

TECHNICAL REPORT



**Electronic displays –
Part 5-2: Visual assessment – Colour discrimination according to viewing
direction**



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CONTENTS

FOREWORD.....	4
INTRODUCTION.....	6
1 Scope.....	7
2 Normative references	7
3 Terms, definitions and abbreviated terms	7
3.1 Terms and definitions.....	7
3.2 Abbreviated terms.....	8
4 Introduction to visual assessment.....	8
5 Standard measuring equipment and coordinate system	10
5.1 Light measuring devices	10
5.2 Viewing direction coordinate system	10
6 Test patterns	11
6.1 Geometrical construction	11
6.2 Colour assignment.....	12
6.3 Dots fill factor	14
7 Visual assessment method	15
7.1 General description of the assessment	15
7.2 Test room conditions.....	15
7.3 DUT parameters	16
7.4 Observers	16
7.5 Instructions for visual assessment method.....	17
7.6 Repeatability	18
7.7 Presentation and interpretation of the experimental assessment results.....	18
Annex A (informative) Fill factor dependency	26
Annex B (informative) Display white luminance dependency	29
Annex C (informative) Pattern generator	32
Bibliography.....	34
Figure 1 – Comparison between the proposed visual assessment and the conventional physical measurement	9
Figure 2 – Definition of viewing directions by the spherical angles of θ and φ	10
Figure 3 – Layout for horizontal viewing direction	11
Figure 4 – Pattern structures.....	12
Figure 5 – Colour assignment of test pattern.....	14
Figure 6 – Test environment	15
Figure 7 – Average CMF according to ethnic origin	17
Figure 8 – Assessment procedure.....	18
Figure 9 – Visual assessment results: statistical plot (upper figure) and mean recognition rates (lower figure)	19
Figure 10 – Statistical plot (upper) and mean of colour differences (lower) of test patterns	20
Figure 11 – Process of S-CIELAB transformation	21
Figure 12 – Contrast sensitivity function of HVS.....	21
Figure 13 – S-CIELAB results: statistical plot (upper) and mean colour difference (lower)	22

Figure 14 – Correlation between physical measures and S-CIELAB results.....	23
Figure 15 – Correlation between visual assessment and S-CIELAB method.....	23
Figure 16 – Pattern dependency	24
Figure 17 – Observer dependency	25
Figure A.1 – Fill factor variation	26
Figure A.2 – FF dependency	27
Figure A.3 – Colour difference relationship between pictorial image and test patterns with various FF	28
Figure B.1 – Colour reproduction performance of the DUT	30
Figure B.2 – White luminance dependency	31
Figure C.1 – Pattern generator user interface	33
Table 1 – Measurement directions for DUTs in living rooms	11
Table 2 – Reference colours of test pattern.....	13
Table 3 – Test room condition.....	15
Table 4 – Experimental setup of the DUT	16
Table 5 – Correlation coefficients.....	24
Table B.1 – Experimental setup and parameters	29

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Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this Technical Report is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts in the IEC 62977 series, published under the general title *Electronic displays*, can be found on the IEC website.

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- amended.

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INTRODUCTION

Current display measurement standards use mainly simple patterns for physical measurement methods to characterize display performance. Recent studies have introduced multiple colour test patterns to simulate real images based on physical measurements. Such types of physical measurements are commonly used and are an essential method of the industry. Often, humans can perceive a structural similarity [1]¹ as much as physical factors (colour, luminance, etc.). This document describes a method of structural sensitivity assessment dependent on the viewing direction, interpretation of assessment results, and correlation between assessment results and physical measurements. This correlation value can be used as the basis for determining one aspect of the viewing direction range of a display, which has relevance from a visual quality point of view. However, it should be noted that several characteristics (e.g. contrast ratio, resolution, and colour shift) are simultaneously changing in the assessment of the viewing direction.

This visual assessment approach has the benefit of obtaining direct human response to variations for any given task. However, it can be challenging with this approach to get reproducible experimental results due to different colour matching functions (CMFs), differences in observer experience, observer fatigue, attitudes toward experiments, human adaptation to different experimental environments (including illumination conditions, surround, or other environmental factors), content-dependent differences, and other variables. Therefore, the uncertainty for these visual assessment methods can be higher compared to instrumentation-based evaluation methods. Accordingly, this document should be seen as a limited constrained model to help understand some of the various human responses to the experiment. It can be used as an indicator of such response and to provide a framework to guide the acquisition of performance data by way of reliable instrumentation-based measurement methods.

¹ Numbers in square brackets refer to the Bibliography.

ELECTRONIC DISPLAYS –

Part 5-2: Visual assessment – Colour discrimination according to viewing direction

1 Scope

This part of IEC 62977, which is a Technical Report, describes the visual assessment method of the viewing direction characteristics of display devices. This document reviews the visual assessment of viewing direction by using special test patterns to estimate colour changes, image structure, and image luminance.

Experimental results are shown to reveal the effectiveness of this kind of visual assessment.

This method is a valuable tool for identifying image quality issues, but physical measurements will be used to confirm display performance specifications.

NOTE The visual assessment results will depend on the test pattern parameters and display setup conditions. As the viewing direction changes, characteristics such as contrast ratio, resolution, and device colour-shift simultaneously change in the perceived image.

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1 Terms and definitions

3.1.1

pixel

smallest encoded picture element in the input image

Note 1 to entry: Pixel is used as the unit of resolution of image sensor, image signal and display, respectively.

3.1.2

structural similarity

SS

measurement of the similarity between two images by comparison of the luminance, contrast and structure

Note 1 to entry: Refer to [1].