

INTERNATIONAL
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Ophthalmic instruments — Chart projectors

Instruments ophtalmiques — Projecteurs d'optotypes

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Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75% of the member bodies casting a vote.

International Standard ISO 10938 was prepared by Technical Committee ISO/TC 172, *Optics and optical instruments*, Subcommittee SC 7, *Ophthalmic optics and instruments*.

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Ophthalmic instruments — Chart projectors

1 Scope

This International Standard, together with ISO 15004, specifies minimum requirements and test methods for chart projector systems, including an optical projector and a screen, for the projection of targets used for the determination of visual acuity, the refractive status and the binocular functions of the human eye.

This International Standard takes precedence over ISO 15004, if differences exist.

2 Normative references

The following standards contain provision which, through reference in this text, constitute provision of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 8596:1994 *Ophthalmic optics - Visual acuity testing - Standard optotype and its presentation*

ISO 8597:1994 *Optics and optical instruments - Visual acuity testing - Method of correlating optotypes*

ISO 15004:1997 *Ophthalmic instruments - Fundamental requirements and test methods*

IEC 60601-1:1988 *Medical electrical equipment - Part 1: General requirements for safety*

3 Requirements

3.1 General

The chart projector shall conform to the requirements specified in ISO 15004.

3.2 Functional requirements

The chart projector shall conform to the requirements specified in 3.2.1 to 3.2.5.

NOTE - Verification of these requirements is described in clause 4.

3.2.1 Optotypes

If designed to be used for certification purposes, the chart projector shall be equipped either with the standard optotype according to ISO 8596 in the grades specified therein, or with optotypes which are correlated to the standard optotype by the method described in ISO 8597.

3.2.2 Test area and positioning of optotypes

If designed to be used for certification purposes, the target of the chart projector system shall comply with the requirements of clause 5 and 6.1 of ISO 8596:1994.

NOTE - It is recommended that there be at least 5 presentations (see 6.2 of ISO 8596:1994) of each optotype size.

3.2.3 Resolving power

When tested as described in 4.2, the chart projector shall conform to the following requirements:

The minimum resolution on the screen (expressed in lines per millimetre) shall be $4/V$ times the line separation corresponding to the limb width on the smallest optotype which the system is designed to project, where V is the decimal acuity grade of the smallest optotype (see ISO 8596).

3.2.4 Luminance and contrast

When tested as described in 4.2, the chart projector shall conform to the following requirements:

The luminance and contrast of the projected chart shall comply with ISO 8596.

The luminance of the background surrounding the optotype shall be between 80 cd/m^2 and 320 cd/m^2 .

NOTE - The recommended luminance is 200 cd/m^2 .

The luminance of the background within 2 character diameters of the optotype shall not vary by more than 30 %. Across the entire area of the projected field it shall not vary by more than 50 %.

Screens which are suitable for use with the projector shall be specified by the manufacturer.

3.2.5 Projection range

The projection range shall be 2,9 m to 6,1 m.

4 Test methods

4.1 General

All tests described in this International Standard are type tests.

Measuring devices shall have an accuracy better than 10 % of the smallest value to be determined.

4.2 Resolving power

The smallest projected optotype shall be observed at $\frac{1}{3}$ of the designed viewing distance and shall not differ noticeably in contrast and contour from larger optotypes.

The observer shall have a decimal visual acuity at least equal to 1,0.

5 Accompanying documents

The chart projector shall be accompanied by documents containing instructions for use. In particular, this information shall contain:

- a) name and address of the manufacturer;
- b) specification of projection screen;