to ensure that IEC 61965 maintains the stringent requirements of both IEC 60065 and the alternative tests in common use. These tests and calculations also confirmed

- a) the acceptability of one standard ball for the mechanical strength test, and
- b) the need for the implosion test where it is not always possible to induce rapid devacuation using the ball impact test.

As the impact tests in this standard are overstress tests, only the effect of rapid devacuation is evaluated and not subsequent relaxation of mechanical stresses in the CRT from the implosion protection system.

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MECHANICAL SAFETY OF CATHODE RAY TUBES

1 Scope

This International Standard is applicable to cathode ray tubes and cathode ray tube assemblies (hereinafter referred to as CRTs) which are intended for use as components in apparatus and which have integral protection with respect to the effects of implosion.

These requirements apply to CRTs intended for use in apparatus including electrical and electronic measuring and testing equipment, information technology equipment, medical equipment, telephone equipment, television equipment and other similar electronic apparatus.

This standard is intended to apply only to those CRTs in which the face of the CRT forms part of the enclosure for the apparatus. The test methods do not apply to CRTs which are protected by separate safety screens.

A CRT covered by this standard is intended to be installed in an enclosure designed both to protect the rear of the CRT against mechanical or other damage under normal conditions of operation and to protect the user against particles expelled in a backwards direction from the CRT face in the event of implosion.

This standard contains requirements for CRTs of 76 mm diagonal and larger that incorporate implosion protection systems providing protection against the hazards of particles expelled forwards beyond the face. There is no intended protection against particles expelled in other directions.

Compliance is tested by subjecting CRTs to the test procedures and criteria, which are given in Clauses 8 (large CRTs), 9 (small CRTs) and 10 (CRTs with protective film) of this standard. The definitions of large and small CRTs are given in Clause 3.

NOTE This set of requirements replaces the current requirements for the mechanical safety of cathode ray tubes (CRTs) as described in IEC 60065 (Clause 18), which will be modified accordingly.

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 60065:2001, *Audio, video and similar electronic apparatus – Safety requirements*

IEC 60068-1:1988, *Environmental testing – Part 1: General and guidance*
Amendment 1 (1992)

IEC 60216-1:2001, *Electrical insulating materials – Properties of thermal endurance – Part 1: Ageing procedures and evaluation of test results*

ISO 527-1:1993, *Plastics – Determination of tensile properties – Part 1: General principles*

ISO 527-3:1995, *Plastics – Determination of tensile properties – Part 3: Test conditions for films and sheets*

ISO 8510-1:1990, *Adhesives – Peel test for a flexible-bonded-to-rigid test specimen assembly – Part 1: 90 degree peel*

3 Definitions

For the purposes of this document the following definitions apply.

3.1

bonded frame

system employing a preformed metal frame that covers the periphery of the CRT rim area. The space or void between the CRT rim and the metal frame is filled with resin or equivalent

3.2

CRT diagonal

nominal diagonal of the glass envelope at its maximum dimension (for example, mould-match line) excluding any hardware

3.3

CRT envelope

structure consisting of a face or faceplate, funnel and neck assembly

3.4

devacuation

equalization of the pressure in a CRT relative to the ambient pressure

3.5

fracture

one or more cracks in the faceplate or funnel causing a rapid or slow devacuation of the CRT envelope

3.6

glass particle

piece of glass that exceeds 0,025 g in weight

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3.7

implosion

devacuation due to the rapid and sudden inward collapse of a CRT envelope, usually accompanied by a loud report

3.8

laminated CRT

system that provides a separate external safety panel bonded to the face of the CRT

3.9

prestressed banded CRT

system that employs a metal tension band (located over the CRT rim area) that is tightened by thermal shrinking, or other means, to a tensile load. The system may also include a metal rim band located between the tension band and the CRT rim. The tension band or the rim band or both may have an interlayer of tape, resin or the equivalent placed between the mating parts

3.10

prestressed banded CRTs with protective film

system employing a prestressed banded construction (see 3.9) that also includes a layer of film adhered to the CRT face as an integral component of the protection system

3.11**shaling**

condition where the glassware splits into thin layers

3.12**test cabinet**

enclosure, which is used to accommodate the CRT during tests

3.13**useful phosphor screen**

a) colour CRT: the visible phosphored area of the CRT as viewed from the front

b) monochrome CRT: specified maximum useful phosphored area of the CRT

3.14**large CRT**

CRT with diagonal dimension exceeding 160 mm

3.15**small CRT**

rectangular CRT with a minor face dimension of at least 50 mm, a minimum diagonal dimension of 76 mm and a maximum diagonal dimension of 160 mm; a round CRT of a minimum diameter of 76 mm and a maximum diameter of 160 mm

3.16**common quality management system**

quality management system described in documentation which is identical with systems used in two or more plants and under one central control and management

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4 General requirements

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4.1 Corrosion protection

If corrosion of a metal part will contribute to a failure to meet the requirements of this standard, then the part shall be adequately protected against corrosion.

4.2 Mechanical damage

To improve repeatability and reproducibility of test results, it should be verified that samples submitted for test have no external visible scratching on the surface of the faceplates.

4.3 Handling

Safety precautions should be addressed when handling test samples prior to and after testing.

4.4 Film-coated CRTs

In the case of CRTs with film, which is not an integral part of the implosion protection system, the product must be tested without film in accordance with Tables 1 and 2 and 6 to 9.