INTERNATIONAL STANDARD

ISO 10197

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Micrographics — Reader-printers for transparent microforms — Characteristics

Micrographie — Lecteurs-reproducteurs de microformes transparentes — Caractéristiques

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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 10197 was prepared by Technical Committee ISO/TC 171, *Micrographics and optical memories for document and image recording, storage and use*.

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Micrographics — Reader-printers for transparent microforms — Characteristics

1 Scope

This International Standard specifies the essential performance characteristics of reader-printers designed for viewing and making hard copies from microfilm with a maximum width of 35 mm, whether in microfilm strips or in roll form, in open reels, cartridges or cassettes, microfiche, jackets and image cards. It applies to reader-printers with a magnification less than or equal to 50:1.

The requirements for the functions of readers, as specified in ISO 6198, are summarized in clause 4 for convenience of the users of this International Standard.

This International Standard establishes minimum criteria for the hard copy prints produced by reader-printers based on the use of microtest charts ISO No. 1 and ISO No. 2 or from microforms with a specified minimum quality, either an original or a duplicate.

This International Standard does not apply to special reader-printers that produce colour or other types of specialized microforms or prints. In addition, it does not necessarily apply to enlarger-printers.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions 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 216:1975, *Writing paper and certain classes of printed matter — Trimmed sizes — A and B series.*

ISO 446:1991, *Micrographics — ISO character and ISO test chart No. 1 — Description and use.*

ISO 1116:1975, *Microcopying — 16 mm and 35 mm microfilms, spools and reels.*

ISO 3272-1:1983, *Microfilming of technical drawings and other drawing office documents — Part 1: Operating procedures.*

ISO 3334:1989, *Micrographics — ISO resolution test chart No. 2 — Description and use.*

ISO 6196-1:1993, *Micrographics — Vocabulary — Part 01: General terms.*

ISO 6196-2:1993, *Micrographics — Vocabulary — Part 02: Image positions and methods of recording.*

ISO 6196-3:1983, *Micrographics — Vocabulary — Part 03: Film processing.*

ISO 6196-4:1987, *Micrographics — Vocabulary — Part 04: Materials and packaging.*

ISO 6196-5:1987, *Micrographics — Vocabulary — Part 05: Quality of images, legibility, inspection.*

ISO 6196-6:1992, *Micrographics — Vocabulary — Part 06: Equipment.*

ISO 6196-7:1992, *Micrographics — Vocabulary — Part 07: Computer micrographics.*

ISO 6196-8:—[1], *Micrographics — Vocabulary — Part 08: Application.*

ISO 6198:1993, *Micrographics — Readers for transparent microforms — Performance characteristics.*

1) To be published.

ISO 7565:1993, *Micrographics — Readers for transparent microforms — Measurement of characteristics.*

ISO 7761-1:—[1], *Micrographics — Single-core cartridge for 16 mm processed microfilm — Dimensions and operational constraints — Part 1: Open-type cartridge.*

ISO 7762:—[1], *Micrographics — Cassette for 16 mm processed microfilm — Dimensions and operational constraints.*

IEC 417H:1987, *Graphical symbols for use on equipment. Index, survey and compilation of the single sheets. Eighth supplement.*

IEC 950:1991, *Safety of information technology equipment including electrical business equipment.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 6196 and the following definitions apply.

3.1 reader-printer: Device which serves both as a reader and a printer and implies the provision of a viewing screen large enough to display a full-size, or nearly full-size, image of the original document. Reader-printers are usually designed for image and print sizes up to A3 or A2.

3.2 enlarger-printer: Device intended primarily for printing possibly having a limited viewing facility for image alignment and verification but not for detailed reading. These devices, sometimes also known as production printers, are usually designed for sizes in the range A2 to A0.

4 Performance characteristics of the reader portion

The essential performance characteristics are specified in ISO 6198.

For the convenience of the user, the requirements of the reader portion which pertain to reader-printers are summarized below. For methods of verifying the compliance with these requirements, see ISO 7565.

4.1 Magnification

The magnification shall be within ± 5 % of the nominal value indicated by the manufacturer. If multiple lenses are available for different magnifications, they shall be appropriately marked.

4.2 Image quality

4.2.1 Image resolution

With the appropriate microtest chart in the film gate, the character or pattern resolved on the screen shall be, at a minimum, that specified in column 2 of table 1 or 2.

The test image used shall be capable of resolving at least four patterns higher than specified in table 2 for the appropriate magnification.

4.2.2 Image distortion

Image distortion shall be less than 0,5 % due to curvilinear effects and 2 % for geometric effects.

4.3 Screen luminance and contrast

4.3.1 Screen luminance

At all points in the useful (measurement) area of the screen, the luminance shall not be less than 35 cd/m^2. The minimum luminance at the centre of the screen shall be 140 cd/m^2. For rear projection readers, the luminance between the maximum value and the minimum value shall not exceed a ratio of 10 except for those reader portions of reader-printers with very large screens. Screens having a diagonal greater than 540 mm are considered very large and the luminance ratio shall not exceed 15.

Table 1 — Minimum sized ISO microtest chart No. 1 characters (reduced 1:20) to be resolved in the screen image and in the hardcopy
(Values based upon prepared microtest chart)

Character of ISO No. 1 microtest chart to be read		
Nominal magnification	**Screen**	**Hard copy**
10:1	125	140
15:1	112	125
20:1	100	112
25:1	90	100
30:1	80	90
35:1	71 [1)]	80
40:1	63 [1)]	71 [1)]
45:1	56 [1)]	63 [1)]
50:1	50 [1)]	56 [1)]

1) The difficulty in obtaining such fine characters on the microtest chart can make the measurements incorrect.

Table 2 — Minimum sized ISO microtest chart No. 2 pattern to be resolved in the screen image and in the hard copy

(Values based upon specifically made microtest chart which can require calculations to give true values)

Pattern of ISO No. 2 microtest chart to be read[1)]		
Nominal magnification	**Screen** lp/mm	**Hard copy** lp/mm
10:1	6,3	5,0
15:1	4,5	3,6
20:1	4,0	3,2
25:1	3,6	2,8 [1)]
30:1	3,2	2,5 [1)]
35:1	3,2	2,5 [1)]
40:1	2,8 [1)]	2,5 [1)]
45:1	2,5 [1)]	2,5 [1)]
50:1	2,5 [1)]	2,5 [1)]
NOTE — Calculations involving the reduction used to make the microtest chart can be necessary to determine the actual resolution specified in table 2.		
1) The difficulty in obtaining such fine characters on the microtest chart can make the measurements incorrect.		

For front projection readers, the luminance between the maximum value and the minimum value shall not exceed a ratio of 5.

4.3.2 Screen contrast

The screen contrast expressed as a luminance ratio shall be a minimum of 10. The light leakage from the reader portion of the reader-printer shall be restricted so that neither direct nor reflected rays will reduce the image quality.

4.4 Film accommodation

The reader portion of the reader-printer shall accommodate the specific microform type(s) and size(s) for which the reader portion of the reader-printer was designed and display the images in an upright and right-reading manner.

The screen size shall be large enough to accommodate the image size for which it was designed. The reader portion of roll film readers shall be designed so as to minimize abrasion of the film image area during transport of the film through the reader portion of the reader-printer. The film carrier or other film positioning mechanism shall be designed to accommodate a reel, cartridge or cassette as specified in ISO 1116, ISO 7761-1 or ISO 7762 and so that it will not abrade the film.

4.5 Focus

A suitable and easily accessible means shall be provided for adjusting the focus of the image for any of the microforms for which the reader portion of the reader-printer was designed. The image shall remain in focus when a large frame is scanned or when the reader-printer is moving images from one frame to another on the same microform, unless roll microfilm is being transported at high speed, in which case when any image is viewed, it shall appear in best focus.

4.6 Controls

All operator controls shall be readily accessible and easy to use from the normal operating position. The controls shall be marked in the language which is acceptable to the country in which the devices will be sold or marked with ISO/IEC standard symbols (see IEC 417H).

5 Performance characteristics of the printer portion

5.1 Paper requirement

5.1.1 Paper sizes

The printer portion of the reader-printer shall accommodate one or more of the paper sizes specified in ISO 216. By agreement between manufacturers and users, other paper sizes are acceptable. If the paper is supplied in roll form, the cut length from the roll shall have a $\pm$ 3 mm tolerance from the length or width specified.

5.1.2 Paper handling

The paper feeding system shall be easy to load and thread. A sketch showing the threading path and any instructions for clearing a paper jam shall be in a conspicuous place. If a temperature of above 40 °C is required to process the hard copy, the heating chamber shall be labelled with a warning (e.g. "CAUTION-HOT") or with the appropriate ISO/IEC symbol. The paper driving mechanism shall not cause misalignment of the paper by more than 5 mm/m when the paper is properly threaded.

NOTE 1 Misalignment applies to either sideways or twisting displacement.

The hard copy prints should be available for use within 30 s from the time the print cycle is activated.

5.1.3 Paper characteristics

The paper surface after processing shall be capable of being marked with conventional writing instruments such as pencils, ballpoint pens, etc.

5.2 Controls

The paper and printer shall be labelled to indicate if they can operate in a bimodal manner, i.e. make positive-appearing prints from either negative- or positive-appearing film images. The necessary controls for such operations shall be clearly labelled.

In addition to a print cycle start control, there shall be a graduated exposure control to compensate for film density variations. If multicopy capability is a feature, a counter selector shall be provided. These controls shall be clearly labelled.

The focus of the image during printing shall be the same as the focus of the image that is viewed (i.e. best focus). For reader-printers which have screens larger than the projected frame, there shall be indicators to show where the image is to be located so that it will be centred on the hard copy. Some reader-printers permit variable width prints, in which case width controller and indicators shall be clearly labelled.

5.3 Image quality

5.3.1 Image size

With the exception of technical documents (engineering drawings), the image printed on the paper shall correspond to the image displayed on the screen with a tolerance of $^{0}_{-4}$ %.

For print enlargement ratio and sizes of technical documents, see ISO 3272-1.

5.3.2 Image resolution

Images of microtest charts ISO No. 1 or ISO No. 2 on the hard copy shall resolve the character or test pattern in accordance with table 1 or 2. A magnifier may be used to verify the character or test pattern resolved when read in accordance with ISO 446 or ISO 3334.

5.4 Temperature

5.4.1 Film gate temperature

The temperature in the film gate shall not exceed 72 °C after 60 min of continuous operation with the reader in focus and the lamp operating at its higher brightness setting permitted by the reader when measured in accordance with ISO 7565.

5.4.2 Case temperature

The case temperature shall meet the requirement given in ISO 6198.

5.5 Safety

Reader-printers that are designed to stand on a flat and horizontal surface shall not tip over when tested in accordance with the methods described in IEC 950. Materials used in the construction of reader-printers shall be such that if the device catches fire, they prevent the spread of flames and do not emit toxic fumes. Devices shall be constructed in accordance with the appropriate requirements of IEC 950.

Reader-printers shall be constructed so there is no mechanical or electrical risk to the operator when the device is operated under the severest conditions for which it was designed (see ISO 6198).

All processing supplies shall be in noncorrosive, spillproof reservoirs and meet the legal requirement of toxicity. Replenishment methods shall be designed to prevent contact with the operator. All supplies including paper shall be labelled with an expiration date, if applicable, and storage conditions.

5.6 Noise

The noise level of reader-printers shall meet the requirements given in ISO 6198.