# INTERNATIONAL STANDARD ISO 3066

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# Duplicating machines — Registration

*Duplicateurs — Tolérances de repérage*

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## FOREWORD

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Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 3066 was drawn up by Technical Committee ISO/TC 95, *Office machines*, and circulated to the Member Bodies in February 1973.

It has been approved by the Member Bodies of the following countries :

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| Australia | Italy | Switzerland |
| Canada | Japan | Thailand |
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| Germany | Romania | |
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The Member Body of the following country expressed disapproval of the document on technical grounds :

U.S.A.





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# Duplicating machines — Registration

## 0 INTRODUCTION

The positional consistency of images reproduced by a duplicating machine is a measure of the registration obtainable on that machine. This International Standard gives assistance to manufacturers and users by specifying methods of test for determining such registration and by providing a means of classifying the results obtained from the tests.

Several factors may affect the registration obtainable on a duplicating machine, such as atmospheric conditions, speed of machine operation, type of paper, and paper stretch. It is recognized that in some instances improved registration may be obtained by working a machine under conditions different from those used for the test, for example, at slower speed.

It is not to be expected that the registration obtainable on the different types of duplicating equipment should be directly comparable. As the different types of equipment are used for different purposes, comparisons would be invidious. For this reason, the letters used in this International Standard for classifying the registration are qualified by a letter to identify the type of equipment.

The recommended basis weights of paper are intended solely for the purpose of standardizing the conditions of test and should not be regarded as necessarily indicating the most suitable paper for normal use with the type of machine concerned.

## 1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies methods of test by which the registration obtained on each of the following types of duplicating machine may be determined :

- offset litho;
- stencil;
- spirit (or other fluid).

Tables of limits are given by which the registration obtained on different types of duplicating equipment may be classified.

## 2 VOCABULARY[1)]

**2.1 offset duplicator :** A machine which prints subject matter by transferring, through an intermediate surface, an image from an offset lithographic master or plate.

**2.2 stencil duplicator :** A machine which brings a succession of sheets of material into pressure contact with a duplicating stencil, through the perforations of which passes a controlled quantity of a suitable ink capable of forming a visible image on the receiving surface.

**2.3 spirit (or other fluid) duplicator :** A machine which brings a spirit (or other fluid) master into pressure contact with a succession of sheets of material bearing spirit, or other suitable solvent, capable of transferring from the master sufficient colouring matter or colour-forming materials to produce an image on each sheet.

**2.4 registration :** The consistency of the relative position of images printed on paper by duplicating equipment.

**2.5 machine direction (grain) :** The dimension of a paper or board corresponding to the direction of flow of the stuff on the paper-making machine.

**2.6 standard atmosphere for conditioning and testing :** With reference to temperature and relative humidity, 20 ± 2 °C and 65 ± 5 % respectively.

## 3 OFFSET DUPLICATORS

**3.1** Make a suitable metal master-plate of an image from a sheet of squared paper, the horizontal and vertical lines of which are 10 mm (0.394 in) apart and of a thickness not exceeding 0,125 mm (0.005 in). The size of the image shall be slightly smaller than the size of the paper to be used.

NOTE — A measuring microscope or a linen tester with a graticule are suitable instruments for measuring line thickness.

1) The contents of this section are subject to consideration by Sub-committee ISO/TC 95/SC 7, which is responsible for vocabulary.

**3.2** Set up the machine for normal working.

NOTE — A minimum weight of ink shall be carried for the purpose of this test.

**3.3** Take a quantity of wrapped bond paper, of grammage 80 to 90 g/m², cut square, of international paper size A3 or A4, whichever is appropriate to the machine capacity, which has remained for at least 24 h in the standard atmosphere for conditioning and testing. Examine the paper for smoothness and remove any sheets which are creased or wrinkled. Fan out the paper and square it up to the original state.

**3.4** Ensure that the paper is fed in the machine direction (grain) of the paper, and that the felt (top) side of the paper is printed.

NOTE — When a watermark is right reading, the felt side of the paper is on top.

**3.5** Print 50 sheets at two-thirds of the maximum speed in machines having a variable speed control and the nearest speed to this in other machines. Discard the first two sheets. On one sheet, measure the thickness of the lines which are nearest to each corner of the sheet.

**3.6** Re-run the copies at the same speed so that each sheet is overprinted with a second impression of the image. Discard the first two sheets. Re-measure the thickness of the resultant line or, if separated, the distance between the outer edges of the two lines; in either case, subtract the thickness of the original line used for the test (see 3.5).

**3.7** Examine the 46 remaining sheets and note the greatest registration error occurring both vertically and horizontally. Classify this registration according to table 1. Any one sheet that falls into a lower classification than the rest may be discarded and the next greatest error taken to classify the registration.

TABLE 1 — **Classification of registration for offset duplicators**

| Registration tolerance under standard atmospheric conditions | Classification of registration tolerance |
|---|---|
| Up to and including 0,125 mm (0.005 in) | LA |
| Over 0,125 mm (0.005 in) up to and including 0,25 mm (0.01 in) | LB |
| Over 0,25 mm (0.01 in) up to and including 0,5 mm (0.02 in) | LC |
| Over 0,5 mm (0.02 in) | LD |

NOTE — Letter L used in the classification column of this table denotes offset duplicator, i.e. lithographic machine.

**3.8** If more than one sheet falls into a lower classification than the rest, the test may be re-run. If the result of this retest constitutes an improvement on the first result, it is used to classify the registration, employing the method given in 3.7. Otherwise the first result shall stand.

## 4 STENCIL DUPLICATORS

**4.1** Type or write over a large area of a new stencil in order that the stencil may be evenly inked.

**4.2** Cut a horizontal line, as fine as possible, at line five of the stencil and at one side of the main frame, long enough to reach the side edge of the paper on the printed copy.

Cut a vertical line near the bottom of the A4 paper-size position, coincident with the centre line on the stencil and long enough to reach the bottom edge of the paper.

**4.3** Set up the machine for normal working.

**4.4** Take a quantity of wrapped stencil duplicating paper of grammage 80 to 90 g/m², cut square, of international paper size A4, which has remained for at least 24 h in the standard atmosphere for conditioning and testing. Examine the paper for smoothness and remove any sheets which are creased or wrinkled. Fan out the paper and square it up to the original state.

**4.5** Ensure that the paper is fed in the machine direction (grain) of the paper, and that the felt (top) side of the paper is printed.

NOTE — When a watermark is right reading, the felt side of the paper is on top.

**4.6** If the machine is electrically operated, print 50 sheets at two-thirds of the maximum speed in machines having a variable speed control and the nearest speed to this in other machines. If the machine is hand operated, print 50 sheets at a speed consistent with smooth running of the machine.

**4.7** Remove the printed copies from the machine, square them up to the leading edge and fan them out for inspection. Discard the first two sheets and observe the formation of the lines described in 4.2.

**4.8** To assess the vertical registration, measure the distance between the corresponding edges of the highest and lowest positions of the horizontal line in the batch of 48 copies.

**4.9** To assess the horizontal registration, measure the distance between corresponding edges of the most laterally dispersed lines in the batch of 48 copies, viewed at the bottom of the copy.