

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Organic light emitting diode (OLED) displays –
Part 1-1: Generic specifications

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Afficheurs à diodes électroluminescentes organiques (OLED) –
Partie 1-1: Spécifications génériques

IEC 62341-1-1:2009
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Organic light emitting diode (OLED) displays –
Part 1-1: Generic specifications

Afficheurs à diodes électroluminescentes organiques (OLED) –
Partie 1-1: Spécifications génériques

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ORGANIC LIGHT EMITTING DIODE (OLED) DISPLAYS –

Part 1-1: Generic specifications

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

FDIS	Report on voting
110/168/FDIS	110/176/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 parts of IEC 62341 series, under the general title *Organic light emitting diode (OLED) displays* 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

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ORGANIC LIGHT EMITTING DIODE (OLED) DISPLAYS –

Part 1-1: Generic specifications

1 Scope

This part of IEC 62341 is a generic specification for organic light emitting diode (OLED) displays. It defines general procedures for quality assessment to be used in the IECQ-CECC system and establishes general rules for methods of electrical and optical measurements, environmental and mechanical tests and endurance tests.

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

IEC 60747-1:2006, *Semiconductor devices – Part 1: General*

IEC 62341-1-2, *Organic light emitting diode displays – Part 1-2: Terminology and letter symbols*

IEC 62341-5¹, *Organic light emitting diode (OLED) displays – Part 5: Environmental testing methods*

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IEC 62341-6-12, *Organic light emitting diode (OLED) displays – Part 6-1: Measuring methods of optical and electro-optical parameters*

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

ISO 2859 (all parts), *Sampling procedures for inspection by attributes*

3 Terms, definitions, units and symbols

For the purposes of this document, the terms, definitions, units and symbols given in IEC 62341-1-2 apply.

4 Technical aspects

4.1 Order of precedence

Where there are conflicting requirements, documents shall rank in the following order of authority:

- a) the detail specification;
- b) the blank detail specification;

¹ In preparation.

² In preparation.

- c) the family specification, if any;
- d) the sectional specification;
- e) the generic specification;
- f) the basic specification;
- g) the IECQ rules of procedure;
- h) any other international (e.g. IEC) documents to which reference is made;
- i) a national document.

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

4.2 Standard atmospheric conditions

Preferred values of temperature, humidity and pressure for the measurement characteristics and tests, for operating condition, are specified in 8.1.3. Unless otherwise specified, all measurement and tests shall be carried out under the condition described in 8.1.3.

4.3 Marking

4.3.1 Device identification

The marking on the device shall enable clear identification of the device. The order of priority for marking on small products shall be specified in the detail specification.

4.3.2 Device traceability

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

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4.3.3 Packing

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Marking on the packing shall state:

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

This marking shall be in accordance with custom regulations.

4.4 Categories of assessed quality

This generic specification provides three categories of assessed quality. The devices are grouped in an identified inspection lot in accordance with IEC QC 001002-3, 3.3, which is tested to the specified quality categories. The AQL (acceptance quality levels) or LTPD (lot tolerance percentage defective) associated with the same inspection group may vary for each category and shall be as specified in the detail specification.

The minimum requirements of the categories are as follows:

Category I The type shall meet the requirements of qualification approval of categories II or III. Each lot shall meet the inspection requirements of group A, which includes functional tests. Every three months, one lot shall meet the inspection requirements for interconnection ability. Annually, one lot shall meet the group B and group C inspection requirements (see 6.2.1)

Category II The type shall meet the requirements of group A, group B, group C and group D if needed, for qualification approval. The lot shall meet the inspection requirements of group A and group B on a lot-by-lot basis, and of group C on a periodic basis.

Category III The type shall meet the requirements of group A, group B, group C and group D if needed, for qualification approval. The lot is 100 % screened and shall meet the inspection requirements of group A and group B on a lot-by-lot basis, and of group C on a periodic basis.

The sectional or blank detail specification shall define the minimum requirements for each category. A detail specification may contain requirements, including screening requirements, additional to those given in the generic, sectional or blank or any other relevant detail specification.

4.5 Screening

A screening is an examination or test applied to all devices in a lot.

When required by the detail specification, all devices in the lot shall be screened by submitting them to one of the sequences given in the relevant sectional or blank detail specification, and all defectives shall be removed. Other sequences not specified in this standard are applicable only where the above sequences are not correlated or are in contradiction with failure mechanisms. When a part of the screening process as given in the sectional or blank detail specification forms part of the manufacturing process in the prescribed sequence, these procedures need not be repeated.

4.6 Handling

See IEC 60747-1, Clause 8, <https://standards.iteh.ai/catalog/standards/sist/4f26da55-0b25-4a7a-aeaf-6f5f21a43188/iec-62341-1-1-2009>

Adequate warning shall be displayed in the case of harmful products.

5 Quality assessment procedures

Quality assessment comprises the procedure for obtaining qualification approval followed by quality conformance inspection on a lot-by-lot basis (including screening if required) and on a periodic basis as qualified in the detail specification. The quality assessment tests are subdivided into group A, B and C tests; these are performed lot by lot or periodically, group D (see 6.2.1.5) tests may also be specified, for example, for qualification approval.

5.1 Eligibility for qualification approval

A type of device becomes eligible for qualification approval when the rules of procedure of IEC QC 001002-3, Clause 3, are satisfied.

5.2 Primary stage of manufacture

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

5.3 Commercially confidential information

If any part of the manufacturing process is commercially confidential, this shall be suitably identified, and the designated management representative (DMR) shall demonstrate to the satisfaction of the National Supervising Inspectorate (NSI) that the requirements of the rules of procedure given in 2.3.3.1 of IEC QC 001002-3, have been complied with.

5.4 Formation of inspection lots

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

5.5 Structurally similar devices

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

Details concerning grouping are given in the relevant sectional or blank detail specification.

5.6 Subcontracting

The use of subcontracting is permitted for quality assessments procedures. To use the subcontracting, see the rules of procedure given in IEC QC 001002-3, Annex B to Clause 2 and 3.1.2.

5.7 Validity of release

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

6 Quality approval procedure

6.1 Granting of qualification approval

See the rules of procedure given in IEC QC 001002-3, 3.1.4 and 3.1.5. Method a), b) or c) 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 specification. Samples may be composed of appropriate structurally similar devices. In some cases, group D tests are required for qualification approval. 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 variables and/or attributes data.

The manufacturer shall retain all data for submission to the NSI on demand.

6.2 Quality conformance inspection requirements

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. Samples for periodic tests shall be drawn from one or more lots which have passed group A and B inspection. Individual devices shall have passed the group A measurements called for in the detail specification.

6.2.1 Division into groups and subgroups

The following grouping shall be used in the preparation of detail specification.

6.2.1.1 Group A inspection (lot-by-lot)

This group prescribes the visual inspection and the electrical measurements to be made on a lot-by-lot basis to assess the principal properties of a device. Unless otherwise specified, structural similarity grouping is not permitted.

Group A inspection is divided into appropriate subgroups as follows:

Subgroup A1 This subgroup comprises a visual examination as specified in 8.2.1.

Subgroup A2 This subgroup comprises measurements of primary characteristics of the device.

Subgroup A3/A4 These subgroups may not be required. They comprise measurements of secondary characteristics of the device. The correct requirements for each device category are given in the sectional or blank detail specification. The choice between subgroup A3 or A4 for given measurements is essentially governed by the desirability of performing them at a given quality level.

6.2.1.2 Group B inspection (lot-by-lot, except for category I)

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

6.2.1.3 Group C inspection (periodic)

This group prescribes the procedures to be used on a periodic basis to assess certain additional properties of the devices, and includes electrical and optical measurements, mechanical, environmental and endurance tests appropriate for checking at intervals of either three months (categories II and III) or one year (category I), or as specified in the relevant sectional or blank detail specification.

6.2.1.4 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 tests in these groups have been divided among subgroups bearing the same number for corresponding tests.

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The division is as given below. (standards.iteh.ai)

Subgroup B1/C1 Comprise measurements that assess visual and dimensional properties of the devices. <https://standards.iteh.ai/catalog/standards/sist/4f26da55-0b25-4a7a-aeaf-6f5f21a43188/iec-62341-1-1-2009>

Subgroup B2a/C2a Comprise measurements that assess electrical and optical properties of the devices of a design nature.

Subgroup B2b/C2b 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 of optical condition.

Subgroup B2c/C2c Comprise verification of ratings of the device, where appropriate.

Subgroup B3/C3 Comprise tests intended to assess mechanical robustness of the devices.

Subgroup B4/C4 Comprise tests intended to assess interconnection ability of the devices.

Subgroup B5/C5 Comprise tests intended to assess the ability of the device to withstand climate stresses, for example change of temperature, sealing.

Subgroup B6/C6 Comprise tests intended to assess the ability of the device to withstand mechanical stresses, for example vibration, shock.

Subgroup B7/C7 Comprise tests intended to assess the ability of the device to withstand long-term humidity.

Subgroup B8/C8 Comprise tests intended to assess failure characteristics of the device under endurance testing.

- Subgroup B9/C9* Comprise tests intended to assess electrical and optical properties of the device under storage conditions at extremes of temperature.
- Subgroup B10/C10* Comprise tests intended to assess performance of the device during vibration of air pressure.
- Subgroup B11/C11* Comprise tests on the permanence of marking.
- Subgroup CRRL* Lists a selection of tests and/or measurements made in the preceding subgroups, the results of which shall be presented in the certified record of released lots (CRRL).

These subgroups may not all be required.

6.2.1.5 Group D inspection

This group prescribes the procedures to be carried out at intervals of 12 months or for qualification approval only.

6.2.2 Quality conformance inspection requirements

The Statistical sampling procedures described in 6.3 shall be used.

6.2.2.1 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 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 resubmitted, it shall be considered a rejected lot.

6.2.2.2 Re-submitted lots

Failing lots, those 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 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.

6.2.2.3 Procedure in case of test equipment failure or operator error

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

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.

6.2.2.4 Procedure in case of failure in periodic tests

When a group B failure occurs, the corresponding group C tests are invalid. In the event of failing periodic inspection tests for causes other than faults or an operator error, see the rules of procedure given in IEC QC 001002-3, 3.1.8.

6.2.3 Supplementary procedure for reduced inspection

6.2.3.1 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 all be made when a sample has failed to meet a subgroup inspection under the reduced inspection procedure.

6.2.3.2 Group C

When a three-month interval is specified for periodic tests, the test period may be extended to six months 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 6.2.2.4).

6.2.4 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.) In the case of not complying with this requirement, the sampling requirement shall be specified in the detail specification.

- a) Non-destructive testing: (standards.iteh.ai)
- 1) 100 % of the OLED modules shall be inspected for any test indicated as non-destructive; or, [IEC 62341-1-1:2009](https://standards.iteh.ai/catalog/standards/sist/4f26da55-0b25-4a7a-aaaf-6b521a45188/iec-62341-1-1-2009)
 - 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.

6.2.5 Certified records of released lots (CRRL)

See the rules of procedure given in 1.5 and Annex B of IEC QC 001002-2.

6.2.6 Delivery of devices subjected to destructive or non-destructive test

Tests considered as destructive are marked (D) in the sectional or blank detail specification. 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.

6.2.7 Delayed deliveries

Before delivery of lots in store for a period and in conditions specified in the 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. Once this has been done the complete lot, no further re-testing is required for another period.

6.2.8 Supplementary procedure for deliveries

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

6.3 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. In the case of not complying with this procedure, the sampling procedure shall be specified in the detail specification.

6.3.1 AQL sampling plans

See Clause 4 of IEC 60410. There are three types of sampling plans: single, double and multiple. When several types of plans are available for a given AQL and code letter, any one may be used.

6.3.2 LTPD sampling plans

See Annex A.

6.4 Endurance tests

6.4.1 General

Endurance tests performed on devices at, or within, their maximum rating shall be considered non-destructive. If the LTPD sampling procedure isn't complied with sampling requirement, test time, acceptance criteria and the procedure to be used shall be specified in the detail specification. Endurance tests shall be specified in the relevant specification.

6.4.2 Endurance tests where the failure rate is specified

Failure rate as used in this standard is defined as LTPD expressed as a percentage per thousand hours.

[IEC 62341-1-1:2009](https://standards.iteh.ai/catalog/standards/sist/4f26da55-0b25-4a7a-aeaf-6f5f21a43188/iec-62341-1-1-2009)

<https://standards.iteh.ai/catalog/standards/sist/4f26da55-0b25-4a7a-aeaf-6f5f21a43188/iec-62341-1-1-2009>

6.4.2.1 Selection of samples

Samples for endurance tests shall be selected at random from the inspection lot (see Annex A). The sample size for a 1 000 h test shall be chosen by the manufacturer from the column under the specified failure rate (see Table A.1) or the actual lot size (see Table A.2).

The acceptance number shall be the one associated with the particular sample size chosen.

6.4.2.2 Failure

A device, which fails at one or more of the end-point limits specified for endurance tests at any specified reading interval shall be considered a failure and be considered as such at any subsequent reading interval. If the sample fails, the test may be terminated at the discretion of the manufacturer.

6.4.2.3 Endurance test time

Whenever the failure rate is specified, the endurance test time should be preferably 1 000 h initially. Once a lot has passed the 1 000 h test, endurance tests can be reduced to a certain period, as specified in the detail specification. If the initial test time other than 1 000 h is applied, the time shall be specified in the detail specification.

6.4.2.4 Procedure to be used if the number of observed failures exceeds the acceptance number

In the event that the number of failures observed on endurance tests exceeds the acceptance number, the manufacturer shall choose one of the following options:

- a) withdraw the entire lot;