



SLOVENSKI STANDARD
SIST EN 114000:2002

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Generic specification: Photomultiplier tubes

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Fachgrundspezifikation: Eine deutsche Version liegt zur Zeit nicht vor

Spécification générique: Tubes photomultiplicateurs

Ta slovenski standard je istoveten z: EN 114000:1991

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ICS:

31.100 Elektronke Electronic tubes

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English version

Generic Specification: Photomultiplier tubes

Spécification Générique:
 Tubes photomultiplicateurs

Fachgrundspezifikation:
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This European Standard was approved by the CENELEC Electronic Components Committee (CECC) on 20 November 1991. The text of this standard consists of the text of CECC 14000 Issue 1 1984 of the corresponding CECC Specification. CENELEC members are bound to comply with 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 General Secretariat of the CECC 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 CECC General Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom. The membership of the CECC is identical, with the exception of the national electrotechnical committees of Greece, Iceland and Luxembourg.

CECC

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

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Förderverein für Elektrotechnische Normung (FEN) e. V.
Cenelec Electronic Components Committee

CECC

English version

Harmonized System of Quality Assessment for
Electronic Components

GENERIC SPECIFICATION:
**PHOTOMULTIPLIER
TUBES**

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Système Harmonisé d'Assurance de la Qualité
des Composants Electroniques

SPECIFICATION GNERIQUE:
**TUBES
PHOTOMULTIPLICATEURS**



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Foreword

The CENELEC Electronic Components Committee (CECC) is composed of those member countries of the European Committee for Electrotechnical Standardization (CENELEC) who wish to take part in a harmonized System for electronic components of assessed quality.

The object of the System is to facilitate international trade by the harmonization of the specifications and quality assessment procedures for electronic components, and by the grant of an internationally recognized Mark, or Certificate, of Conformity. The components produced under the System are thereby accepted by all member countries without further testing.

This specification has been formally approved by the CECC, and has been prepared for those countries taking part in the System who wish to issue national harmonized specifications for PHOTOMULTIPLIER TUBES. It should be read in conjunction with document CECC 00100: Basic Rules (1974).

At the date of printing of this document the member countries of the CECC are Austria, Belgium, Denmark, Finland, France, Germany, Ireland, Italy the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. Copies of it can be obtained from the addressees shown on the blue fly-sheet.

Preface

This specification was prepared by CECC Working-Group 11: Electro-optical devices.

In accordance with the requirements of document CECC 00100 it is based, wherever possible, on the Recommendations of the International Electrotechnical Commission and in particular on IEC 306-4: Methods of measurement for photomultipliers.

The text of this specification was circulated to the CECC for voting in the document indicated below and was ratified by the President of the CECC for printing as a CECC Specification:

Document	Voting Date	Report on the Voting
CECC(Secretariat)973	April 1981	CECC(Secretariat)1061

This specification will be supplemented by blank detail specifications applicable to each sub-family of photomultiplier tubes.

The CECC Management Committee at its meeting in Copenhagen in March 1979 decided that as the German National Authorized Institution would not be implementing the requirements of this CECC generic specification, the text should be published in the English and French versions only.

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Section 1. Scope

This document relates to photomultiplier tubes of assessed quality.

Section 2. General

2.1 Order of precedence

Where any discrepancies occur for any reason, documents shall rank in the following order of authority:

- 1) the detail specification
- 2) the generic specification
- 3) document CECC 00100 or any other international (for example IEC) documents to which reference is made.

The same order of precedence shall apply to equivalent national documents.

2.2 Related documents

ISO 1000	1973	<i>SI units and recommendations for the use of their multiples and of certain other units.</i>
IEC 27	—	<i>Letter symbols to be used in electrical technology</i>
IEC 27-1	1971	<i>Part 1 General</i>
IEC 50	—	<i>International Electrotechnical Vocabulary</i>
IEC 67	1966	<i>Dimensions of electronic tubes and valves</i>
IEC 68	—	<i>Basic environmental testing procedures (see CECC 00006)</i>
IEC 100	1962	<i>Methods for the measurement of direct interelectrode capacitances of electronic tubes and valves</i>
IEC 117	—	<i>Recommended graphical symbols</i>
IEC 134	1961	<i>Rating systems for electronic tubes and valves and analogous semi-conductor devices</i>
IEC 151	—	<i>Measurements of the electrical properties of electronic tubes</i>
IEC 151-1	1963	<i>Measurement of electrode current</i>
IEC 151-15	—	<i>Methods of measurement of spurious and unwanted electrode currents</i>
IEC 306	—	<i>Measurement of photosensitive devices</i>
IEC 306-1	1969	<i>Basic recommendations</i>
IEC 306-4	1971	<i>Methods of measurement for photomultipliers</i>
IEC 410	1973	<i>Sampling plans and procedures for inspection by attributes (see CECC 00007)</i>
IEC 462	—	<i>Standard test procedures for photomultiplier tubes for scintillation counting</i>
CECC 00007	—	<i>Basic specification: Sampling plans and procedures for inspection by attributes</i>
CECC 00100	1974	<i>Basic Rules</i>

2.3 Units, symbols and terminology

Units, graphical symbols, letter symbols and terminology shall, wherever possible, be taken from the following documents:

ISO 1000	1973	<i>SI units and recommendations for the use of their multiples and of certain other units.</i>
IEC 27	1973	<i>Letter symbols to be used in electrical technology</i>
IEC 50	—	<i>International Electrotechnical Vocabulary</i>
IEC 117	—	<i>Recommended graphical symbols</i>

Any other units, symbols and terminology peculiar to a component covered by this generic specification, shall be taken from other relevant IEC or ISO documents to be listed under "Related Documents".

For the purpose of this specification, the following additional symbols shall apply:

Dynode	d_1, d_2, d_3 etc.
Cathode luminous sensitivity	sk_v
Cathode spectral sensitivity	$sk_e(\lambda)$
Anode luminous sensitivity	sa_v
Anode spectral sensitivity	$sa_e(\lambda)$
Anode dark current	i_{da}

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2.3.1 Terminology

For the purpose of this specification, the following shall apply:

- 1) In a photomultiplier with "n" dynodes, the first dynode shall be that following the cathode, the nth dynode shall be that preceding the anode.
- 2) A dynode chain is a chain of resistors across a high voltage source, from which all electrode voltages are derived.
- 3) Overall voltage is the voltage between photocathode and anode.
- 4) The illuminant A is defined as a source with a colour temperature of $2\ 856 \pm 20$ K. (See 4.1.2)

2.4 Marking

The detail specification shall prescribe the identification criteria and other information to be shown on the component and/or on the packing. Any identification code used shall be described in full, or reference made to the appropriate document.

The use of potentially dangerous material in the construction of the tube shall be indicated in accordance with the national safety requirements.

Section 3. Quality assessment procedures

3.1 Primary stage of manufacture

The primary stage of manufacture, in accordance with § 7 of CECC 00107, is the assembly of the electrode structure.

The use of the procedure of § 7.2.2 of CECC 00107 is prohibited.

3.2 Structural similarity

When simultaneous or successive production is proceeding on several types of tubes having common features, those common features may be sampled from the range of types instead of from each lot of each type.

Admissible common features and associated tests include the following as examples:

3.2.1 Envelope and terminations

- Dimensions
- Robustness of terminations
- Solderability
- Damp heat testing

3.2.2 Electrode structure including mounting and location

- Capacitances
- Inter-electrode insulation
- Vibration and shock

3.2.3 Number of dynodes: the design and construction of the anode, dynodes, and other electrodes

- Response pulse duration
- Anode pulse rise time
- Transit time
- Transit time jitter

3.2.4 Photocathode and window material

- Cathode luminous sensitivity
- Cathode spectral sensitivity

3.2.5 Photocathode: design of anode and dynodes

- Operational endurance

3.3 Qualification approval procedures

The manufacturer shall:

- meet the general requirements of CECC 00100 governing qualification approval.
- meet the requirements for the primary stage of manufacture contained in 3.1 of this document.

3.4 Supplementary procedure for qualification approval

The detail specification shall prescribe the sample size for Qualification Approval tests. The sample size shall be not less than two. Tubes which have failed other tests may be used for destructive tests provided that the cause of failure does not invalidate the test.

3.5 Quality conformance inspection

The blank detail specification shall prescribe the minimum test schedule which shall be included in each detail specification for those photomultipliers covered by the scope of this document. Additional tests may be included at the discretion of the specification writer.

3.6 Sampling requirement for small lots or expensive items

Where the lot size indicates that, for the specified AQL and inspection level, a sampling plan (see CECC 00007) with an acceptance number of zero shall be used, the Chief Inspector, at his discretion and with the approval of the National Supervising Inspectorate (ONS) may use one of the following alternative procedures:

3.6.1 100 % inspection

3.6.2 The plan having a larger sample with an acceptance number of 1 for the specified AQL.

3.6.3 The plan indicated for the given lot size and inspection level but with the next higher AQL if this leads to the plan with an acceptance number of 1.