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INTERNATIONAL STANDARD

NORME INTERNATIONALE

Plasma display panels –
Part 5: Generic specification

Panneaux d'affichage à plasma –
Partie 5: Spécification générique

IEC 61988-5:2009

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CONTENTS

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PLASMA DISPLAY PANELS –

Part 5: Generic specification

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.

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International Standard IEC 61988-5 has been prepared by IEC technical committee 110: Flat panel display devices.

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

FDIS	Report on voting
110/182/FDIS	110/191/RVD

Full information on the voting for the approval on 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.

A list of all the parts in the IEC 61988 series, under the general title *Plasma display panels*, can be found on the IEC website.

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- withdrawn;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.

PLASMA DISPLAY PANELS –

Part 5: Generic specification

1 Scope

This generic specification for plasma display panels specifies general procedures for quality assessment to be used in the IECQ-CECC system and establishes general principles for describing and testing of electrical, optical, mechanical and environmental characteristics.

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 60027 (all parts), *Letter symbols to be used in electrical technology*

IEC 60050 (all parts), *International electrotechnical vocabulary*

IEC 60410:1973, *Sampling plans and procedures for inspection by attributes*

IEC 60617, *Graphical symbols for diagrams*

IEC 60747-1, *Semiconductor devices – Part 1: General*

IEC 61988-1, *Plasma display panels – Part 1: Terminology and letter symbols*

IEC 61988-2-1, *Plasma display panels – Part 2-1: Measuring methods – Optical*

IEC 61988-2-2, *Plasma display panels – Part 2-2: Measuring methods – Optoelectrical*

IEC 61988-3-1, *Plasma display panels – Part 3-1: Mechanical interface*

IEC 61988-4, *Plasma display panels – Part 4: Climatic and mechanical testing methods*

IECQ 01, *IEC Quality Assessment System for Electronic components (IECQ) – Basic Rules*

QC 001002 (all parts), *IEC Quality Assessment System for Electronic components (IECQ) – Rules of Procedure*

ISO 1000:1992, *SI units and recommendations for the use of their multiples and of certain other units*

ISO 2859-1, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 2859-10, *Sampling procedures for inspection by attributes – Part 10: Introduction to the ISO 2859 series of standards for sampling for inspection by attributes*

ISO 3534-2, *Statistics – Vocabulary and symbols – Part 2: Applied statistics*

3 Terms, definitions, units, symbols and abbreviations

3.1 Terms and definitions

For the purpose of this document, the following terms and definitions given in IEC 61988-1, IEC 60050 series, IECQ 01, and ISO 3534-2 apply.

NOTE Special terms for statistical quality control are given in IECQ 01 and ISO 3534-2.

3.2 Units, symbols and abbreviations

Units, graphical and letter symbols shall, wherever possible, be taken from IEC 60027, IEC 60617 and ISO 1000:1992.

Any other units, symbols or terminology peculiar to one of the devices covered by this generic specification shall be taken from the relevant IEC or ISO standards (see Clause 2) or derived in accordance with the principles of the standards listed above.

In this document following abbreviations are used:

AQL: Acceptance quality level (see 8.4.1)

LTPD: Lot tolerance percentage defectives (see 8.4.2)

SI: Supervising Inspectorate

DMR: Designated Management Representative

4 Order of precedence

The documents are ranked in the following order of authority:

a) Detail specifications
b) Blank detail specifications
c) Sectional specifications
d) Generic specifications
e) Basic specifications
f) IECQ rules of procedure
g) Any other international (e.g. IEC) documents to which reference is made
h) National documents.

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

Detail specifications are prepared by the National Standards Organization (NSO), an approved manufacturer, industrial task groups or users as described in IEC QC 001002-2:1998, 1.4.

Blank detail specifications, sectional specifications and generic specification (this standard) are to be prepared by technical committee of IEC.

Basic specifications are IEC or ISO documents related to all electrical components.

IECQ rules of procedure are specified in IEC QC 001002.

In Annex B, the general description of specifications is shown extracted from IEC Guide 102, 2.3.

5 Standard environmental conditions

Standard environmental conditions for the measurement of characteristics, for tests and operating conditions are at temperature of 25 °C ± 3 °C, a relative humidity of 25 % to 85 %, and pressure of 86 kPa to 106 kPa.

6 Marking

6.1 Device identification code

Each device shall have a marking that will enable clear identification of the device type, for example the model number.

6.2 Device traceability code

The device shall be provided with a traceability code which enables back-tracing of the device to a certain production or inspection lot, for example the serial number.

6.3 Packing

Marking on the packing shall state

a) the device identification code(s) of the enclosed device(s);
b) the device traceability code(s);
c) the number of enclosed devices;
d) the required precautions, if any.

This marking shall be in accordance with import/export customs regulations. Additional requirements can be specified in the relevant detail specification.

7 Quality assessment procedures

7.1 General

Quality assessment is carried out in the following order:

a) approval of the manufacturer;
b) qualification approval;
c) quality conformance inspection;
d) certification of conformity.

The quality conformance inspection are subdivided into group A, B and C tests; these are performed lot by lot or periodically, as defined in 8.3.2. In some cases, group D tests may also be specified, for example, for qualification approval.

7.2 Eligibility for qualification and/or capability approval

A type of device becomes eligible for qualification and/or capability approval when the rules of the following procedures are satisfied: IEC QC 001002-3:2005, Clause 3, *Qualification Approval of electronic components*, describing the procedure for qualification approval (QA), the release for delivery and validity of release.

7.3 Primary stage of manufacture

The primary stage of manufacture is defined in the sectional specification.

7.4 Commercially confidential information

If any part of the manufacturing process is commercially confidential, this shall be suitably identified, and DMR shall demonstrate to the SI that the requirements of the rules of procedure given in IEC QC 001002-3:2005, 2.3.3.1, have been complied with.

7.5 Formation of inspection lots

See the rules of procedure given in IEC QC 001002-3:2005, 3.3.1.

7.6 Structurally similar devices

See the rules of procedure given in IEC QC 001002-3:2005, 3.3.2.

7.7 Subcontracting

The use of subcontracting is permitted, unreservedly.

See the rules of procedure given in IEC QC001002-3:2005, from 3.1.2.3 to 3.1.2.7.

7.8 Incorporated components

See the rules of procedure given in IEC QC 001002-3:2005, 5.2.3.

7.9 Validity of release

See the rules of procedure given in IEC QC 001002-3:2005, 3.2.2.

8 Qualification approval procedure

8.1 Qualification approval testing

Method a), b) or c) of IEC QC001002-3:2005, 3.1.4 of the rules of procedure may be used at the manufacturer's discretion in accordance with the inspection requirements given in the sectional or blank detail specifications.

Samples may be composed of appropriate structurally similar devices.

All measurements called for in the detail specification shall be recorded.

The qualification report shall include a summary of all the test results for each group and subgroup, including number of devices tested and number of devices failed. This summary shall be derived from the recorded data. The manufacturer shall retain all data for submission to the SI on demand.

8.2 Granting of qualification approval

See the rules of procedure given in IEC QC 001002-3:2005, 3.1.5.

8.3 Quality conformance inspection requirements

8.3.1 General

Quality conformance inspection shall consist of the examinations and tests of groups A, B, C and D, as specified. For group B and C inspection, samples may be composed of structurally similar devices. Sample for periodic test shall be drawn from one or more lots which have passed groups A and B inspection. Individual devices shall have passed the group A measurements called for in the detail specification.

8.3.2 Division into groups and subgroups

The following groups and subgroups shall be used in the preparation of detail specifications.

8.3.2.1 Group A inspection (lot-by-lot)

This group prescribes the visual inspection, the electrical and the optical measurements to be made on a lot-by-lot basis to assess the principal characteristics of a device. Unless otherwise specified, samples shall not be composed of structurally similar devices. Group A inspection is divided into appropriate subgroups as follows:

a) Subgroup A1

This subgroup comprises a visual examination as specified in 10.2.1.

b) Subgroup A2

This subgroup comprises measurements of primary electrical characteristics of the device.

c) Subgroup A3

This subgroup comprises measurements of primary optical characteristics of the device.

d) Subgroup A4 and A5

These subgroups may not be required. They comprise measurements of secondary characteristics of the device. The choice between subgroups A4 or A5 for given measurements is essentially governed by the desirability of performing them at a given quality level.

8.3.2.2 Group B inspection (lot-by-lot)

This group prescribes the procedures to be used to assess additional properties of the device, and includes electrical and optical measurements, mechanical, climatic and endurance tests that can normally be performed in one week or as specified in the relevant sectional or blank detail specification.

8.3.2.3 Group C inspection (periodic)

This group prescribes the procedures to be used on a periodic basis to assess additional properties of the devices, and includes electrical and optical measurements, mechanical, climatic and endurance tests appropriate for checking at intervals of either three months or twelve months, or as specified in the relevant sectional or blank detail specification.

8.3.2.4 Division of group B and group C into subgroups

To enable comparison and to facilitate change from group B to group C and vice versa when necessary (see 8.3.4), tests in these groups are divided among subgroups bearing the same number for corresponding tests.

a) Subgroup B1/C1

Comprise measurements that control dimensional interchange-ability of the devices.

b) Subgroup B2/C2

Comprise measurements that assess the electrical properties of the device design.

c) Subgroup B3/C3

Comprise measurements that assess the optical properties of the device design.

d) Subgroup B4/C4

Comprise measurements that further assess some of the electrical and optical characteristics of the device already measured in group A by measurement under different voltage, current, temperature or optical conditions.

e) Subgroup B5/C5

Comprise verification of ratings of the device, where appropriate.

f) Subgroup B6/C6

Comprise tests intended to assess mechanical robustness of the device.

g) Subgroup B7/C7

Comprise tests intended to assess interconnection ability of the device.

h) Subgroup B8/C8

Comprise tests intended to assess the ability of the device to withstand climatic stress, for example change of temperature.

i) Subgroup B9/C9

Comprise tests intended to assess the ability of the device to withstand mechanical stresses, for example vibration, shock.

j) Subgroup B10/C10

Comprise tests intended to assess the ability of the device to withstand long-term humidity.

k) Subgroup B11/C11

Comprise tests intended to assess electrical and optical properties of the device under storage conditions at extremes of temperature.

l) Subgroup B12/C12

Comprise tests intended to assess performance of the device under different conditions of air pressure.

m) Subgroup B13/C13

Comprise tests intended to assess failure characteristics of the device under endurance testing.

n) Subgroup B14/C14

Comprise tests on the permanence of marking.

These subgroups may not all be required. The required subgroups are specified in the relevant sectional or blank detail specification.

8.3.2.5 Group D inspection

This group prescribes the procedures to be carried out at intervals of twelve months or for qualification approval only.

8.3.3 Inspection requirements

The statistical sampling procedures described in 8.4 shall be used.

8.3.3.1 Criteria for lot rejection

Lots failing to meet the quality conformance inspection of either group A or group B inspection shall not be accepted. If, during quality conformance inspection, devices fail a test in a subgroup which would result in the lot being rejected, the quality conformance inspection can be terminated, and the lot shall be considered a rejected lot in group A and B. If a lot is withdrawn in a state of failing to meet quality conformance requirements and is not re-submitted, it shall be considered a rejected lot.

8.3.3.2 Re-submitted lots

Failing lots, that have been reworked when technically possible and are resubmitted for quality conformance inspection, shall contain only devices that were included in the original lot and shall be re-submitted only once for each inspection group (group A and B). Re-submitted lots shall be kept separate from new lots and shall be clearly identified as re-submitted lots. Re-submitted lots shall be randomly re-sampled and inspected for all the inspection criteria of group A.

8.3.3.3 Procedure in case of test equipment failure or operator error

If any devices are believed to have failed as a result of test equipment failure or operator error, the failures shall be entered in the test record (but may be excluded from the certified records of released lots by agreement with the SI) and shall be submitted along with a complete explanation of why the failures are believed to be invalid to the SI.

The chief inspector shall decide whether replacement devices from the same inspection lot may be added to the sample. Replacement devices shall be subjected to the same tests to which the discarded devices were subjected prior to failure and to any remaining specified tests to which the discarded devices were not subjected prior to failure.

8.3.3.4 Procedure in case of failure in periodic tests

When a group B failure occurs, the corresponding group C tests (see 8.3.2.4) are invalid. In the event of failing periodic inspection tests for causes other than test equipment failure or operator error, see the rules of procedure given in IEC QC001002-3:2005, 3.1.8.

8.3.4 Supplementary procedure for reduced inspection

8.3.4.1 Group B

A special reduced inspection procedure may be used which allows the manufacturer to carry out the appropriate group B tests at normal inspection on every fourth lot with a maximum interval of three months instead of on a lot-by-lot basis for the tests in all subgroups of group B. This special procedure applies to each subgroup which has fulfilled the required conditions.

The condition for this change shall be that 10 successive lots have passed group B inspection. Reversion to normal inspection in group B shall be made when a sample has failed to meet a subgroup inspection under the reduced inspection procedure.

8.3.4.2 Group C

When a three-month interval is specified for periodic tests, the test period may be extended to six month provided that three successive periodic tests have been passed at three-month intervals. Reversion to the normal three-month interval shall be made when a sample has failed to meet a subgroup inspection under the extended interval procedure (see also 8.3.3.4).

8.3.5 Sampling requirements for small lots

Where a lot size is 200 or less, the following procedures, complying with the appropriate requirements of Annex A, shall be used.

Where the AQL system is specified, the equivalent LTPD shall first be selected from Table A.3 of Annex A.

a) Non-destructive testing
   1) 100 % of the devices shall be inspected for any test indicated as non-destructive. Or:
   2) Any appropriate LTPD single sampling plan selected from Table A.2 of Annex A. Or:
   3) Any appropriate LTPD double sampling plan.

b) Destructive testing
   1) Any appropriate LTPD single sampling plan selected from Table A.2 of Annex A. Or:
   2) Any appropriate LTPD double sampling plan.

8.3.6 Certified records of released lots (CRRL)

Certified records of released lots (CRRL) may be prepared by agreement between the manufacturer and customer. Informative guide is provided in Annex B of IECQ QC001002-2:1998.

8.3.7 Delivery of device subjected to destructive or non-destructive tests

Tests considered as destructive are marked (D) in the sectional or blank detail specifications. Devices subjected to destructive tests shall not be included in the lot for delivery. Devices subjected to non-destructive environmental tests may be delivered provided they are re-tested according to group A requirements and satisfy them.

8.3.8 Delayed deliveries

Before delivery of lots in store for a period and in conditions specified in the relevant sectional or blank detail specification, the lots or the quantities to be delivered shall undergo the specified group A inspection and the group B interconnection ability tests.

8.3.9 Supplementary procedure for deliveries

The manufacturer may, at his discretion, supply devices that have met a more severe assessment level than that required.

8.4 Statistical sampling procedures

For group A, B and C inspections, either the AQL sampling procedure or the LTPD sampling procedure shall be used. The detail specification shall specify which of the procedures is to be used.