

# INTERNATIONAL STANDARD

**ISO**  
**10938**

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## **Ophthalmic instruments — Chart projectors**

*Instruments ophtalmiques — Projecteurs d'optotypes*



Reference number  
ISO 10938:1998(E)

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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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International Organization for Standardization  
Case postale 56 • CH-1211 Genève 20 • Switzerland  
Internet central@iso.ch  
X.400 c=ch; a=400net; p=iso; o=isocs; s=central

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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 encourage 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	<i>Ophthalmic optics - Visual acuity testing - Standard optotype and its presentation</i>
ISO 8597:1994	<i>Optics and optical instruments - Visual acuity testing - Method of correlating optotypes</i>
ISO 15004:1997	<i>Ophthalmic instruments - Fundamental requirements and test methods</i>
IEC 60601-1:1988	<i>Medical electrical equipment - Part 1: General requirements for safety</i>

## 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  $80 \text{ cd/m}^2$  and  $320 \text{ cd/m}^2$ .

NOTE - The recommended luminance is  $200 \text{ cd/m}^2$ .

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  $1/3$  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;

- c) if appropriate, a statement that the chart projector contains standard optotypes in accordance with ISO 8596 and/or correlated optotypes in accordance with ISO 8597;
- d) where appropriate, a statement that the chart projector in its original packaging conforms to the transport conditions as specified in 5.3 of ISO 15004:1997;
- e) any additional documents as specified in 6.8 of IEC 60601-1:1988.

## 6 Marking

The chart projector shall be permanently marked with at least the following information:

- a) name of manufacturer or supplier;
- b) name and model of chart projector;
- c) marking as required by IEC 60601-1;
- d) a reference to this International Standard (ISO 10938), if the manufacturer or supplier claims compliance with it.

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**Descriptors:** optics, optical equipment, ophthalmic equipment, test equipment, chart projectors, specifications, optical properties, tests, type testing (tests), performance tests, marking, instructions.

Price based on 3 pages

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