



**SLOVENSKI STANDARD**  
**SIST EN 112000:2002**

**01-september-2002**

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**Generic specification: Image converter and image intensifier tubes**

Generic Specification: Image converter and image intensifier tubes

Fachgrundspezifikation: Bildwandler- und Bildverstärkerröhren

Spécification générique: Tubes convertisseurs d'image et tubes intensificateurs d'image

**Ta slovenski standard je istoveten z: EN 112000:1992**

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**ICS:**

31.120	Elektronske prikazovalne naprave	Electronic display devices
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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 112000

November 1992

UDC

Supersedes CECC 12 000 Issue 1 : 1980

Descriptors: Quality, electronic components, tubes

English version

## Generic Specification: Image Converter and Image Intensifier Tubes

Spécification Générique:  
Tubes convertisseurs d'image et tubes  
intensificateurs d'image

Fachgrundspezifikation:  
Bildwandler- und Bildverstärkerröhren

This European Standard was approved by the CENELEC Electronic Components Committee (CECC) on 20 November 1991. 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 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**

CENELEC Electronic Components Committee  
Comité des Composants Electroniques du CENELC  
CENELEC- Komitee für Bauelemente der Elektronik

General Secretariat: Gartenstr. 179, W- 6000 Frankfurt/Main 70

## Preface

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 acceptable in 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 **Image Converter and Image Intensifier Tubes**. It should be read in conjunction with the current regulations for the CECC System.

## Foreword

This specification was prepared by CECC WG 11 'Electro-optical devices'. It was based, wherever possible on the Publications of the International Electrotechnical Commission (IEC).

The CECC voting procedure for the conversion of publication CECC 12 000 Issue 1 : 1980 to EN has resulted in a positive vote.

The voting report [document CECC (Secretariat) 2888/8.91] has been submitted for formal approval and has been accepted. The following reference documents were approved by CECC as EN 112 000 : 1992 on 20 November 1991:

CECC 12 000 Issue 1 : 1980 with Amdts 1, 2 and Addendum.

The following dates were fixed:

- latest date of announcement of the EN at national level (doa) 1992-12-08
- latest date of publication of an identical national standard (dop) 1993-06-08
- latest date of withdrawal of conflicting national standards (dow) 1993-06-08

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## SECTION 1 - SCOPE

This document applies to image converter and image intensifier 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 precedence:

- (1) the detail specification
- (2) the generic specification
- (3) document CECC 00 100 or any other international (that is 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	SI units and recommendations for the use of their multiples and of certain other units
IEC 27			Letter symbols to be used in electrical technology
IEC 27-1		1971	Part 1 General
IEC 50			International electrotechnical vocabulary
IEC 68			Basic environmental testing procedures (see CECC 00 006)
IEC 117			Recommended graphical symbols
IEC 134		1961	Rating systems for electronic tubes and valves and analogous semiconductor devices
IEC 306			Measurement of photosensitive devices
IEC 306-1		1969	Part 1 Basic recommendations
IEC 410		1973	Sampling plans and procedures for inspection by attributes (see CECC 00 007)
CECC 00 100		1974	Basic Rules
CECC 00 006			Harmonization document for IEC 68: basic environmental testing procedure.
CECC 00 007			Harmonization document for IEC 410: sampling plans and procedures for inspection by attributes
CECC 00 107		1977	Rule of Procedure 7: Quality assessment procedures
CECC 00 109		1974	Rule of Procedure 9: Certified test records.

## 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	SI units and recommendations for the use of their multiples and of certain other units
IEC 27	—	Letter symbols to be used in electrical technology
IEC 117	—	Recommended symbols.

### 2.3.1. Terminology

When using the terminology to refer to radiant quantities instead of luminous quantities, the text and units shall be modified accordingly.

#### (1) Image converter tube

An electronic tube in which an image (usually of non-visible radiation) projected onto a photoemissive surface produces a corresponding visible image on a luminescent surface.

#### (2) Image intensifier tube

An electronic tube in which an image projected onto a photoemissive surface produces a corresponding intensified image on a luminescent surface.

#### (3) Background luminance

The average luminance over a specified area of the screen when the photocathode receives no radiation capable of producing a photoemissive effect.

#### (4) Equivalent background input (E.B.I.)

The uniform flux density incident upon the photocathode, parallel to the input optical axis, over a specified area and having a specified spectral distribution required to give an increase in screen luminance equal to the background luminance.

#### (5) Luminance gain

The quotient of (1) Screen luminous exitance averaged over a specified area of the screen by (2) The uniform illuminance, having a specified spectral distribution, over a specified area of the photocathode.

#### (6) Radiance gain

The quotient of (1) The screen radiant exitance, having a specified spectral distribution, averaged over a specified area of the screen by (2) The uniform irradiance, having a specified spectral distribution, over a specified area of the photocathode.

#### (7) Contrast transfer function (C.T.F.)

The variation of contrast transfer ratio with input spatial frequency. The contrast transfer ratio of an image tube is the contrast of the image formed on the output screen by a parallel bar pattern with square-wave modulation at a stated spatial frequency of radiation flux density on the input photocathode.



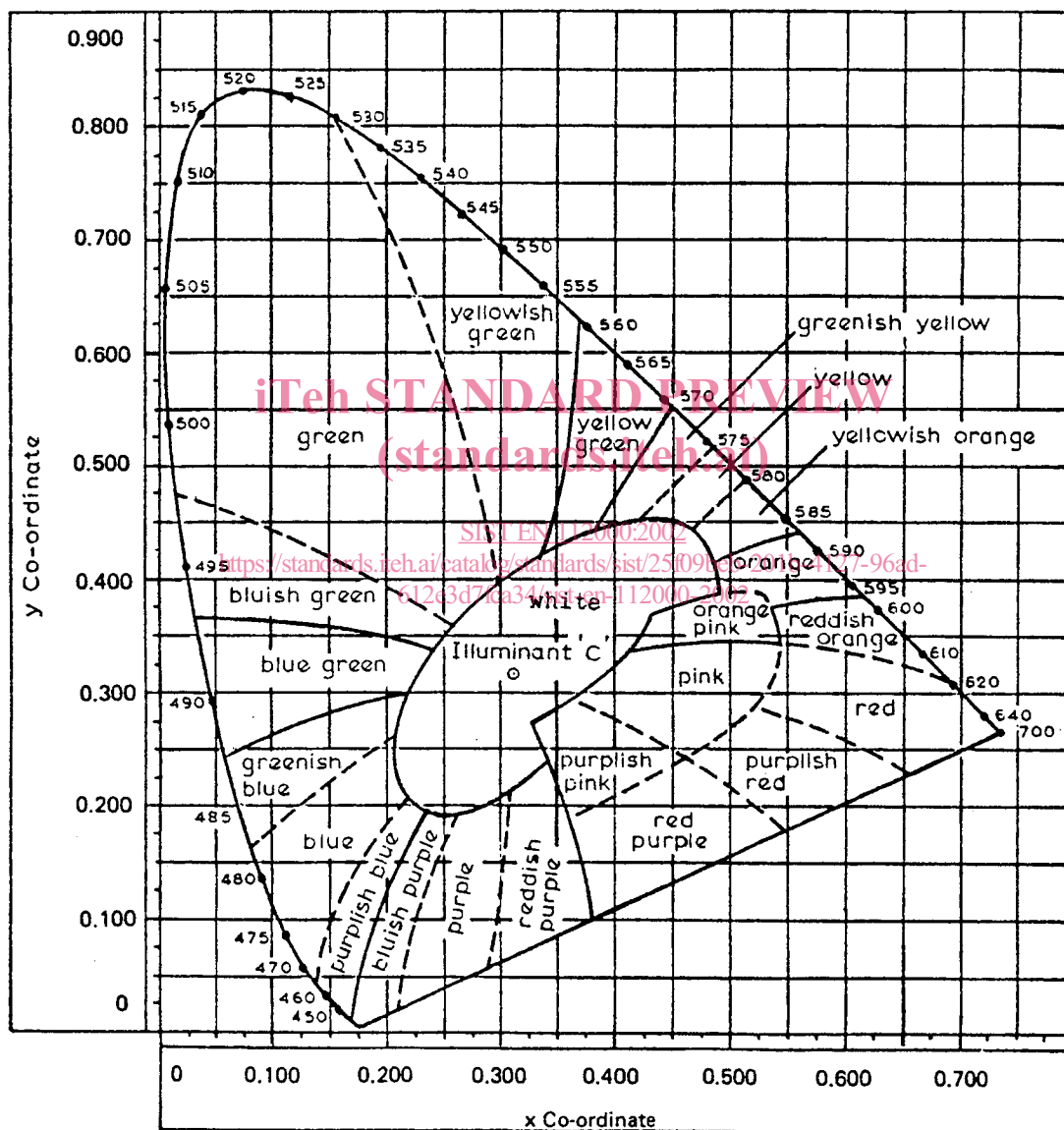
Contrast (C) is computed by:

$$C = \frac{W - B}{W + B} \times 100\%$$

where W is the average maximum flux density  
and B is the average minimum flux density in the image.

(8) Colour:

The colour of the display shall be defined in accordance with the Kelly chart shown below:



(9) Persistence of display:

Time to decay to 10% of  
initial peak value

- Less than 1  $\mu$ s
- 1  $\mu$ s to 10  $\mu$ s
- 10  $\mu$ s to 1000  $\mu$ s
- 1 ms to 100 ms
- 100 ms to 1 s
- More than 1 s

Description

- Very short
- Short
- Medium short
- Medium
- Long
- Very long

(10) Bar pattern

An optical pattern consisting of alternate opaque and transparent parallel bars of equal width (Xmm). The optical transmission factor of the transparent bars shall be at least one thousand times that of the opaque bars. The spatial frequency of the pattern is stated in line pairs/mm and is given by the expression  $\frac{1}{2X}$

(11) Test pattern

An arrangement of one or more bar patterns or as otherwise specified for a particular device.

Any other units, symbols, and terminology peculiar to one of the components covered by this generic specification, shall be taken from other relevant IEC or ISO documents (which are listed under "Related documents") or derived in accordance with the principles of the documents listed above and clearly described.

2.4 Marking

The detail specification shall indicate 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 shall be made to the appropriate documents.

Use of potentially hazardous materials in the construction of the tube shall be indicated in accordance with the national safety requirements.

## SECTION 3 – QUALITY ASSESSMENT PROCEDURES

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3.1 Primary stage of manufacture

The primary stage of manufacture in accordance with 7 of CECC 00 107 is the assembly of the vacuum envelope.

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The subcontracting of this process in accordance with 7.2.2 of CECC 00 107 is prohibited.

3.2 Structurally similar components

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

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

## (1) Envelope and terminations

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

## (2) Electrode structure including mounting and location

- Vibration
- Shock

## (3) Screen phosphors

- Persistence
- Luminance

### 3.3. Qualification approval procedures

The manufacturer shall:

- meet the general requirements of CECC 00 107 governing qualification approval
- meet the requirements for the primary stage of manufacture contained in 3.1 of this document
- produce test evidence of conformance to the specification requirements on three consecutive lots for lot-by-lot inspection and on one lot for periodic inspection .

Samples shall be taken from the lots in accordance with CECC 00 007.

Normal inspection shall be used, but where the sample size is that which would give acceptance on zero defectives, additional specimens shall be taken to meet the sample size to give acceptance on one defective.

### 3.4 Supplementary procedure for qualification approval

The following table shall supersede the normal sample size requirements for production lot size below 280 specimens. The samples may be drawn from one production lot.

A second sample, as shown in the table, shall be taken when the quantity of defectives exceeds the acceptance quantity but is less than the reject quantity.

Group	Lot Size	Sample Size	Accept	Reject	2nd Sample	Total Sample	Accept	Reject
A	1–7	100% (See note)	0	1				
	8–280	5	0	2	3	8	1	2
B	1–7	100% (See note)	0	1				
	8–280	5	0	2	3	8	1	2
C1	1–5	100% (See note)	0	1				
	6–280	5	1	2				
C2	As for C1							
C3	1–5	2	0	1				
	6–280	2	0	2	2	4	1	2
C4	1–5	2	0	1				
	6–280	2	0	1				
C5	1–4	100% (See note)	0	1				
	5–280	3	0	2	2	5	1	2
D	Up to 280	2	0	1				

NOTE: Qualification approval depends on a total of at least two tubes being tested.