

INTERNATIONAL STANDARD

Liquid crystal display devices –
Part 1–1: Generic – Generic specification

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIQUID CRYSTAL DISPLAY DEVICES –

Part 1-1: Generic – Generic specification

FOREWORD

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International Standard IEC 61747-1-1 was prepared by IEC technical committee 110: Electronic display devices.

This Part 1-1 forms the generic specification for liquid crystal display devices.

This first edition cancels and replaces the first edition of IEC 61747-1 published in 1998 and Amendment 1:2003. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) IEC 61747-1, has been divided into IEC 61747-1-1, *Liquid crystal display devices – Part 1-1: Generic – Generic specification* and IEC 61747-1-2, *Liquid crystal display devices – Part 1-2: Generic – Terminology and letter symbols*;
- b) the contents of the terminology have been transferred to IEC 61747-1-2;

- c) Annex C has been changed from normative to informative, because Tables C.1 and C.2 mismatch some of the large scale production practices of recent date;
- d) References cited have been updated.

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

CDV	Report on voting
110/527/CDV	110/563/RVC

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.

A list of all the parts in the IEC 61747 series, under the general title *Liquid crystal display devices*, can be found on the IEC website.

NOTE The structure of the IEC 61747 series and the changes in the numbering are shown in Annex D of IEC 61747-30-1:2012.

The committee has decided that the contents of this publication will remain unchanged until the stability 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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A bilingual version of this publication may be issued at a later date.

LIQUID CRYSTAL DISPLAY DEVICES –

Part 1–1: Generic – Generic specification

1 Scope

This part of IEC 61747 is a generic specification for liquid crystal display devices. It defines general procedures for testing and gives general rules for the measuring methods of the electrical and optical characteristics, the rules for climatic and mechanical tests, and the rules for endurance tests.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 (all parts), *Semiconductor devices – Discrete devices*

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

IEC 60747-10:1991, *Semiconductor devices – Part 10: Generic specification for discrete devices and integrated circuits*

IEC 60748 (all parts), *Semiconductor devices – Integrated circuits*

IEC 60749, *Semiconductor devices – Mechanical and climatic test methods*

IEC 61747-1-2, *Liquid crystal display devices – Part 1-2: Terminology and letter symbols*

IEC 61747-5, *Liquid crystal and solid-state display devices – Part 5: Environmental, endurance and mechanical test methods*

IEC 61747-10-1, *Liquid crystal display devices – Part 10-1: Environmental, endurance and mechanical test methods – Mechanical*

IEC 61747-10-2, *Liquid crystal display devices – Part 10-2: Environmental and endurance measurements*

IEC 61747-20 (all parts), *Liquid crystal display devices – Visual inspection*

IEC 61747-30-1, *Liquid crystal display devices – Part 30-1: Measuring methods for liquid crystal display modules – Transmissive type*

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

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*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61747-1-2 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;
- c) the family specification, if any;
- d) the sectional specification;
- e) the generic specification;
- f) the basic specification;
- g) international (e.g. IEC) documents to which reference is made;
- h) a national document.

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

4.2 Standard environmental conditions

The preferred values of temperature, humidity and pressure for the measurement of characteristics, for tests and for operating conditions, are a temperature of 25 °C ± 5 °C, a relative humidity of 45 %RH to 75 %RH, and a pressure of 86 kPa to 106 kPa.

4.3 Marking

4.3.1 Device identification

The marking on the device shall enable clear identification of the device.

4.3.2 Device traceability

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

4.3.3 Packing

The 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.

NOTE Additional requirements can be specified in the relevant detail specification.

4.4 Categories of assessed quality

This generic specification provides three categories of quality control. The devices are grouped in an identified and date-coded inspection lot, which is tested to the specified quality categories. The AQLs (acceptance quality levels) or LTPDs (lot tolerance percentage defectives) 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 meets the requirements of categories II or III. Each lot meets the inspection requirements of group A which includes functional tests. Every three months, one lot meets the inspection requirements for interconnection ability. Annually, one lot meets the group B and group C inspection requirements.
- Category II The lot meets 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 lot is 100 % screened and meets 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 specifications 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 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 table of the sectional or blank detail specification, and all defectives removed. Other sequences not specified in this standard are applicable only where the above sequences are not correlated or are in contradiction with recognized failure mechanisms. When a part of the screening process as given in the relevant table of the sectional or blank detail specification forms part of the manufacturing process in the prescribed sequence, these procedures need not be repeated. For the purpose of this specification, burn-in is defined as thermal and electrical stress applied to all devices in a lot for a specified period of time for the purpose of detecting and removing potential early failures.

4.6 Handling

See IEC 60747-1:2006, Clause 8.

Adequate warning shall be displayed in the case of harmful products (e.g. Be0).

5 Quality assessment procedures

5.1 General

Quality assessment comprises the procedure for obtaining qualification approval as defined in 5.6, 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. In some cases, group D tests may also be specified, for example, for qualification approval.

5.2 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 that the requirements of the rules of procedure given in the specified quality assessment system have been complied with.

5.3 Formation of inspection lots

An inspection lot may be formed by the aggregation of several production lots provided that

- a) the production lots are manufactured under essentially the same conditions (materials, processes, machines, personnel, etc.), and,
- b) quality control and inspection during manufacture is performed to the extent necessary, in accordance with directives established by the appropriate departments of the manufacturer in consultation with the DMR, and,
- c) the results of this inspection indicate for each production lot that the quality of materials and processing is maintained within the limits necessary for the production of components satisfying the requirements of the specification, and,
- d) the period over which production lots may be aggregated into one inspection lot should normally not exceed one week, and shall not exceed one month unless permitted by the relevant specification.

The programme for the aggregation of production lots into inspection lots shall be determined by the DMR and shall be submitted for approval.

5.4 Structurally similar devices

Structurally similar components are components produced by the same manufacturer with essentially the same design, materials, processes and methods. They are such that the results of a given test carried out on one of these components can be recognised as being valid for the others of the group. They are separately identifiable.

The relevant specification shall give the requirements for grouping structurally similar components for the purpose of testing for QA and quality conformance inspection.

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

5.5 Granting of qualification approval

The CB shall validate the recommendation and grant the QA, when the requirements of the specific quality assessment system have been met.

Method a) or b) 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. In some cases, group D tests are required for qualification approval. All variables measurements called for as post-test end-points in the detail specification shall be recorded as variables data.

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 on demand.

5.6 Quality conformance inspection

5.6.1 General

Quality conformance inspection shall consist of the examinations and tests of groups A, B, C and D, as specified.

For groups 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 groups A and B inspection. Individual devices shall have passed the group A measurements called for in the detail specification.

5.6.2 Division into groups and subgroups

5.6.2.1 General

The following guidelines shall be used in the preparation of detail specifications.

5.6.2.2 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 groupings are not permitted.

Group A Inspection is divided into appropriate subgroups as follows:

- | | |
|---------------------|--|
| Subgroup A1 | This subgroup comprises a visual examination as specified in 6.2.1. |
| Subgroup A2 | This subgroup comprises measurements of primary characteristics of the device. IEC 61747-1-1:2014 |
| Subgroups A3 and 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 relevant sectional or blank detail specification. The choice between subgroups A3 or A4 for given measurements is essentially governed by the desirability of performing them at a given quality level. |

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

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

5.6.2.4 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, climatic 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.

5.6.2.5 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 into subgroups bearing the same number for corresponding tests.

The division is as given below.