

INTERNATIONAL STANDARD

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**Liquid crystal display devices –
Part 5-2: Environmental, endurance and mechanical test methods – Visual
inspection of active matrix colour liquid crystal display modules**

**Dispositifs d'affichage à cristaux liquides –
Partie 5-2: Méthodes d'essais d'environnement, d'endurance et mécaniques –
Inspection visuelle des modules d'affichage à cristaux liquides couleurs à
matrice active**



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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LIQUID CRYSTAL DISPLAY DEVICES –**Part 5-2: Environmental, endurance
and mechanical test methods –
Visual inspection of active matrix
colour liquid crystal display modules**

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International Standard IEC 61747-5-2 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
110/287/FDIS	110/306/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 the IEC 61747 series, under the general title *Liquid crystal display devices*, can be found on the IEC website.

Future standards in this series will carry the new general title as cited above. Titles of existing standards in this series will be updated at the time of the next edition.

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INTRODUCTION

IEC 61747-5-2 facilitates subjective visual inspection of image defects of LCD modules by the human eye. Visual inspection is performed under specified conditions and criteria, and the objective measurement method of visual image defect by instrument will be studied and standardized.

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LIQUID CRYSTAL DISPLAY DEVICES –

Part 5-2: Environmental, endurance and mechanical test methods – Visual inspection of active matrix colour liquid crystal display modules

1 Scope

This part of IEC 61747 gives the details of the quality assessment procedures and provides general rules for visual inspection of the active area of transmissive type active matrix colour liquid crystal display modules by the human eye. Furthermore, this standard includes defect definitions and the method for visual defect inspection.

NOTE 1 Mura is excluded from this standard because it was not clearly specified at the time this standard was developed.

NOTE 2 Restrictions on defect types, number, and sizes are specified in the quality contract (customer acceptance specification and incoming inspection specification) between panel and set makers.

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 61747-1:2003, *Liquid crystal and solid-state display devices – Part 1: Generic specification*

IEC 61747-5:1998, *Liquid crystal and solid-state display devices – Part 5: Environmental, endurance and mechanical test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61747-1, as well as the following, apply.

3.1

visual inspection

method by human eye for checking display defects that are difficult to objectively measure and characterize with an instrument

NOTE The limitation on display defects depends on supplier and customer. Therefore a limit sample, with well defined observation and operational conditions, can be used as a reference for the defect level.

3.2

defect

defined as any observable abnormal phenomena appearing in the active display area

NOTE It includes all kinds of defects such as one / more subpixel (dot) defect, line defect, scratch, foreign material and stain with unclear boundary larger than a pixel.

Figure 1 shows a classification of defects into two categories. The first category is classified as defects with a clear boundary, and the second category is classified as defects with an

unclear boundary. The latter category is not yet well defined, and hence difficult to evaluate. For this reason, defects in the second category are excluded from this standard.

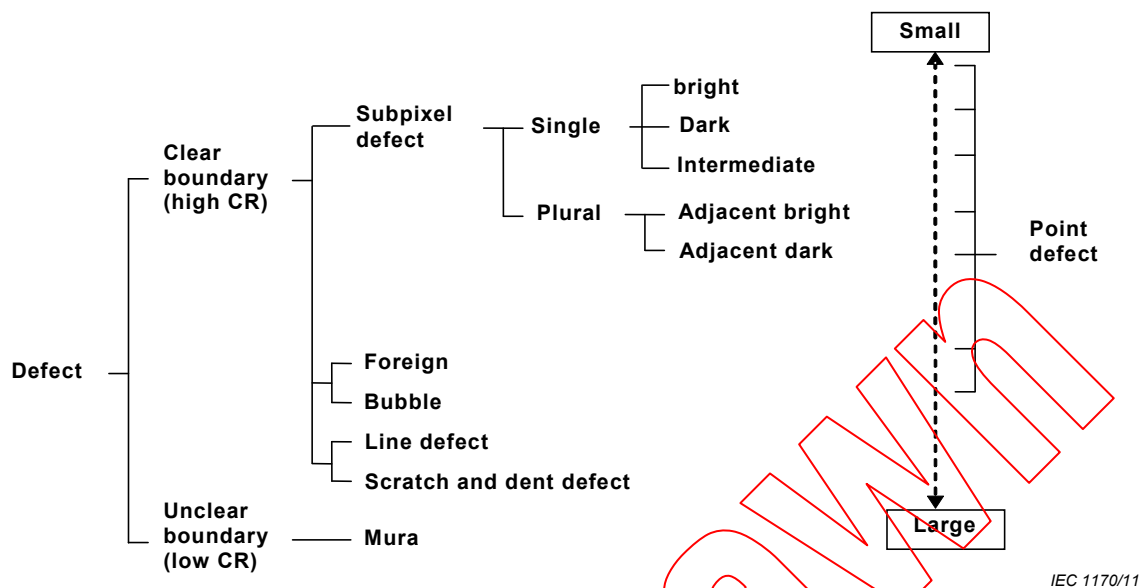


Figure 1 – Classification of defect by visual inspection

3.2.1

subpixel defect

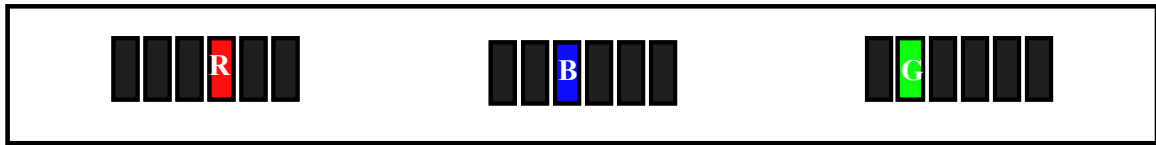
defect in the smallest pixel element when it appears in a different than the intended state, for instance bright subpixels appear on the dark pattern, and dark subpixels appear on a bright pattern

3.2.1.1

bright subpixel defects

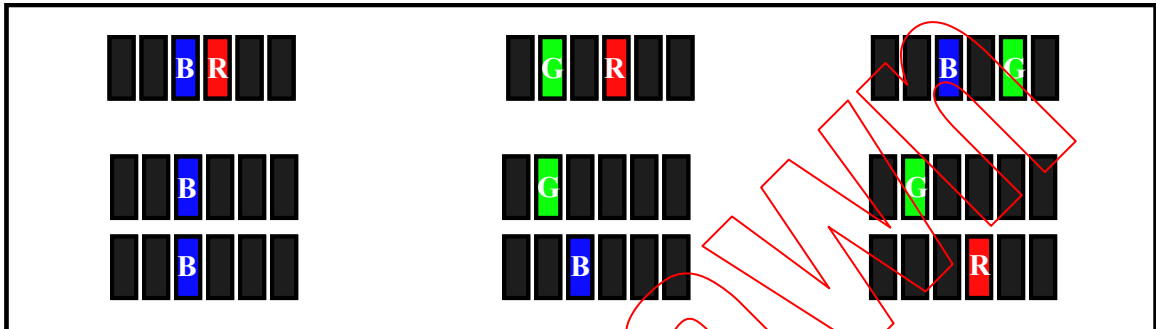
defects which appear bright on the screen when a dark pattern is displayed

Figure 2a) shows a single subpixel bright defect of red, green, and blue respectively. And Figure 2b) shows two adjacent bright subpixel defects connected or disconnected in horizontal or (and) vertical one pixel area. Figure 2c) shows adjacent three bright subpixel defects connected in three horizontal or (and) vertical subpixel area.



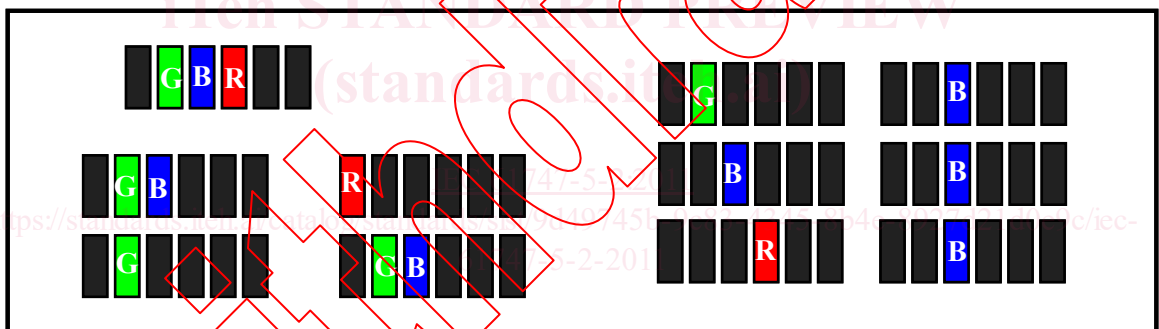
IEC 1171/11

Figure 2 a) – Examples of one bright subpixel defect



IEC 1172/11

Figure 2 b) – Examples of two adjacent bright subpixel defects



IEC 1173/11

Figure 2 c) – Examples of three adjacent bright subpixel defects

Figure 2 – Example of bright subpixel and adjacent subpixel defects in case of RGB primary colour display

3.2.1.2

dark subpixel defects

defects which appear dark on the screen when a bright pattern is displayed

Figure 3 a) shows single subpixel defects of the dark-type of red, green, blue, respectively. Figure 3 b) shows two adjacent dark subpixel defects connected or disconnected in horizontal or(and) vertical one pixel area. Figure 3 c) shows adjacent three dark subpixel defects connected in three horizontal or(and) vertical subpixel area.

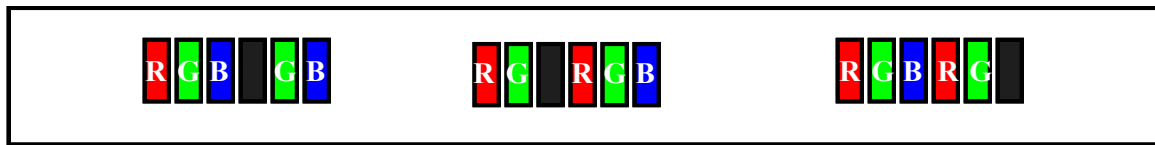


Figure 3 a) – One dark subpixel defect

IEC 1174/11

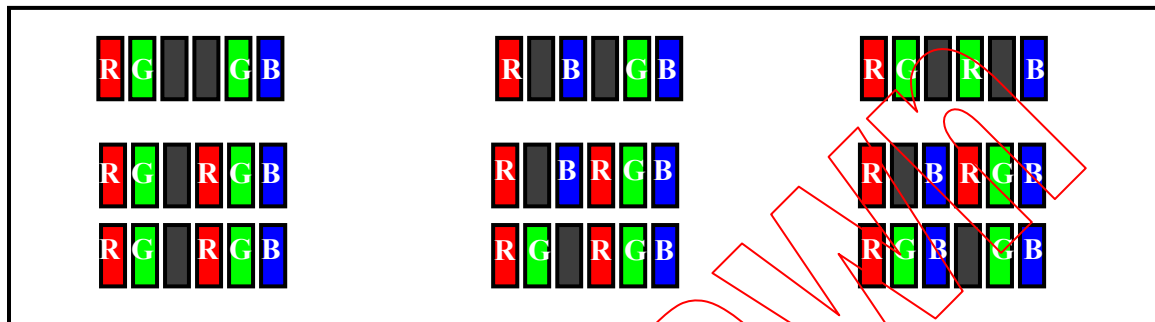


Figure 3 b) – Two adjacent dark subpixel defects

IEC 1175/11

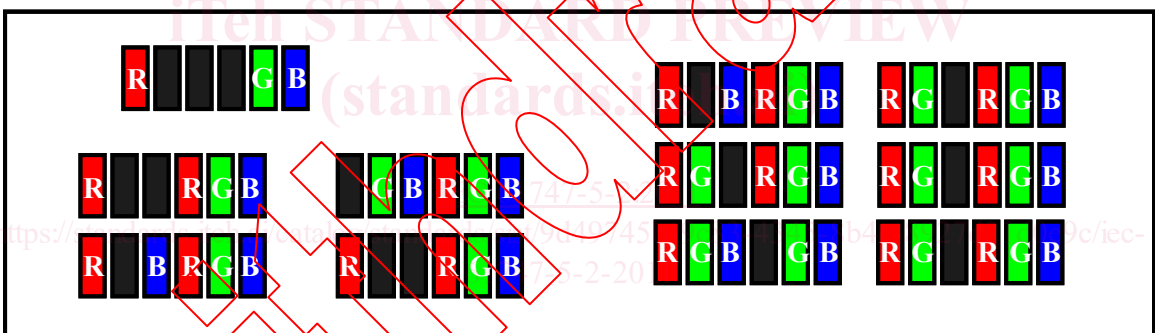


Figure 3 c) – Three adjacent dark subpixel defects

IEC 1176/11

Figure 3 – Example of dark subpixel and adjacent subpixel defects in case of RGB primary colour display

3.2.1.3

intermediate subpixel defects

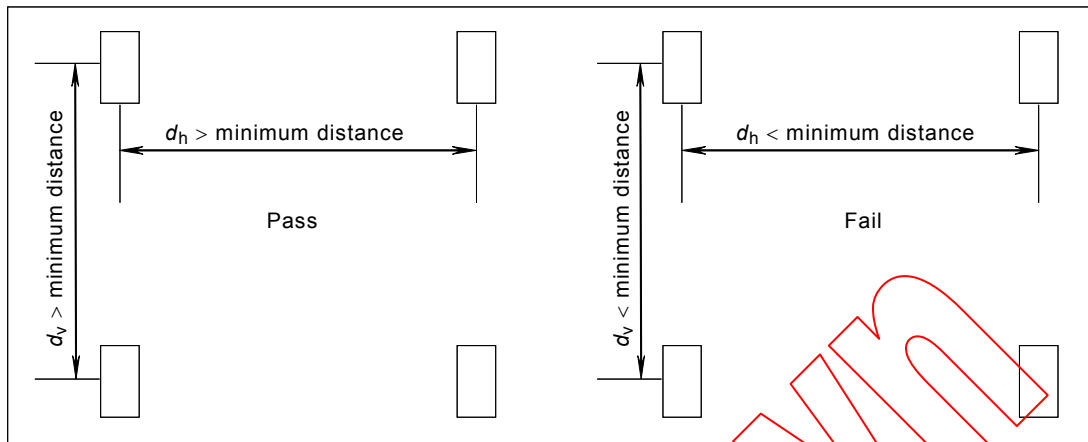
defects which appear with an intermediate level on the screen when a bright or dark pattern is displayed

3.2.1.4

cluster subpixel defects

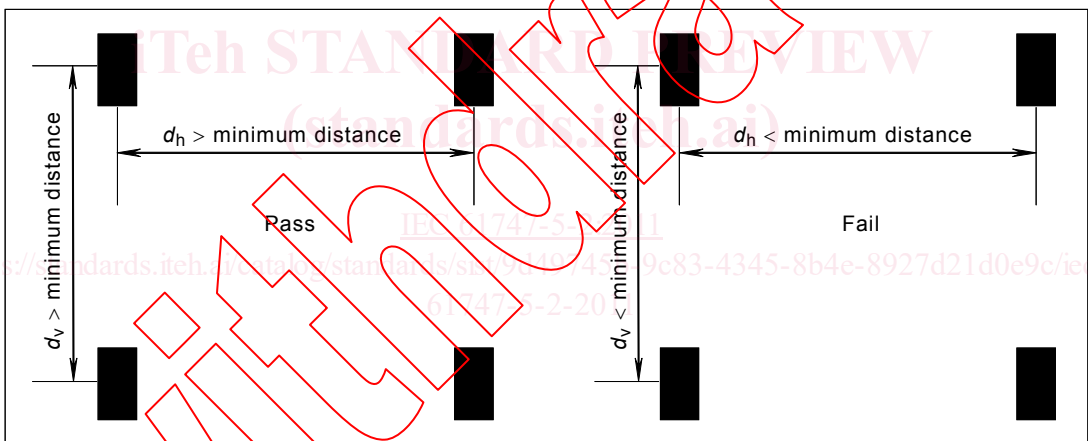
defects clustered in a specified area or within a specified distance with many subpixel defects

Figures 4 a) and Figure 4 b) show an example of bright and dark cluster subpixel defects in which the minimum distance between the defects is specified.



IEC 1177/11

Figure 4a) – Bright subpixel defect to bright subpixel defect



IEC 1178/11

Figure 4 b) – Dark subpixel defect to dark subpixel defect

Figure 4 – Examples of minimum distance between subpixel defects

3.2.2

line defect

vertical or horizontal line which appears in the bright or dark state when a dark or bright pattern is displayed

3.2.2.1

bright line defect

line that appears bright on the screen when a dark pattern is displayed

3.2.2.2

dark line defect

line that appears dark on the screen when a bright pattern is displayed