INTERNATIONAL STANDARD

ISO 11928-2

First edition
2000-02-15

Micrographics — Quality control of graphic COM recorders —

Part 2: Quality criteria and control

Micrographie — Contrôle de la qualité des imprimantes COM graphiques —

Partie 2: Critères et contrôle qualité

Reference number
ISO 11928-2:2000(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 734 10 79
E-mail copyright@iso.ch
Web www.iso.ch

Printed in Switzerland

Contents

Page

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.

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 11928 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 11928-2 was prepared by Technical Committee ISO/TC 171, *Document imaging applications*, Subcommittee SC 1, *Quality*.

ISO 11928 consists of the following parts, under the general title *Micrographics — Quality control of graphic COM recorders*:

— *Part 1: Characteristics of the test frames*

— *Part 2: Quality criteria and control*

Annex A of this part of ISO 11928 is for information only.

Introduction

This part of ISO 11928 has been prepared because increasing numbers of technical drawings are now produced on COM, and, although their quality is usually reasonable, they are not always comparable with microfilm copies of hard copy drawings. This can cause difficulty when both kinds of drawing are put into aperture cards and used in systems designed to deal with microfilm copies of hard-copy-drawings.

This part of ISO 11928 has therefore been prepared to help users to establish procedures that should ensure that the quality of COM-generated drawings is both acceptable in itself and comparable in quality with technical drawings on conventional microfilm that complies with ISO 3272-1, ISO 3272-2 and ISO 3272-3.

The test frames specified in ISO 11928-1 may be used for simplified routine checks if users wish to monitor the quality of COM-generated drawings without going to the expense of carrying out the specified tests.

Micrographics — Quality control of graphic COM recorders —

Part 2:
Quality criteria and control

1 Scope

This part of ISO 11928 describes methods for using test frames specified in ISO 11928-1 to monitor the image quality of microforms from graphic COM recorders.

It applies to graphic COM recorders that are capable of producing both alphanumeric and graphic images output on to black-and-white films.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 11928. 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 11928 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 5-2:1991, *Photography — Density measurements — Part 2: Geometric conditions for transmission density.*

ISO 5-3:1995, *Photography — Density measurements — Part 3: Spectral conditions.*

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

ISO 5466:1996, *Photography — Processed safety photographic films — Storage practices.*

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

ISO/DIS 11928-1[1], *Micrographics — Quality control of graphic COM recorders — Part 1: Characteristics of the test frames.*

[1] To be published.

3 Terms and definitions

For the purposes of this part of ISO 11928, the definitions given in ISO 6196 and the following apply.

3.1
test frame
data file which generates test images on a COM recorder

4 Evaluation

4.1 General

The evaluation of the quality of a graphic COM image is a complex task. Various conditions can occur in a graphic COM recorder that are not found in alphanumeric COM recorders, which can be evaluated with the use of a form slide. Many graphic COM recorders have no provision for a form slide and if they are to be evaluated all measurements will have to be taken from the microform image produced by the image generator.

NOTE It is customary for graphic COM recorders to produce negative-appearing film images. For clarity of presentation, the examples in figures 1-5 have been reproduced as positive-appearing images.

4.2 Test runs

The tests described in 5 shall be used initially to evaluate the quality of a graphics COM recorder, and then subsequently to monitor its quality. They may be used as a routine procedure, or for determining the reason for unsatisfactory output.

The results of the initial test runs shall be retained as a reference sample for comparison with subsequent runs. Where this test run gives results outside system tolerances (see 4.3), then the system shall be adjusted and the initial tests repeated until results are within system tolerances.

Before tests are run, the operator shall ensure that the film processor is in proper working order.

The test frames shall be plotted using the minimum line width recommended by the manufacturer for the type of test frame being plotted.

The images generated during testing shall be examined, and if any shows significant signs of deterioration in quality compared with the reference sample, the entire set of images shall be re-run and examined.

Results of test runs shall be retained for audit purposes.

4.3 System tolerances

System tolerances for tests specified in 5 shall be agreed with the equipment suppliers and documented along with the results of the initial test runs.

Values obtained from tests specified in 5.2.3 should be in accordance with Table l.

Table 1 — Summary of acceptable density limits

Film type	Process	Minimum D_{max}	Maximum D_{min}	Minimum density difference
Silver-gelatin	Conventional	1,00	0,15 plus base	0,90
Silver-gelatin	Full reversal or direct positive	1,50 (1,80 preferred)	0,20 plus base	1,30
Thermally processed silver	Heat	1,00	0,40 plus base	0,60 (0,80 preferred)

5 Test frames: methods of use

5.1 Test for frame size, linearity and positioning

5.1.1 General

A microscope equiped with a stage capable of measurement along x and y axis should be used to take measurements of the image of the test frame. The test frame (see figure 1) shall be recorded at the beginning and end of each test sequence.

5.1.2 Methods

5.1.2.1 Frame size

Measure the length of the centre lines EG and HF, and check that they are within system tolerances (see 4.3).

5.1.2.2 Line straightness

Align the film so that the endpoints of the centre line HF coincide with the X axis of the microscope. Traverse the line and measure the maximum deviation of the centre of the line from the X axis along the Y axis. Repeat the test for lines AB and DC.

Align the film so that the endpoints of the centre line EG coincide with the Y axis of the microscope. Traverse the line and measure the maximum deviation of the centre of the line from the Y axis along the X axis. Repeat the test for lines AD and BC.

State whether the maximum deviation is within system tolerances (see 4.3). To find the percentage of deviation, divide the maximum deviation by the line length and multiply that number by 100.

5.1.2.3 Orthogonality

First check that the straightness of the centre lines is within system tolerances (see 4.3) and then measure the diagonal lines, EF, EH, GF, GH, AO, BO, CO and DO, to check that they are of equal length to within system tolerances.

5.1.2.4 Linearity

Measure the horizontal and vertical distances of each grid line intersection from the lines AD and CD respectively. Compare these measurements with the computed ideal distance for each and check that any errors are within system tolerances (see 4.3).

5.1.2.5 Line width

Traverse the line and measure its minimum and maximum thickness. Check that the measurements are within system tolerances (see 4.3).

5.1.2.6 Alignment of image centre line to film edge

Align the X axis of the microscope with the reference edge of the film. Measure the distance from the reference edge to the horizontal centre line at the centre of the line and at the endpoints. Check that the measurements are within system tolerances (see 4.3).

5.1.2.7 Image centering

Check that the measurements in 5.1.2.6 correspond with the centre line of the film, to within system tolerances (see 4.3).

For aperture cards, similar measurements should be made also for the vertical centre line both being referred to the card edges.

5.2 Test for resolution, legibility and density

5.2.1 Resolution

Using a microscope with a magnification of 1 to 3 times the effective reduction ratio, examine the targets at the centre and in each corner of the frame (see figure 2). Note the letter of the smallest resolvable group of lines in each target, following the method described in ISO 3334.

NOTE Groups are designated by letter rather than numerical value because the resolution recorded is a function of image size. The actual resolution in line pairs per millimetre can be determined by comparing the results obtained with a table supplied by the manufacturer of the COM recorder.

5.2.2 Legibility

Examine the groups of letters "e" and note the group number of the smallest letter that is fully legible.

5.2.3 Density

Using a densitometer, measure the minimum and maximum diffuse density in accordance with ISO 5-2 and ISO 5-3.

NOTE For thermally processed film measure visual projection density.

Table 1 gives acceptable values.

5.3 Test for radial recording

Take measurements to check that all lines are of equal density and are continuous and straight, without signs of misaligned butting, and whether the lines meet in the centre and are parallel in each line pair.

5.4 Test for curved lines

5.4.1 Introduction

The test frame (see figure 4) is designed to check the system's accuracy in producing curved lines.

5.4.2 Method

Measure the eight radial lines of each circle to check that the distance from circumference of a circle to the centre is the same along any radius.

Take measurements to check whether in the circles drawn with double lines the distance between the two lines is constant.

5.5 Test frame for measuring character display and rotation

Examine the lines of characters. Check for distortion and poorly formed characters, in the character size grid and in the corner patterns.

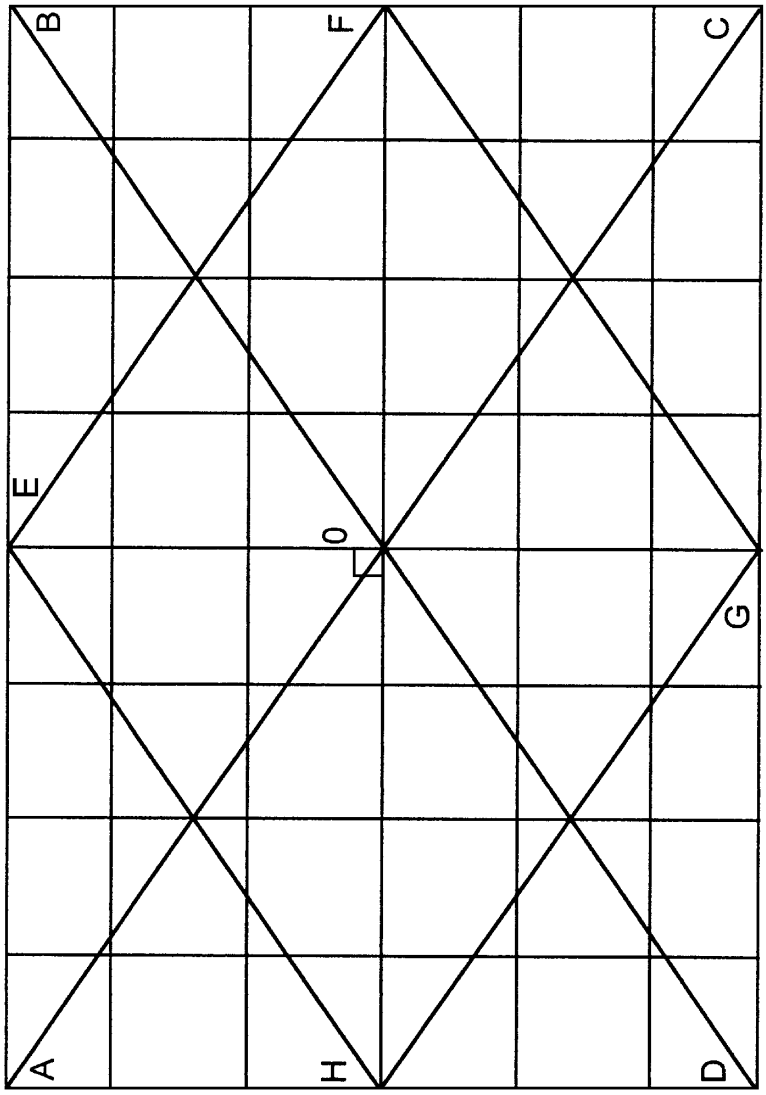

Figure 1 — Sample layout of test frame for checking frame size, linearity and positioning

NOTE The letters at the corners, midpoints and centre of the frame have been added for ease of reference in the text. They need not appear on the film.

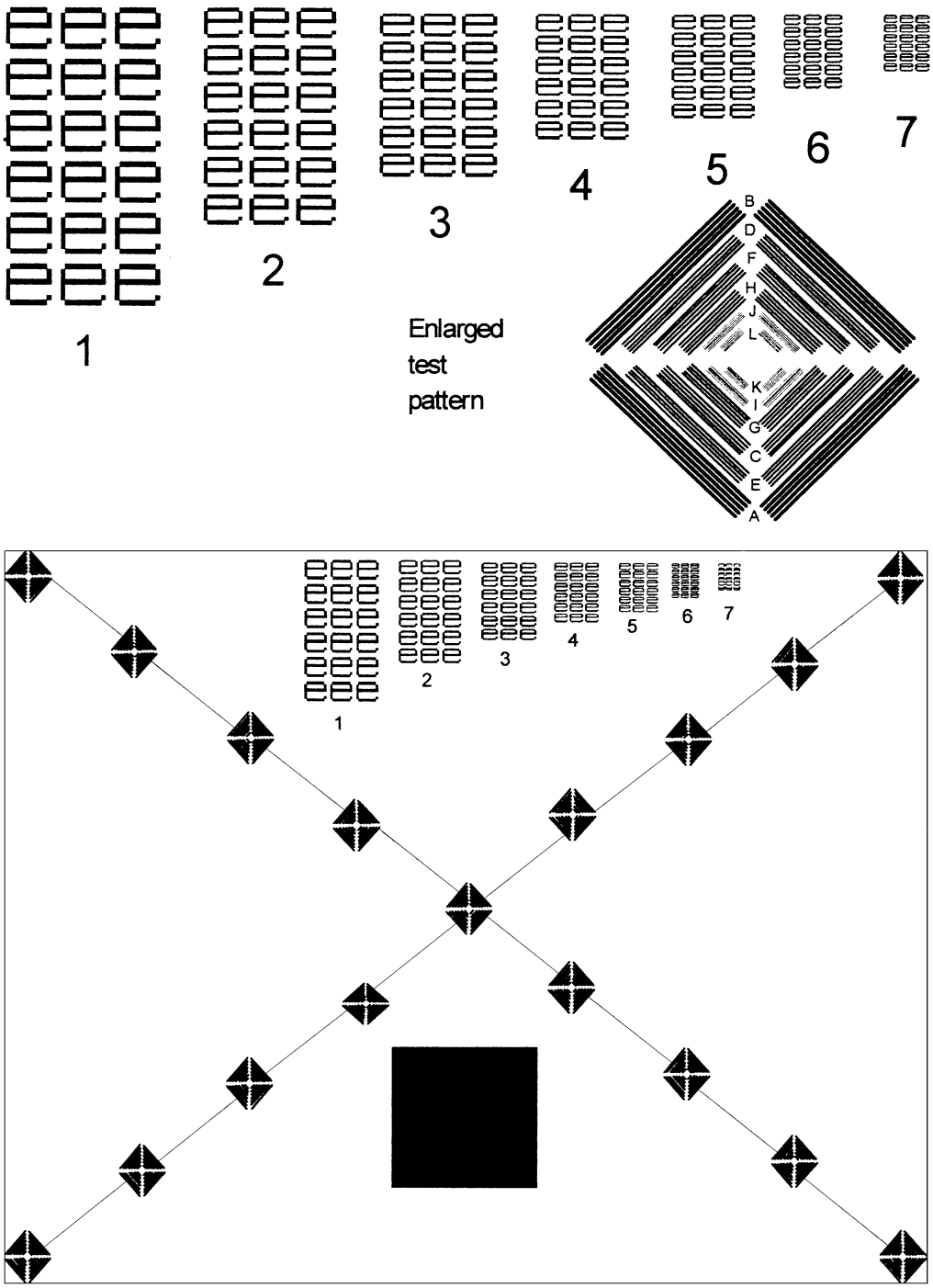

Figure 2 — Sample layout of test frames for checking resolution, legibility and density

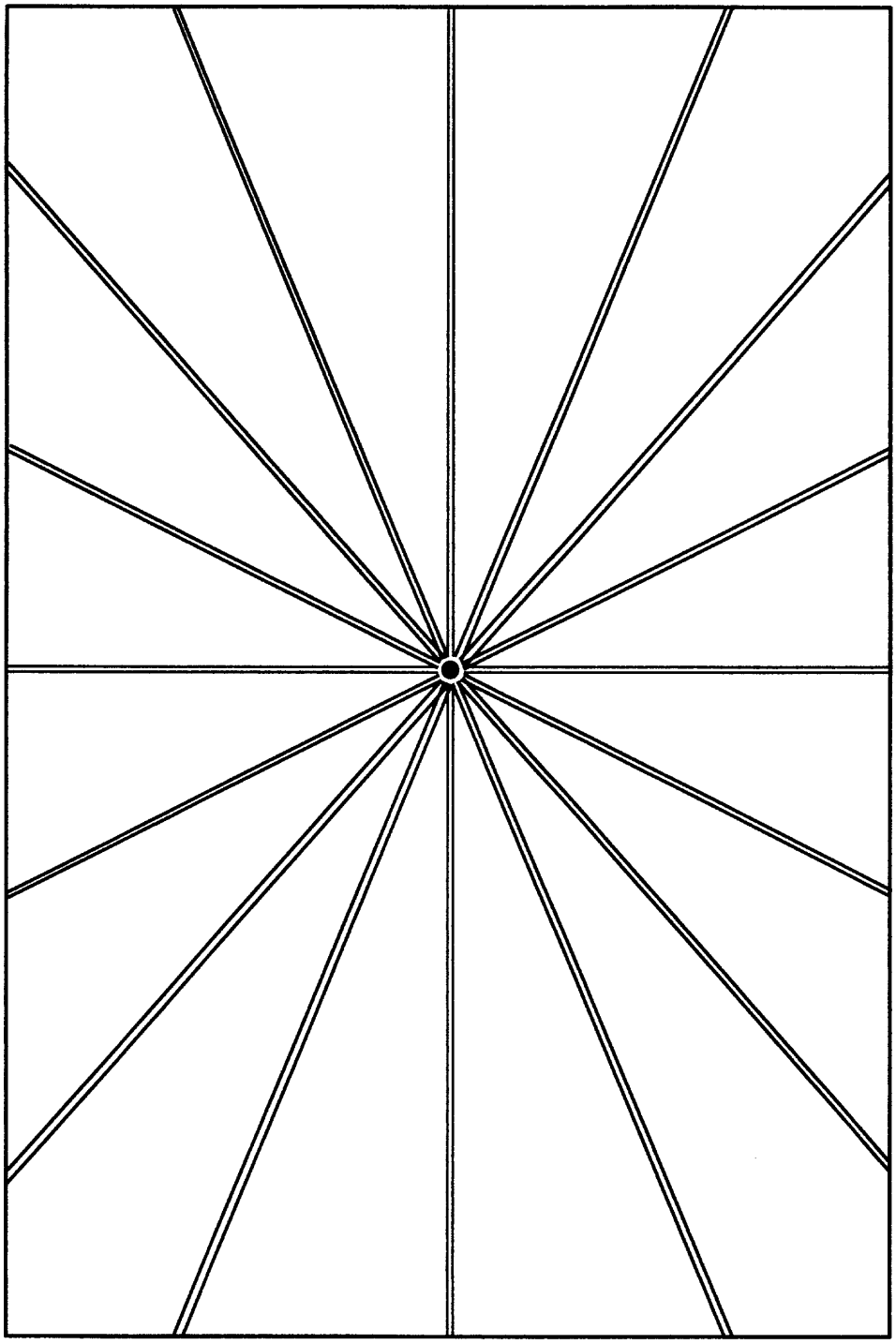

Figure 3 — Sample layout of test frame for checking radial recording

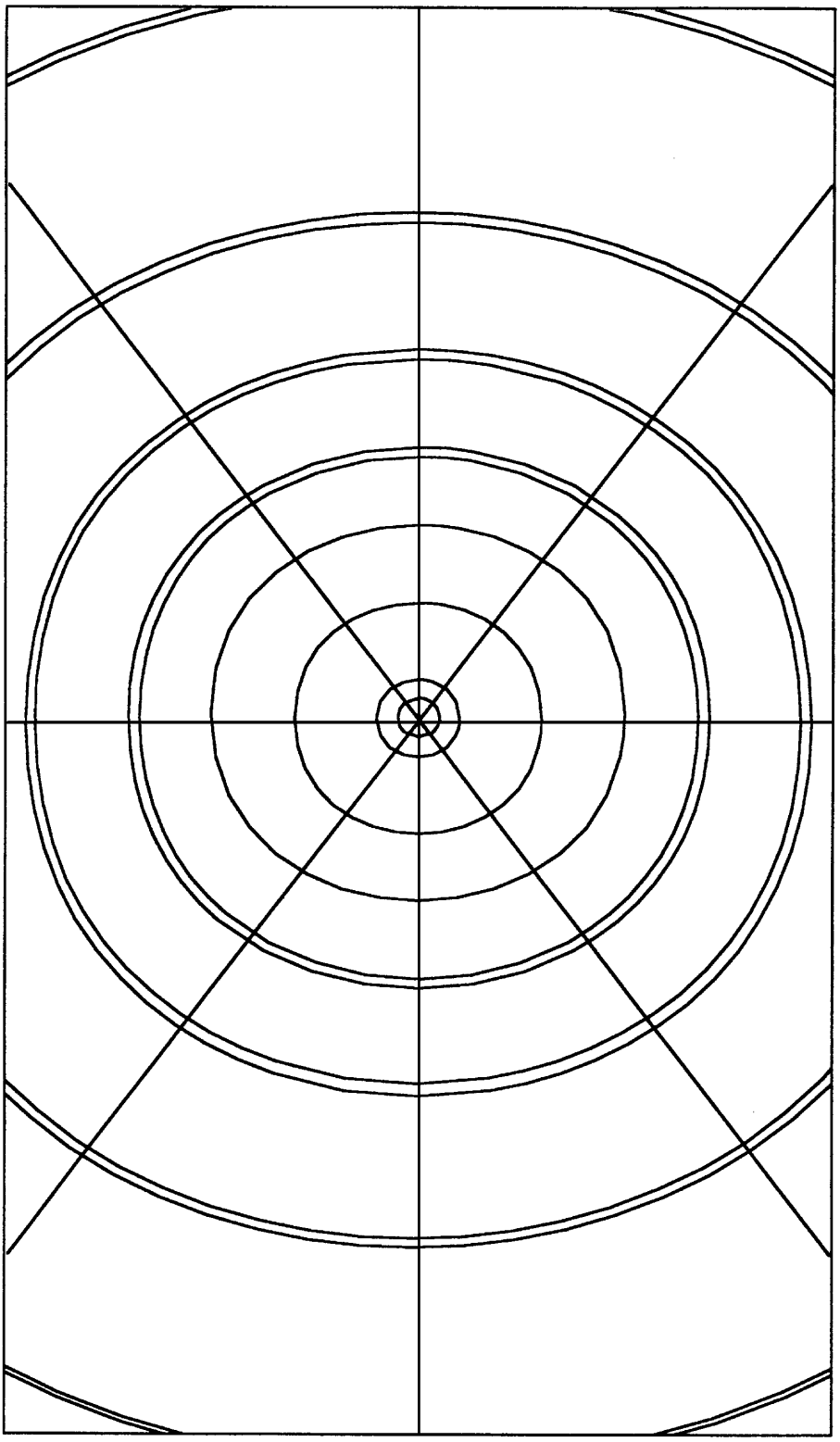

Figure 4 — Sample layout of test frame for checking curved lines

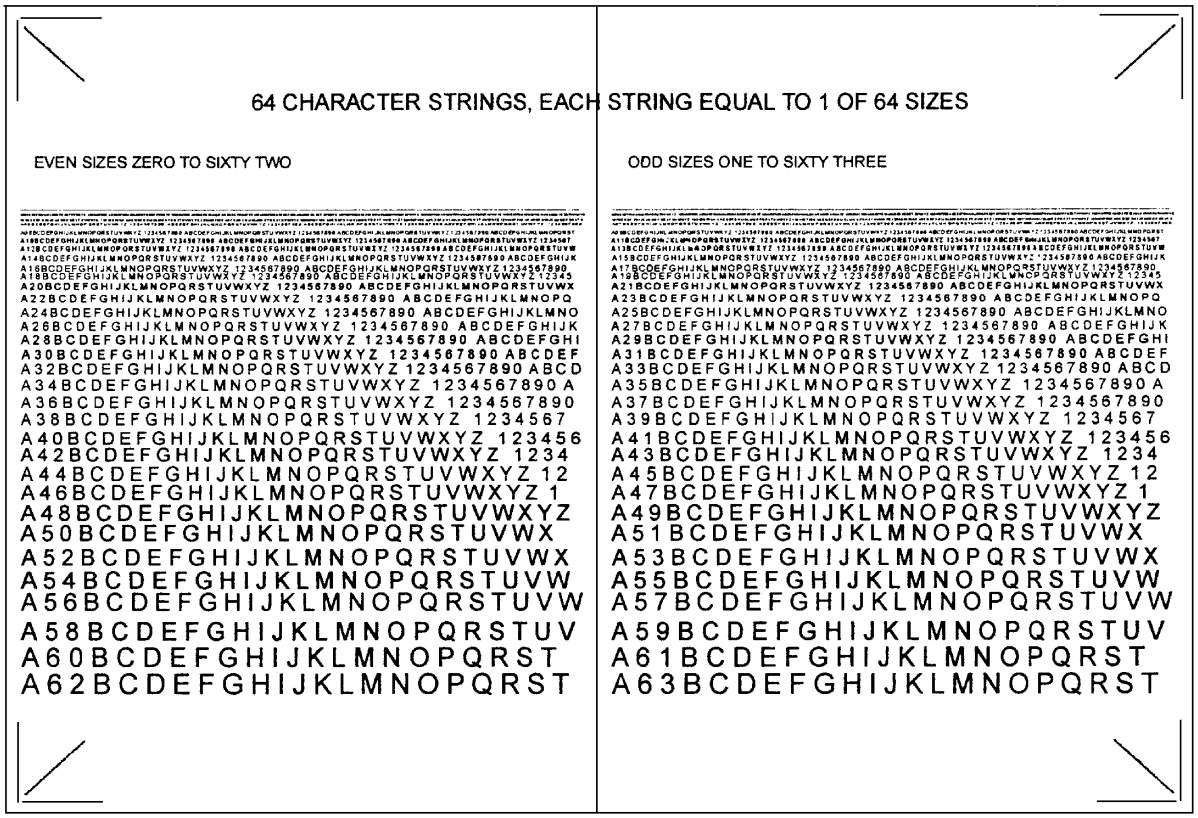

Figure 5 — Sample layout of test frame for measuring character display and rotation

Annex A
(informative)

Line density

It is important to ensure that raster COM-generated images will duplicate satisfactorily when exposed on a duplicating machine at intensity settings compatible with those for source-document microforms.

The requirements for the density of source-document microforms specified in ISO 3272-2 are not necessarily applicable to COM-generated images. The line density of a COM-generated image cannot be measured with instruments normally available to COM users. The correlation of line characteristics and duplicating exposure is complex, and can vary with the type of equipment and its optical characteristics.

The best method for a user and supplier to adopt in agreeing density values for COM-generated images is first to assess master and duplicate or print source-document microforms that comply with ISO 3272-2 and then to compare the characteristics of the COM-generated image so produced with the source-document image. Production of the COM-generated master image may then be adjusted to produce images of agreed quality.

ICS 37.080

Price based on 11 pages