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Micrographics — Methods of measuring image quality produced by aperture card scanners —

Part 1: Characteristics of the test images

Micrographie — Méthodes de mesurage de la qualité de l'image produite par les numérisateurs de cartes à fenêtre —

Partie 1: Caractéristiques des images d'essai

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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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.

Attention is drawn to the possibility that some of the elements of this part of ISO 11698 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 11698-1 was prepared by Technical Committee ISO/TC 171, *Document imaging applications*, Subcommittee SC 1, *Quality*.

ISO 11698 consists of the following parts, under the general title *Micrographics — Methods of measuring image quality produced by aperture card scanners*:

— *Part 1: Characteristics of the test images*

— *Part 2: Quality criteria and control*

Annex A of this part of ISO 11698 is for information only.

Introduction

Scanning of microimages in aperture cards for use in CAD and electronic information systems is of great importance. This International Standard describes a series of test aperture card microimages, which can be used to evaluate the output quality resulting from aperture card scanning systems.

The procedures for the use of these microimages is described in ISO 11698-2.

Micrographics — Methods of measuring image quality produced by aperture card scanners —

Part 1:
Characteristics of the test images

1 Scope

This part of ISO 11698 specifies the characteristics of the test images used for evaluating or checking the quality of electronic images generated by aperture card scanners.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 11698. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 11698 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

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

ISO 6196-4:1998, *Micrographics — Vocabulary — Part 4: Materials and packaging.*

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

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

ISO 6428:1982, *Technical drawings — Requirements for microcopying.*

ISO 12651:1999, *Electronic imaging — Vocabulary.*

3 Terms and definitions

For the purposes of this part of ISO 11698, the terms and definitions given in ISO 6196 and ISO 12651 apply. Where a term appears in both of these International Standards it is essential that the definition used is appropriate to the context of the term.

4 Specifications for test images

4.1 General

Each test card shall be an aperture card with inserted microimage, or a piece of photographic film the size of an aperture card having an image in that area corresponding to the aperture of a card, and right reading when viewed through the base.

NOTE Recommended nominal film thickness is 0,18 mm.

4.2 Test image type 1

Test image type 1 is used for evaluating or checking image centring, scaling, capture size, line straightness, orthogonality and uniformity of line width. Seven Type 1 test images are specified, one for each combination of sheet size and orientation shown in Table 1.

A type 1 test image, see example Figure 1, shall comprise:

— a rectangle, divided by five vertical lines at intervals of one sixth of its length and a horizontal line from the midpoints of the vertical sides, of which the corners and midpoints of the sides shall be joined by diagonal lines;

— a larger rectangle, concentric with the smaller one, bounded by a thick broken line the inner edge of which represents the image area of microimage required to be captured by a scanner, equal in size to the nominal sheet size specified in ISO 3272-1 divided by the nominal reduction ratio specified for that size;

— a 4 mm scale, graduated from −2 mm to +2 mm at intervals of 0,1 mm and 1 mm, extending each line that forms a corner in the inner rectangle.

Points on the inner rectangle shall be assigned letters A-H and the intersection of AC and BD letter O as shown in Figure 1. Dimensions shall be assigned to lines AB and AD as specified in Table 1, giving also the reduction ratio applicable to the microfilm image.

Table 1 — Test image type 1 — sheet size, orientation and dimensions

Test image	Sheet size	Orientation	Dimension AB mm	Dimension AD mm
1	A0	Landscape	1068,9	720,9
2	A1	Landscape	756,2	509,2
3	A2	Landscape	534,0	360,0
4	A3	Portrait	237,0	360,0
5	A3	Landscape	360,0	237,0
6	A4	Portrait	210,0	297,0
7	A4	Landscape	237,0	150,0

4.3 Test image type 2

Test image type 2, see example in Figure 2, is used for evaluating or checking resolving power. It shall contain five test targets, one at the centre and one at each corner. Each test target shall comprise:

— two Pestrecov stars, a square containing a radial pattern of lines having equal angular frequency and concentric circles which indicate the location of radial line frequencies equivalent to 2, 4 and 8 line pairs per millimetre;

— two sections of ISO No. 2 test charts having patterns with spatial frequency in the range 84-300 line pairs per millimetre;

— four sections of Pestrecov star pattern.

The size of each of the test targets shall be such that they do not overlap each other, and enable identification of the elements. Frequency information should be added to the target as appropriate.

4.4 Test image type 3

Five type 3 test images are specified, one each for the sheet sizes in the series A0-A4.

Test image type 3, see example Figure 3, is used for evaluating or checking the performance of the scanner when scanning different line widths. It shall comprise a number of test targets as specified in Table 2. Each test target shall comprise three patterns having two sets of lines of thickness equal to one of the series 0,30-1,0 specified in ISO 6428, equally spaced and at right angles to each other.

— One pattern shall be positive-appearing and have seven sets of lines and spaces of equal width;

— one pattern shall be positive-appearing and have six sets of lines and spaces at least five times greater than line width;

— one pattern shall be negative-appearing and have six sets of lines and spaces at least five times greater than line width.

The test targets should be regularly arranged to cover as much of the microimage area as possible.

Table 2 — Number of test targets

Sheet size	Number of targets
A4	1
A3	2
A2	4
A1	6
A0	6

4.5 Test image type 4

Test image type 4, see example Figure 4, is used for evaluating or checking how well the scanner optics are focused. It shall comprise five test targets on a background, half of which shall contain horizontal lines and the other half vertical lines having spatial frequency of fifty lines pairs per millimetre. Each test target shall comprise two patterns having four sets of lines with increasing spatial frequency, each pattern designated by a letter A-J, in the form of a broken rectangle symmetrical about the lettered axis. The spatial frequencies of line sets are specified in Table 3. The long axes of each pair of patterns shall be at 45 degrees to each other.

Table 3 — Spatial frequency of line sets

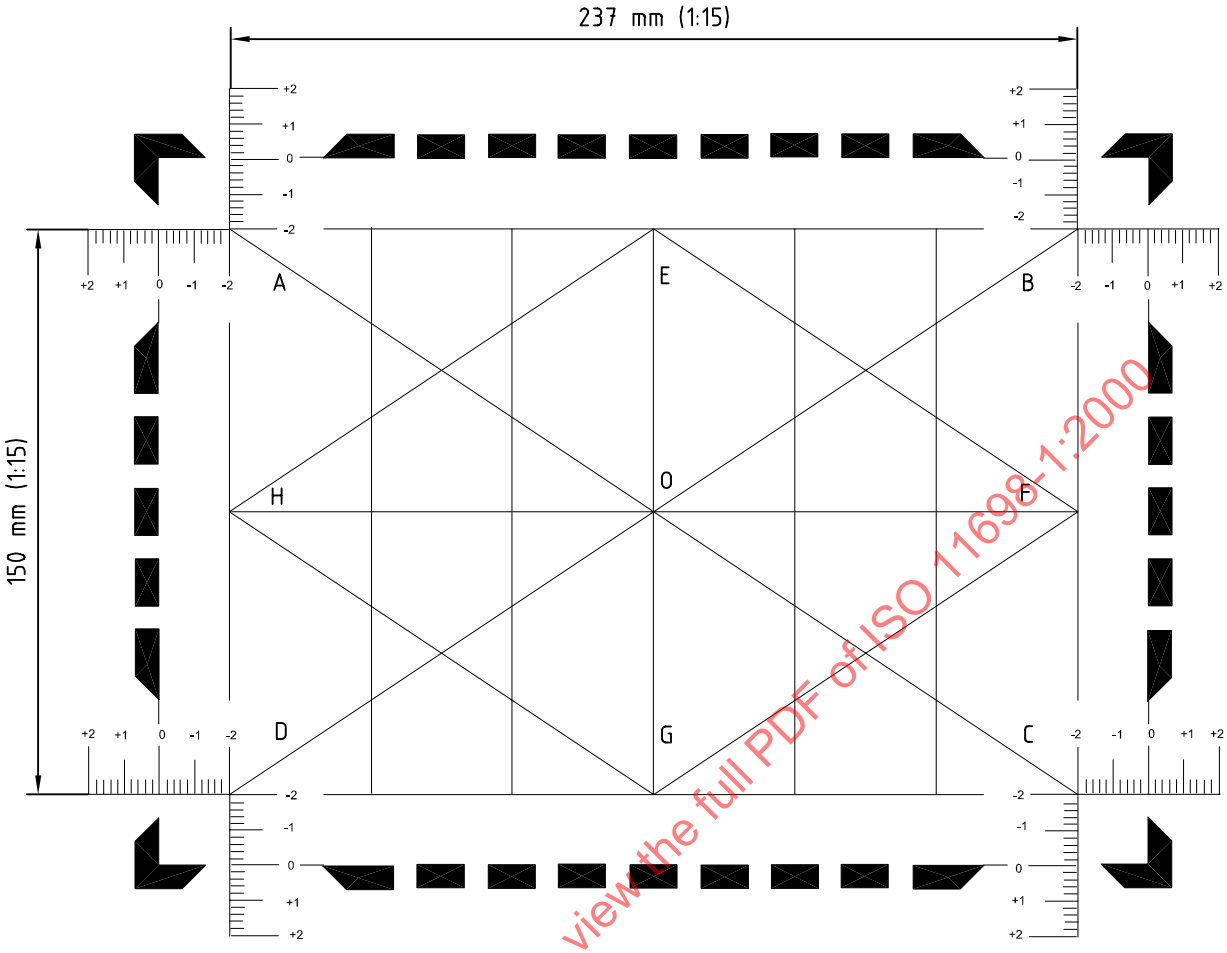
Pattern	A	B	C	D	E	F	G	H	I	J
Line pairs per mm	21,5	25,8	31,0	37,2	44,6	53,5	64,2	77,0	92,5	111,0

4.6 Test image type 5

Test image type 5, see example Figure 5, is used for evaluating or checking legibility. It shall comprise two blocks of character strings of a typeface similar in height to width ratio, line thickness and style to that used for written information on technical drawings. The character sizes used should be from the smallest available on the system designated zero, increasing in equal steps. The character size identifier of lines on each block shall increase from top to bottom by an increment of two. One block shall contain even numbered character size strings from 0 to 62 and the other odd numbered character size strings from 1 to 63. Character lines shall comprise Roman alphabetic characters in alphabetic order and where length of line permits Arabic numerical characters in numerical order. Each character line shall include its character size identifier in numerical characters after the first alphabetic character.

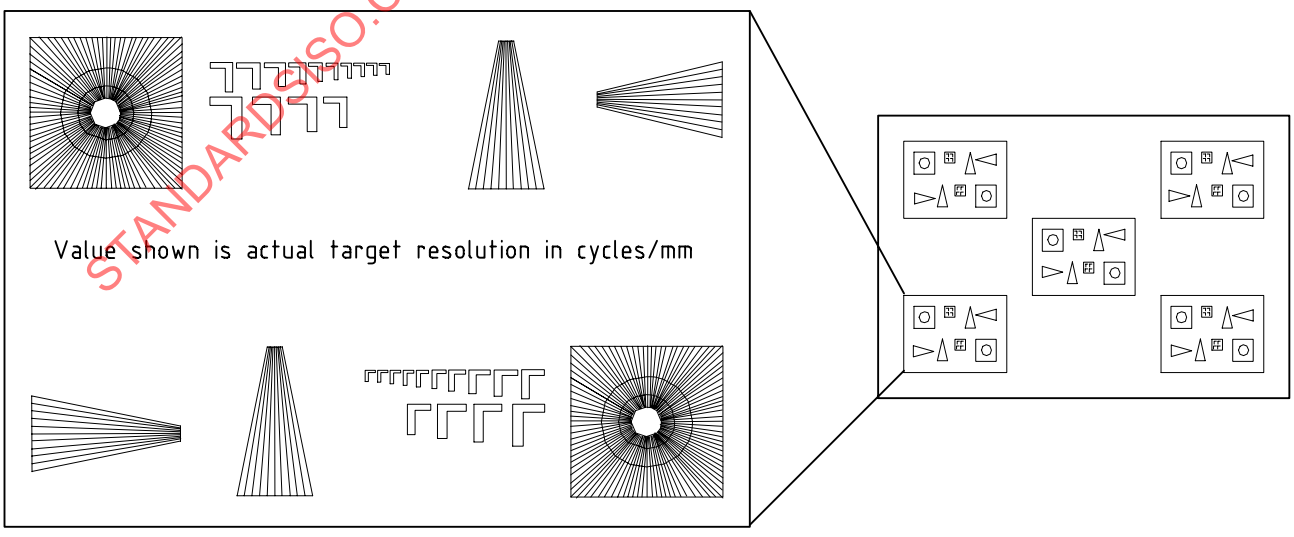
4.7 User target

It may be helpful in some circumstances to define a user target, with image attributes typical of those used in practice. Annex A gives details of a typical user target for technical drawing applications.



NOTE In dimensions AB and AD, the (1:15) denotes the reduction ratio used in producing the test image and is important since the actual dimensions on the film can only be known if the reduction ratio is known.

Figure 1 — Sample layout of test image type 1 (set of 7) for checking image centring, scaling, capture size



Enlarged detail of test target

Figure 2 — Sample layout of test image type 2 for checking resolving power

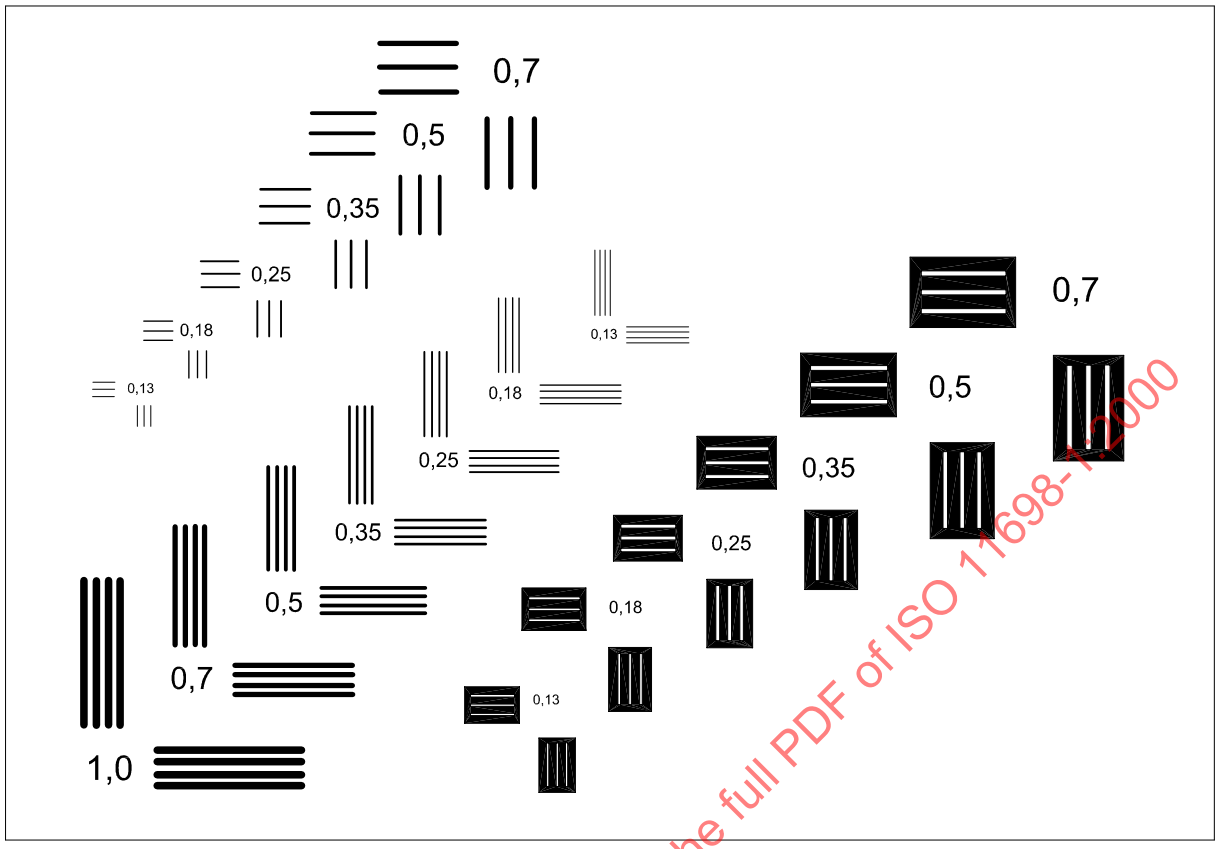


Figure 3 — Sample layout of test image type 3 (set of 5) for checking line width

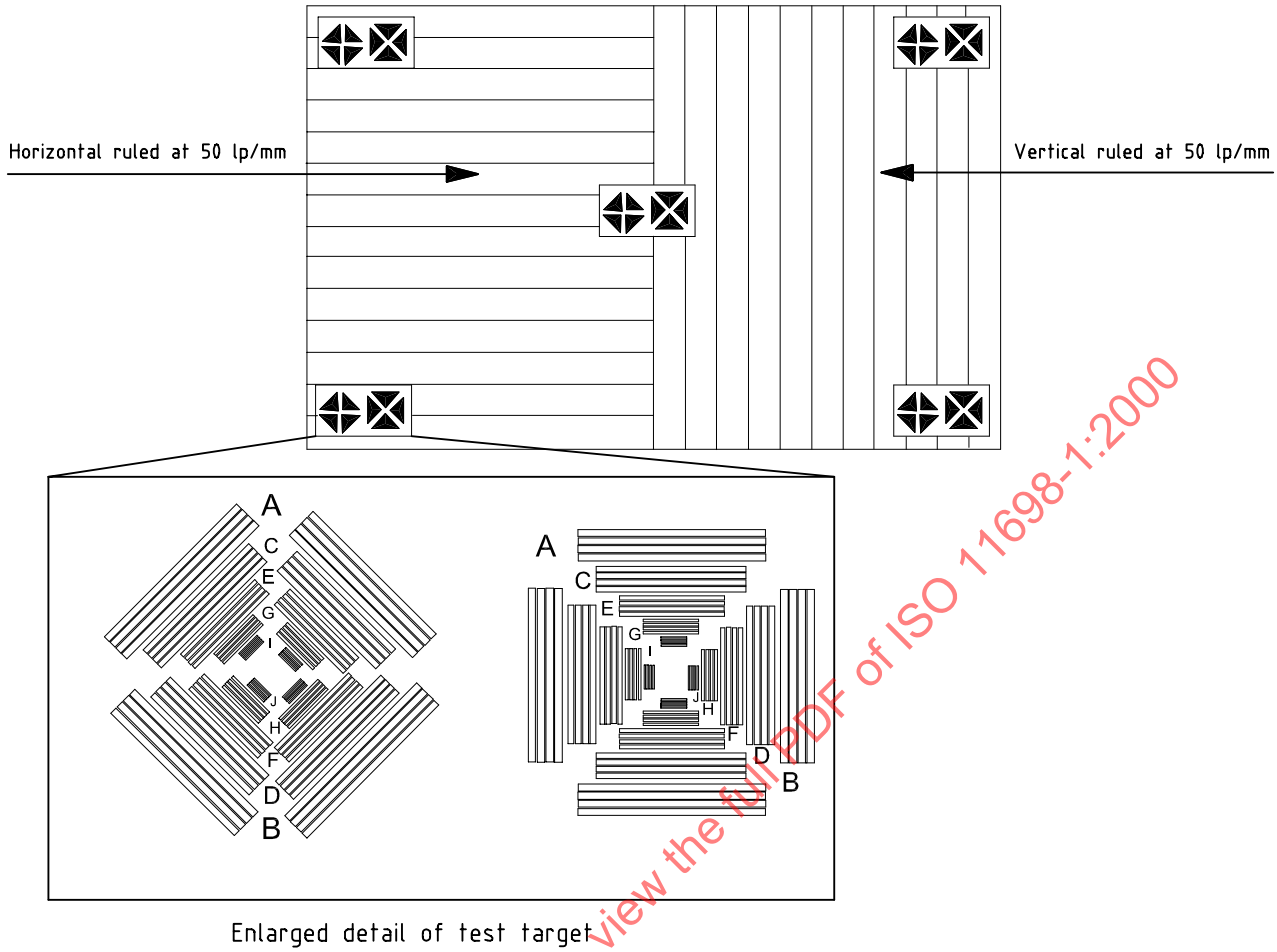


Figure 4 — Sample layout of test image type 4 for checking focus

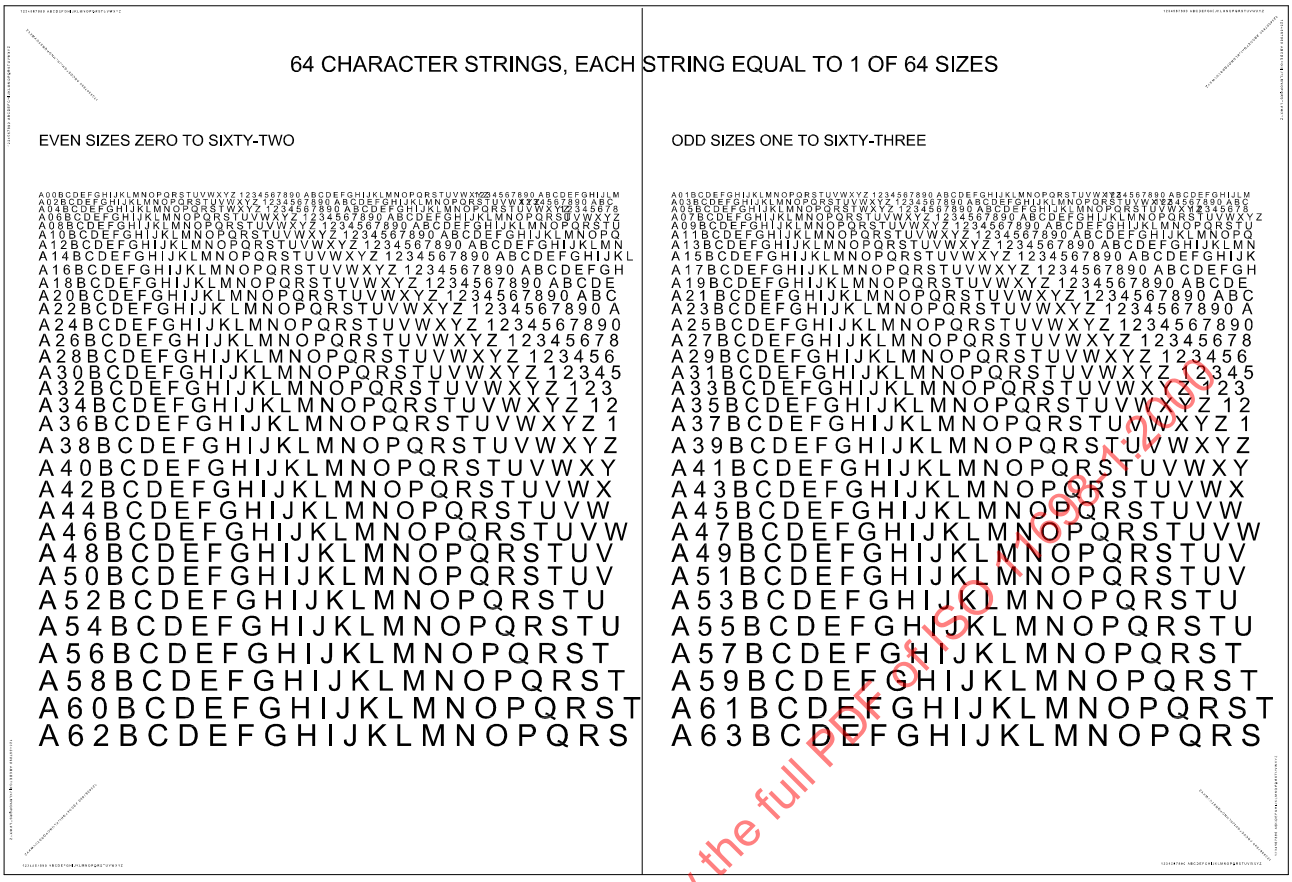


Figure 5 — Sample layout of test image type 5 for checking character legibility