

Guide to

Miniaturization of medical diagnostic images on film

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Information and Documentation Standards Policy Committee (DOT/-) to Technical Committee DOT/16, upon which the following bodies were represented:

- British Computer Society
- British Library
- British Office Technology Manufacturers' Alliance
- British Photographic Association
- Her Majesty's Stationery Office
- London Borough of Bromley
- National Centre for Information Media and Technology (Cimtech)
- United Kingdom Association for Information and Image Management

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Institute of Radiology
- College of Radiographers
- Department of Health
- Institute of Administrative Management
- Royal College of Radiologists

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Foreword

This British Standard guide has been prepared under the direction of the Information and Documentation Standards Policy Committee.

Hospitals and other organizations that are required to keep medical diagnostic images for many years frequently find that they lack space to store them. Miniaturization offers a solution. This guide has been prepared to help organizations that are considering miniaturization to decide whether it will meet their needs and, if so, to help them to establish a suitable programme.

Medical diagnostic images tend to be consulted frequently in the first two years after they are made. Most of them have to be kept for several more years, some for the life of the patient, in case they have to be consulted for medical, legal or social services purposes. They should therefore be stored in a form that will be of a quality to provide the information required if the need to consult them should arise. Straightforward photographic copies are unlikely to be satisfactory because the range of the densities will usually be less than the range of densities on the original and information may be lost in copying. Electronic scanning and adjustment will be needed if all the information is to be retained.

New techniques, e.g. picture archiving and communication systems (PACS), are being developed and any organization that considers using miniaturization should take specialist advice about the range of methods currently available.

Appendix A describes methods of checking the quality of the output of a system for miniaturizing medical diagnostic images.

Appendix B gives advice on the operation (or installation) of a quality management system.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard gives guidance on matters to be taken into account when an organization is considering whether to set up a programme for the miniaturization of medical diagnostic images on film and on procedures to be followed if a miniaturization programme is adopted.

The standard applies to the 35 mm microfilming of medical diagnostic images of good quality that are recorded on film and form part of a patient's medical record.

General guidance on setting up a micrographics unit is given in BS 6660.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Definitions

For the purposes of this British Standard the definitions given in BS 6054-1 apply, together with the following:

2.1 frame

that area of the film on which radiant energy can fall during a single exposure

2.2 microform

generic term for any form, usually film, that contains microimages

2.3 microimage

an image too small to be read without magnification

2.4 noise

granularity, quantum or screen mottle, processing and other blemishes found on film

3 General

3.1 Advantages

The advantages of miniaturizing medical diagnostic images are:

- a) miniaturized images require considerably less storage space than the originals;
- b) originals are released sooner for silver recovery;
- c) individual images will be easier to retrieve if the miniaturization programme includes the introduction of a simple retrieval system (see 7.1).

3.2 Disadvantages

The disadvantages of miniaturizing medical diagnostic images are:

- a) staff who are reluctant to use miniaturized images may take time to accept the new system;
- b) for reading images on 35 mm microfilm some form of optical aid will be required;
- c) some detail can be lost in the miniaturized image;
- d) duplicates of individual images are inconvenient to make and will require a trained operator.

3.3 Suitability of images

When a miniaturization programme is established, the organization concerned should consider whether all categories of diagnostic image are suitable for miniaturization or whether certain categories should be excluded.

3.4 Choice of in-house or bureau systems

A miniaturization programme may be undertaken in-house or contracted to a bureau. Capital costs of setting up an in-house system will include the provision of suitable accommodation and equipment for filming, viewing, retrieval and duplication. Additional members of staff may be required (see 8.1). If the likely volume of work is not large enough to justify such expense, it may be more cost-effective to employ a bureau. In all cases detailed quality requirements should be specified. Appendix A describes methods of checking the quality of output of a system. (See also BS 6660.)

3.5 Quality management

In the processes of miniaturization, retrieval and viewing, something of the original will be lost because of variations in the performance of the equipment or the characteristics of the consumables, or, more commonly, because of human error. To ensure that the programme operates in compliance with established criteria, the organization should consider setting up a quality management system as described in Appendix B.

4 Image polarity

Miniaturized medical diagnostic images should be presented in the same polarity as the original white-bone images, unless black-bone images are specifically requested. The production of images of the same polarity as the original usually requires reversal processing (see 6.2).

5 Film and filming

5.1 Film width: reasons for choosing 35 mm

Although images on 35 mm film cannot be read without magnification and their quality is more likely to be impaired by dust, 35 mm film is widely used for conventional microfilming and much of the equipment needed for miniaturizing is readily available, at a lower cost than that used for 105 mm film. Images on 35 mm film also require less storage space.

This standard has therefore been written for programmes that use 35 mm film.

NOTE If the same emulsion and the same technique, e.g. electronic scanning, are used when exposing both 105 mm and 35 mm film, the larger format provided by 105 mm film should give better results. Miniaturized images on 105 mm film are the smallest that can be viewed without magnification, but the equipment needed to produce and store 105 mm film costs more than that for 35 mm film, and the costs of film and chemicals for processing it are higher.

5.2 Tonal range

The film should be capable of recording an acceptable tonal range without distortion of intermediate density differences. The range required may be achieved by processing or exposure techniques.

5.3 Density

The maximum visual diffuse transmission density of the film should be not less than 2.0.

5.4 Speed

Film exposed by electronic scanning usually requires a higher film speed than film exposed by photographic methods. The manufacturer should be asked to advise.

5.5 Resolution

The film should be of high resolution, typical of film designed for microfilming.

5.6 Reduction ratio

Medical diagnostic images should normally be miniaturized at a reduction ratio of approximately 1 : 14, regardless of the size of the original. The use of a single reduction ratio simplifies procedures for filming and enlarging.

5.7 Duplicates and enlargements

All duplicates and enlargements should be made on silver halide film.

6 Methods of production, processing and storage

6.1 Choice of microform

The choice of microform will depend on cost and projected use. For the purposes of storage, roll film is the simplest and cheapest to produce, but is more likely than other forms to suffer degradation in storage, particularly if the atmosphere is dusty. Individual frames may be difficult to duplicate. If roll film is used, it should comply with BS 1371.

Microfilm jackets provide a convenient way to store the diagnostic images and, if necessary, other microfilmed medical records of a patient in one package. Jackets are simple to use and can be duplicated on 105 mm microfilm, although inserting film in jackets is time-consuming and adds to the cost. If microfilm jackets are used for storage, they should comply with BS 5632.

6.2 Processing

Processing can be negative or reversal (positive). Negative processing is comparatively simple. If reversal processing is required, extra processing chemicals, a more complicated machine and greater understanding of the process will be needed. (See also clause 4.)

6.3 Storage conditions

The miniaturized images should be stored, in accordance with the manufacturer's instructions, in plastics jackets or in rolls in their original containers, depending on the users' requirements. The relative humidity of the storage area should be not more than 60 % and temperature within the range 15 °C to 25 °C. (See also BS 1153.)

6.4 Control of accuracy

The miniaturization programme should include provision for controlling and monitoring the accuracy of the process to ensure that the miniaturized image, when magnified to the size of the original, is an acceptable reproduction of the original. Methods of test are described in Appendix A.

7 Retrieval, viewing and duplication

7.1 Retrieval

7.1.1 Introduction

The complexity and, to some extent, the cost of a microform retrieval system depends on:

- a) the number of microforms in store;
- b) the number of frames per microform;
- c) the frequency of access;
- d) the number of users who access the store;
- e) the degree of randomness of enquiry;