INTERNATIONAL STANDARD

ISO
446

Micrographics — ISO character and ISO test chart No. 1 — Description and use

Micrographie — Caractère ISO et mire ISO N° 1 — Description et utilisation

INTERNATIONAL

ISO

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

This second edition cancels and replaces the first editions (ISO 435:1975 and ISO 446:1975), which have been merged into a single International Standard.

Annex A of this International Standard is for information only.

Introduction

Any reproduction process gives a diminished image of the original document, which may go so far as to make the information unreadable. Poor legibility is also the cause of visual fatigue in cases of prolonged reading.

The legibility of an image can be appreciated by measuring the limit of resolution, i.e. the ability to distinguish lines in different directions. However, the limit of resolution corresponds to a quality level insufficient to permit easy reading, and to prolong it without visual fatigue.

A criterion which corresponded better to actual working conditions was sought. The ISO character, which is a conventional character similar to typefaces used in the printing industry, the outline and details of which should be distinguished without difficulty, answers these requirements.

The main practical applications of the ISO character are based on the following experimental properties:

a) if a particular reproduction process gives an identifiable image from a group of ISO characters of a certain height, it can be assumed that the same process will produce, from a printed text of comparable typeface size, a satisfactory image and, in particular, one sharp enough to be read for a certain time, without undue visual fatigue for the viewer;

b) in general, the identification of one and the same group of ISO characters by different observers gives substantially identical results.

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Micrographics — ISO character and ISO test chart No. 1 — Description and use

1 Scope

This International Standard specifies the characteristics of the ISO character and of the ISO test chart No. 1, in black and white, as well as their use.

It applies to the control of the quality of microimages produced with a given micrographic system, which enables one to determine the potential legibility of the documents recorded with that system.

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 3:1973, *Preferred numbers — Series of preferred numbers*.

ISO 5-2:1985, *Photography — Density measurements — Part 2: Geometric conditions for transmission density*.

ISO 5-3:1984, *Photography — Density measurements — Part 3: Spectral conditions*.

ISO 5-4:1983, *Photography — Density measurements — Part 4: Geometric conditions for reflection density*.

ISO 2471:1977, *Paper and board — Determination of opacity (paper backing) — Diffuse reflectance method*.

ISO 6196-1:1980, *Micrographics — Vocabulary — Section 01: General terms*.

ISO 6196-2:1982, *Micrographics — Vocabulary — Section 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:—[1], *Micrographics — Vocabulary — Part 06: Equipment*.

ISO 6200:1990, *Micrographics — First generation silver-gelatin microforms of source documents — Density specifications*.

3 Definitions

For the definitions of the technical terms used in this International Standard, see ISO 6196.

4 Description and use of the ISO character

4.1 Description

The ISO character is a conventional character, similar to printing typefaces, the shape and size of which are specified as follows.

It consists of a regular octagon, of a given height c, with two internal parallel lines (see figure 1). The tolerances of c are specified in 5.2.2.
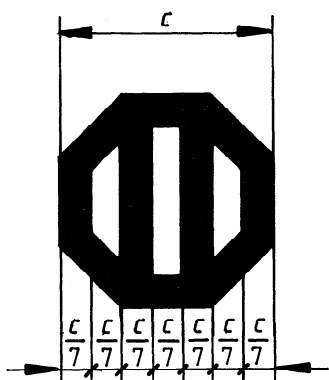
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[1] To be published.

Figure 1 — Enlarged drawing of the ISO conventional character for legibility test

The internal lines can be oriented in four different ways: vertically, horizontally, 45° to the right, and 45° to the left.

This orientation is defined by one of the following terms:

Vertical	‖
Horizontal	⹀
Right-inclined	⫽
Left-inclined	⟍

4.2 Use

The ISO character can be used in micrographics for making black and white or colour test charts (control of microform production equipment) or microtest charts (control of viewing and printing equipment). It can also be used for controlling the quality of images produced with other techniques (photography, reprography, etc.).

5 Realization of ISO test chart No. 1

5.1 Base

The test chart shall be made on either an opaque or a transparent base.

5.1.1 Opaque base

The test chart shall be made on a white opaque base (preferably glossy). Its visual diffuse reflection density, measured as specified in ISO 5-3 and

ISO 5-4, shall be not more than 0,08. The opacity, measured as specified in ISO 2471, shall be over 85 %. This test chart shall be positive-appearing.

5.1.2 Transparent base

The test chart shall be made on a non-coloured transparent base having a maximum visual diffuse transmission density, base + fog, of 0,08 measured as specified in ISO 5-2 and ISO 5-3. This test chart can be positive-appearing or negative-appearing.

5.2 Test chart lay-out

ISO test chart No. 1 consists of groups of ISO characters arranged as shown in figure 2.
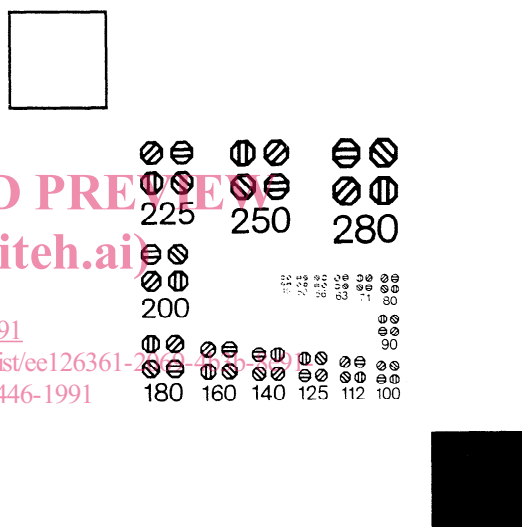

Figure 2 — ISO test chart No. 1 (Reproduction not to be used as an original test chart)

5.2.1 Group of characters

Each group is formed by four ISO characters of the same size and of different orientation (see 4.1).

The characters are arranged in a square pattern as shown in figure 3 and are oriented indiscriminately.

The minimum space between two characters, horizontally and vertically, shall be equal to $2c/7$.

The minimum space between two groups of characters shall be equal to $2c/7$ the smallest character of one or another group.
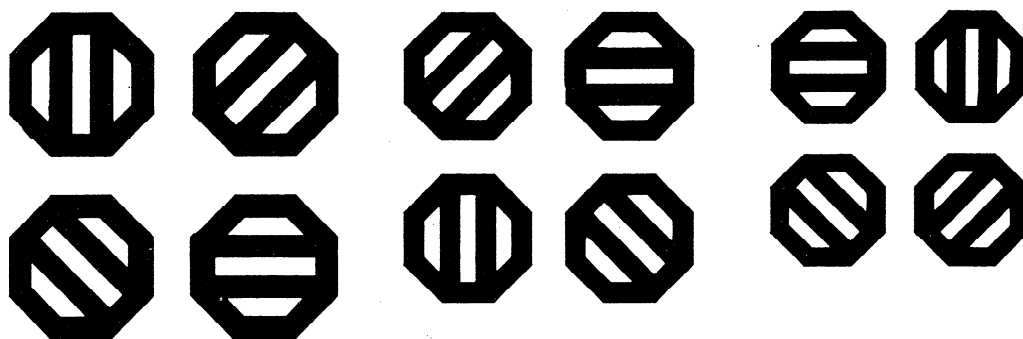
Figure 3 — Examples of groups of ISO characters

5.2.2 Sizes of characters

Dimension c — in hundredths of a millimetre — of the four characters of each group shall be graded according to the R 20 series of preferred numbers specified in ISO 3:

45 50 56 63 71 80 90

100 112 125 140 160 180 200

225 250 280

The white and dark lines shall have the same widths, with a tolerance of $\pm$ 7 μm, measured on each character segment (see figure 4).

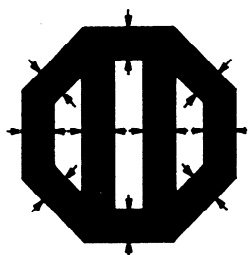The tolerance on these dimensions shall be $\pm$ 2 %.

Figure 4 — Measurement of line width

5.2.3 Contrast

The minimum visual diffuse density difference between the base and the characters shall be 3,0 for test charts on a film base and 1,6 for test charts on paper.

The visual diffuse density of the white lines in the ISO character should be not more than 0,02 greater than the visual diffuse density of the paper.

5.2.4 Identification of the groups of characters

Each group is identified by a number, placed at the bottom of the group, corresponding to the size of the characters it contains. For instance, number 45 corresponds to a group composed of characters 0,45 mm in size.

The numbers shall be legible to the naked eye. The details of the numbers corresponding to characters smaller than 125 shall be greater than those of the corresponding characters.

5.3 Density measuring areas

To check that the test chart meets the requirements of 5.2.3, the test chart shall include two areas, a clear one for measuring the background density of the test chart, and a dark one the density of which can be considered as that of the characters. Each area shall be at least 10 mm × 10 mm.

NOTE 1   These areas are not used for measuring the densities of the microimages (see 6.2).

5.4 Identification

The words "ISO test chart No. 1", a reference to this International Standard or to any equivalent national standards and the certifying agent[2], or source of issue shall appear on the test chart.

5.5 Certification of ISO No. 1 test charts

Only test charts complying in every respect with this International Standard and verified by a qualified laboratory can be designated ISO No. 1 test charts.

2) Test charts certified to conform to this International Standard can be obtained from AFNOR, Cedex 7, Tour Europe, F 92049 Paris La Défense.

3

6 Procedure for using ISO test chart No. 1

6.1 Method

Position the ISO test charts for microfilming so as to test the whole image-field.

6.2 Density of the film

Measure the background visual diffuse transmission density of the microimages of the test chart in accordance with ISO 6200. When positive-appearing test charts are used, this density shall range between 1,50 and 1,70.

6.3 Legibility control

Examine the microimages of the ISO test chart No. 1 with a microscope fitted with a lens having a numerical aperture of at least 0,1, and set with an eye-piece fitted with a micrometer so as to obtain a magnification between × 30 and × 50.

A group of ISO characters of a given size is considered as "read" in a given area of the field if the four characters of the group are identified, i.e. that the characters are completely read if the black and white lines in all ISO characters in a group are discernible and without discontinuity.

Figure 5 gives examples of characters "read" and "non-read".

The maximum sizes of the characters to "read" vary in relation to the reduction ratios used. They are specified in the International Standards determining the conditions of exposure and use of microforms.

READ   NON-READ

Figure 5 — Examples of characters "read" and "non-read"

Annex A

(informative)

Optional features for ISO test chart No. 1

Optional features can complete ISO test chart No. 1 (see figure A.1).
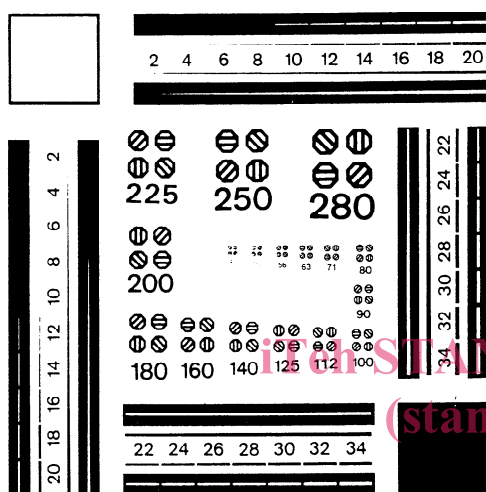

Figure A.1 — ISO test chart No. 1 with optional features

A.1 Description

The following lines are used for checking the legibility of the lines:

Eight discontinuous lines, four white and four black, along the four sides of the test chart, comprising seven or ten segments, the thickness of which ranges from 0,02 mm to 0,2 mm and from 0,22 mm to 0,34 mm.

The following lines are used for checking the exposure and processing conditions:

Eight converging continuous lines, four white and four black, of the same width as the corresponding discontinuous lines.

A.2 Use and interpretation

A.2.1 Legibility of the lines

A line shall be considered as "read" if the integrity of the two corresponding segments (the white one and the black one) is kept (net contour).

A.2.2 Setting of exposure and processing conditions

The best conditions are reached when the white line and the black line are of equal length, on each side.

A.2.3 Step by step control of the sequence of technologies and the ability of the system to reproduce fine detail

a) Calibrate the camera at each reduction ratio to achieve the balance of exposure and development (see A.2.2) and the highest resolving power.

b) Calibrate all devices used for the production of further generations, for reading and producing hard copy.

c) Film a test target with five test charts at each reduction ratio and process the first generation microform through the whole sequence to obtain further generations.

d) Find the smallest legible group of characters in the whole area of the reproduction of the test target (copy, hard copy, screen) and the thinnest legible wedge line section in dark and light. The character and section width numbers will indicate the ability of the system and the quality limits for safe microfilming.