Specifications for 16 mm and 35 mm Roll Microfilm

Standard

Approved As
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AMERICAN NATIONAL STANDARD
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ANSI/AIIM MS14-1988

AIIM
Association for Information and Image Management

1100 Wayne Avenue, Suite 1100
Silver Spring, Maryland 20910
Telephone 301/587-8202

This standard has been adopted for federal government use.

Details concerning its use within the federal government are contained in Federal Information Processing Standards Publication 54-1. For a complete list of the publications available in the Federal Information Processing Standards series, write to the Standards Processing Coordinator (ADP), National Institute of Standards and Technology, Gaithersburg, MD 20899.

ANSI/AIIM MS14-1988

Standard for Information and Image Management —

Specifications for 16 mm and 35 mm Roll Microfilm

Association for Information and Image Management

This standard applies to 16 mm and 35 mm roll microfilm produced as a result of source document and computer-output microfilming. It covers physical characteristics, formats, placement, orientation, and characters.

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Foreword

(This foreword is not part of the American National Standard for Information and Image Management—Specifications for 16 mm and 35 mm Roll Microfilm, ANSI/AIIM MS14-1988.)

For a number of years, separate standards have existed for source document and computer-output microforms. With increasing information requirements and advances in COM technology, computer-output microforms have become commonplace. This increased use of COM resulted in a need for compatibility and interchangeability of the same type of microform, no matter how produced. Therefore, as standards were being revised, a standard was prepared for microfiche produced by either source document or computer-output microfilming (ANSI/AIIM MS5-1985). To parallel that standard, the roll microfilm portion of the Standard for Format and Coding for COM, ANSI/AIIM MS2-1978, was combined with the Specifications for 16- and 35-mm Microfilm, ANSI/AIIM MS14-1978, to produce this document.

From a historical perspective it should be noted that, in 1938, standardization efforts in the field of still photography were first initiated under the procedures of the (then) American Standards Association (ASA) (subsequently renamed the United States of America Standards Institute and now the American National Standards Institute). The committee that was organized to carry on this work was designated as the ASA Sectional Committee on Standardization in the Field of Photography, Z38. This committee continued in operation for over 10 years under the sponsorship of the Optical Society of America and was responsible for the development of over 100 American standards in the photographic field.

By 1950, it was no longer feasible for one committee to handle such a large assignment. Consequently, on November 30, 1950, ASA Committee Z38 was disbanded, and new committees were organized to replace it.

In April 1969, a request was made by the National Micrographics Association subcommittee dealing with computer-output microfilm formats and coding to review film thickness ranges. (This information can now be found in ANSI PH1.51-1983.) During compliance, the simplex format was also reviewed because of reported differences with general industry practice. Because of the advancement of technology and applications, the need for additional formats was recognized, and these were included in the documents. The National Micrographics Association was given the draft for completion and assumed the sponsorship of PH5 in 1973.

In the meantime, work had been progressing on a Standard for Format and Coding of Computer-Output Microfilm. This standard, also prepared by the NMA Standards Committee of the same name, was published in 1971 (ANSI PH5.18/NMA MS2-1971) and revised in 1976 and in 1978. Also in 1978, the NMA Information Storage and Retrieval Standards Committee, was directed to review and revise ANSI PH5.3-1967, Specifications for 16 and 35 mm Silver-Gelatin Microfilms for Reel Applications. A draft has been prepared by the subcommittee PH5.1 of the sectional committee PH5 on Photographic Reproduction of Documents, and the final result was the Specifications for

16 and 35 mm Microfilms in Roll Film. In 1979, NMA streamlined its standards committees and, in the process, expanded the role of the C3 committee by including in its scope the responsibility for all microform formats and renaming it the Microform Formats Standards Committee. As noted earlier, this committee then produced the Standard for Microfiche and, subsequently, this standard.

In conclusion it should be noted that, while currently this standard is based only on the most commonly used roll microfilm—16 mm and 35 mm, it is hoped that future revisions will expand it to its full scope. A step in that direction has already been taken by adding an appendix that contains some information on 105 mm roll microfilm. Likewise, this standard does not currently contain specifications for roll microfilm that may be ultimately converted to other microforms, such as aperture cards or jackets. However, the use of ANSI/AIIM MS14-1988 in these instances is encouraged.

Any suggestions for improving this standard are welcome and should be sent to the Chairman, AIIM Standards Board, Association for Information and Image Management, 1100 Wayne Avenue, Suite 1100, Silver Spring, Maryland 20910.

At the time this standard was approved the AIIM Standards Board had the following members:

Marilyn Courtot, *Chair*

Thomas C. Bagg	Delmar R. Johnson
Thomas E. Berney	Alan S. Linden
Joseph Comiskey	William E. Neale
Henry C. Frey	Marcus Phillips

The Association for Information and Image Management C3, Microform Formats Committee had the following members at the time it approved this standard:

National Guard Bureau	Lt. Col. Alexander Beim, *Chair*
B&B Records Center	Theresa Maultsby, *Vice Chair*
Action Graphics, Div. of SEA	Christian Schweiger
B&L Associates	William E. Lee
Consolidated Micrographics, an Anacomp Company	Jake M. Stellmack
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National Bureau of Standards	Thomas C. Bagg Jean Baronas, Alternate
NCR Micrographic Systems, Inc.	Rolfe D. Kahle
U.S. Air Force HQ AFLC/MMTIB	George Biach
Zytron	David T. Bogue
Individual	Ted Hodur
Individual	Marvin Reid
Individual	Ernest P. Taubes

American National Standard for Information and Image Management—Specifications for 16 mm and 35 mm Roll Microfilm, ANSI/AIIM MS14-1988

1. Scope

This standard applies to 16 mm and 35 mm roll microfilm produced as a result of source document and computer-output microfilming. This standard does not preclude the use of other standards for roll microfilm. This standard covers physical characteristics, formats, placement, orientation, and characters.

2. References

2.1 American National Standards

ANSI IT9.1-1988, American National Standard for Imaging Media (Film)—Silver-Gelatin Type—Specifications for Stability.

ANSI IT9.5-1988, American National Standard for Imaging Media (Film)—Ammonia-Processed Diazo Films—Specifications for Stability.

ANSI PH1.13-1979 (R1983), American National Standard for Dimensions for Cores for Photographic Film Rolls (Plastic, Wood, or Metal).

ANSI PH1.25-1984, American National Standard for Photography (Film)—Safety Photographic Film.

ANSI PH1.29-1985, American National Standard for Photography (Film)—Methods for Determining Curl.

ANSI PH1.43-1985, American National Standard for Photography (Film)—Processed Safety Film—Storage.

ANSI PH1.51-1983, American National Standard for Photography (Film)—Micrographic Sheet and Roll Films—Dimensions.

ANSI PH1.53-1986, American National Standard for Photography (Processing)—Processed Films, Plates, and Papers—Filing Enclosures and Containers for Storage.

ANSI PH1.67-1985, American National Standard for Photography (Film)—Processed Vesicular Film—Specifications for Stability.

ANSI X3.45-1982, American National Standard Specifications for Character Set for Handprinting.

ANSI X3.49-1975 (R1982), American National Standard Character Set for Optical Character Recognition (OCR-B).

ANSI/AIIM MS1-1988, American National Standard for Information and Image Management—Practice for Inspection and Quality Control for Alphanumeric Computer-Output Microforms.

ANSI/AIIM MS5-1985, American National Standard for Micrographics—Microfiche.

ANSI/AIIM MS8-1988, American National Standard for Information and Image Management—Image Mark (Blip) Used in Image Mark Retrieval Systems.

ANSI/AIIM MS15-1977, American National Standard for Information and Image Management—Dimensions and Operational Constraints for Single-Core Cartridge for 16 mm Processed Microfilm.

ANSI/AIIM MS16-1981 (R1988), American National Standard for Information and Image Management—Dimensions and Operational Constraints for Double Core (Bi-Axial) Cassette for 16 mm Processed Microfilm.

ANSI/AIIM MS19-1987, American National Standard for Information and Image Management—Recommended Practice for Identification of Microforms.

ANSI/AIIM MS23-1983, American National Standard for Information and Image Management—Practice for Operational Procedures/Inspection and Quality Control of First Generation Silver Gelatin Microfilm of Documents.

ANSI/AIIM MS29-1987, American National Standard for Information and Image Management—Cores and Spools for Recording Equipment—Dimensions.

ANSI/AIIM MS32-1987, American National Standard for Information and Image Management—Microrecording of Engineering Source Documents on 35 mm Microfilm.

ANSI/AIIM MS35-1987, American National Standard for Information and Image Management—Requirements and Characteristics of Original Black-and-White Documents That May Be Microfilmed.

ANSI/AIIM MS38-1987, American National Standard for Information and Image Management—Microrecording of Engineering Graphics—Computer-Output Microfilm.

ANSI/AIIM MS39-1987, American National Standard for Information and Image Management—Recommended Practice for Operational Procedures, Quality Control and Inspection of Graphic Computer-Output Microforms.

2.2 Related Publications

AIIM TR2-1980, Association for Information and Image Management Technical Report—Glossary of Micrographics. Association for Information and Image Management, 1100 Wayne Avenue, Suite 1100, Silver Spring, MD 20910.

3. Definitions

This section contains only those definitions essential for clarification of this standard. For additional information, see AIIM TR2-1980. Some definitions taken from

AIIM TR2-1980 are reworded for clarity; definitions not found in AIIM TR2-1980 appear in this section also.

Distribution microfilm. The distribution copy of roll microfilm is not defined in terms of generations. Unlike camera and intermediate microfilms that are used either for archival storage or to create microfilm duplicates, distribution microfilm is any roll microfilm intended for actual use. It is a working copy that is expected to be filed, retrieved, and used. The normal use of distribution roll microfilm may be for display on a reader, for re-enlargement on a printer or reader-printer, or for contact printing to produce a duplicate copy.

Edge fog. Dark margins along the length of a developed film or paper resulting from exposure to light or the effect of age and improper storage conditions.

Horizontal mode. The arrangement of microimages on roll microfilm where the lines of print or writing are parallel to the length of the microfilm for horizontal script and perpendicular for vertical script (see Figure 1). Also referred to as B orientation or comic mode (since the frames have the same orientation as those on a comic strip).

Imaginary document. A document of the appropriate size that would have existed if the COM-generated microimage had been produced by source document microfilming.

Right reading. Orientation of text or images in normal sequence for reading, even if the material is rotated from an upright position. Right reading is the opposite of reverse reading which describes a mirror image (see Figures 2 and 3).

Source document microfilming. The conversion of documents, usually paper, to microimages.

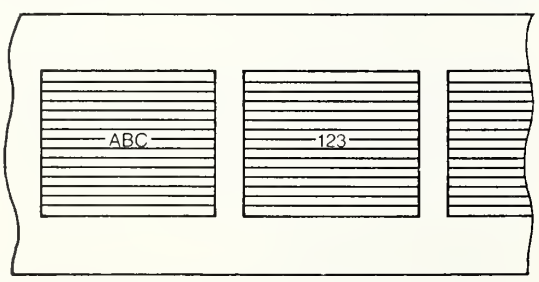


Figure 1. Horizontal Mode (B or comic orientation)

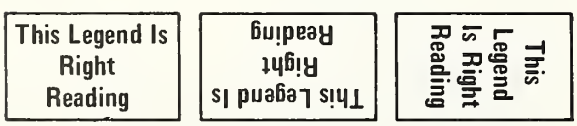


Figure 2. Examples of Right Reading

Vertical mode. The arrangement of microimages on roll microfilm where the lines of print or writing are perpendicular to the length of the microfilm for horizontal script and parallel for vertical script (see Figure 4). Also referred to as A orientation or cine mode (since the frames have the same orientation as those on a movie film).

4. Physical Characteristics

4.1 Width and Thickness. The width and thickness of roll microfilm shall be as specified in ANSI PH1.51-1983. (See also Section 6.6.)

4.2 Preservation. Microfilm intended for preservation may be designated as medium-term, long-term, or archival. Medium- and long-term microfilm refers to preservation requirements of a minimum of ten and one hundred years, respectively. Archival microfilm refers to preservation requirements of records having permanent historical value.

4.2.1 Silver-gelatin Microfilms. Silver-gelatin microfilms intended for archival preservation shall comply with ANSI IT9.1-1988. Silver-gelatin microfilm intended for either long-term or archival preservation shall be stored under archival conditions. Silver-gelatin microfilm intended for medium-term preservation shall be stored under either medium-term or archival conditions. These storage conditions are specified in ANSI PH1.43-1985.

4.2.2 Other Microfilm. Thermally processed silver microfilm and nonsilver-gelatin microfilm, such as diazo (see ANSI IT9.5-1988) and vesicular (see ANSI PH1.67-1985) which are intended for medium- or long-term preservation, shall be stored in accordance with the specifications of ANSI PH1.43-1985 for medium-term or archival storage conditions, respectively.

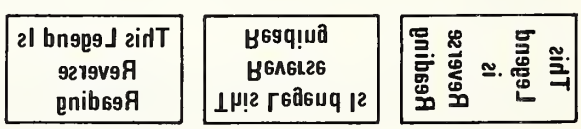


Figure 3. Examples of Reverse Reading

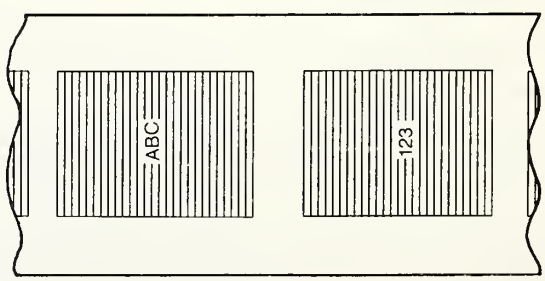


Figure 4. Vertical Mode (A or cine orientation)

4.3 Reels, Cores, Cartridges, and Cassettes. Reels, cores, cartridges, or cassettes used for roll microfilm shall conform to the applicable ANSI or ANSI/AIIM standard (ANSI PH1.13-1979 (R1983), ANSI/AIIM MS15-1977, ANSI/AIIM MS16-1981 (R1988), ANSI/AIIM MS29-1987).

5. Roll Microfilm Formats

5.1 Simplex Format. The simplex format is a microimage positioning sequence where a single row of microimages is photographed across the width of the microfilm. As illustrated in Figure 5, this format allows the following microimage positioning:

5.1.1 IA. A single page of a document arranged so that its microimage appears lengthwise on the microfilm with the lines of print perpendicular to the length of the microfilm (i.e., in the vertical mode).

5.1.2 IB. A single page of a document arranged so that its microimage appears on the microfilm with the lines of print parallel to the length of the microfilm (i.e., in a horizontal mode).

5.1.3 IIA. Two pages of a document arranged side by side so that a single microimage of the two pages appears lengthwise on the microfilm with the lines of print perpendicular to the length of the microfilm (i.e., in the vertical mode).

5.1.4 IIB. Two pages of a document arranged side by side so that a single microimage of the two pages appears on the microfilm with the lines of print parallel to the length of the microfilm (i.e., in a horizontal mode).

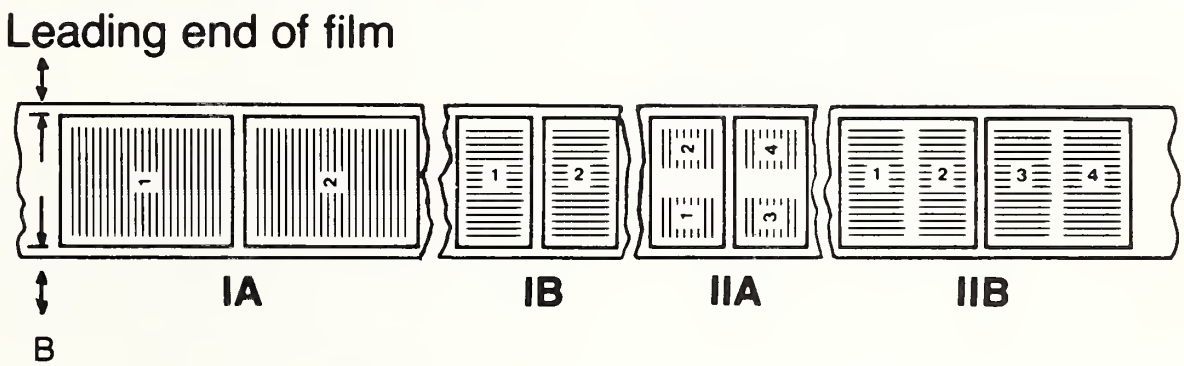


Figure 5. Simplex Format (See Tables 1 and 2 for dimensions)

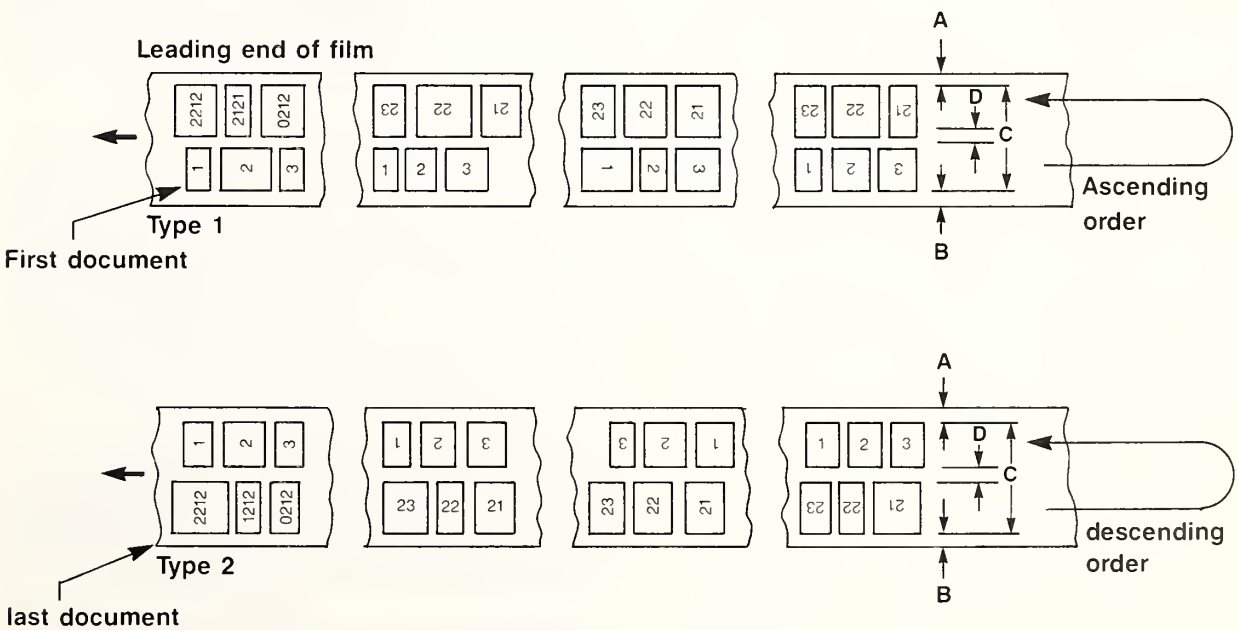
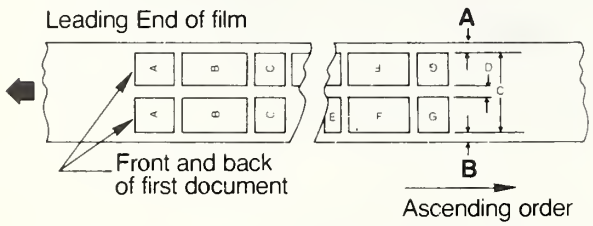


Figure 6. Duo Format (See Tables 1 and 2 for dimensions)

5.2 Duo Format. The duo format is a microimage positioning sequence in which one half of the microfilm is masked and microimages are photographed across the unmasked half of the film width. When the full length of the microfilm has passed through the camera, it is reloaded so that a second series of images is photographed on the half previously left unexposed. This results in one series of microimages running from left to right and the other from right to left. Figure 6 illustrates the two types of duo formats, resulting from microfilming in an ascending or a descending order.

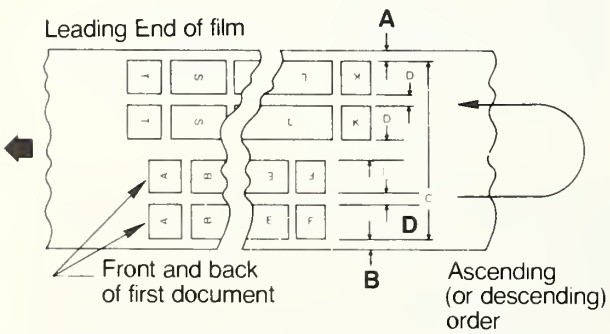
5.3 Duplex Format. The duplex format is an image-positioning sequence where, through the use of mirrors or prisms, an image of the front side of the document is photographed on one half of the film, while an image of the back side of the same document is photographed simultaneously on the other half of the microfilm, as illustrated in Figure 7.

5.4 Duo-duplex Format. The duo-duplex format is a combination of the duo and duplex formats where, through the use of mirrors or prisms, images of both the front and back sides of documents are photographed simultaneously on one half of the width of the microfilm (the other half of the microfilm being masked). When the full length of the microfilm has passed through the camera, it is reloaded so that a second set of images can be photographed on the half previously left unexposed. (See Figure 8.)



The image orientation is controlled by the orientation of the text on the original page and the orientation selected for the image in the opposite row.

Figure 7. Duplex Format (See Tables 1 and 2 for dimensions)



The image orientation is controlled by the orientation of the text on the original page and the orientation selected for the image in the opposite row.

Figure 8. Duo Duplex Format (See Tables 1 and 2 for dimensions)

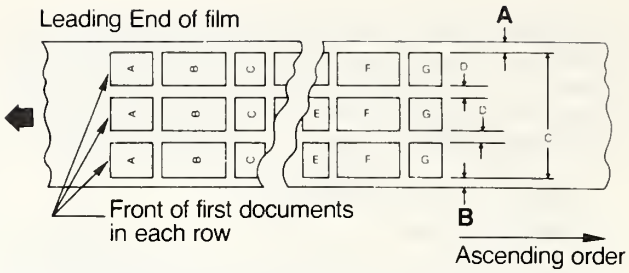


Figure 9. Multiplex Format—Two or More Rows (See Tables 1 and 2 for dimensions)

5.5 Multiplex Format. The multiplex format is a microimage positioning sequence in which the microfilm contains two or more rows of microimages across the width of the microfilm. In this format, the first image in one row is opposite the first image in the other row or rows, as illustrated in Figure 9.

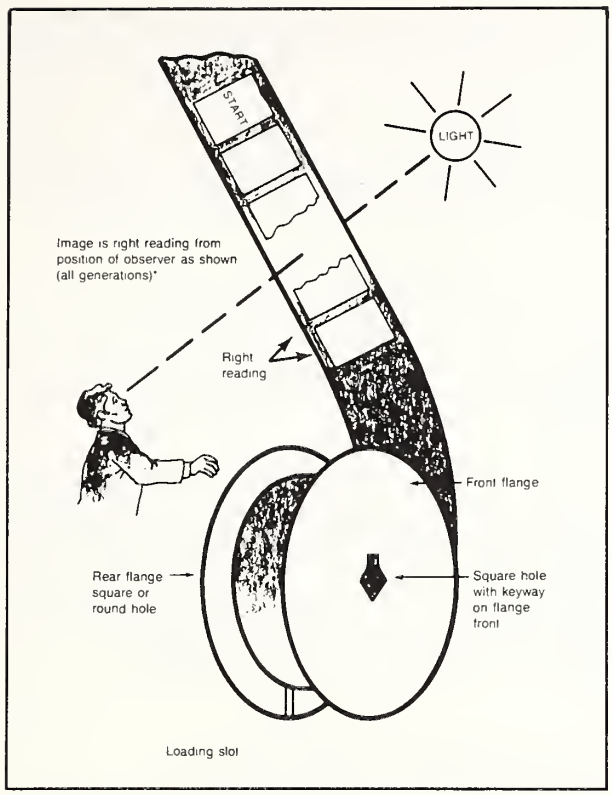
6. Microimage Placement and Orientation

6.1 Orientation on Microfilm. The information content of microimages on rolls of odd generation microfilm shall be right reading when viewed through the base (non-sensitized) side of the microfilm (even generator microfilm is right reading through the sensitized (emulsion) side). For all generations, microimage orientation and arrangement of microimages shall be as illustrated in Figures 5 through 9. The orientation and sequence of microimages in these formats (Figures 5 through 9, are indicated by the placement of the alpha or numeric character shown within each microimage. While each figure illustrates various potential microimage orientations, it is preferable to maintain one consistent orientation within a given roll of microfilm.

6.2 Orientation on Reels. Processed microfilm shall be wound on reels in such a manner that the microimages are right reading and the microfilm unwinds upward from the rear when viewed with the front flange to the right of the observer, as illustrated in Figure 10. The front flange of a microfilm reel is the flange that first engages the supply spindle and has a square center hole with a keyway. When both flanges have this type of hole, either may be considered the front flange.

6.3 Sequence of Microimages. The positioning of various targets and microfilm editing codes, when they are used, and of material being microfilmed shall be in the sequence as illustrated in Figure 11. For additional information on targets and microfilm codes, see Appendix A.

6.4 Leader and Trailer. In addition to any fogged film, which may be removed, a minimum length of 500 mm (20 inches) for 35 mm microfilm shall be left at the be-



Sensitized side (emulsion) wound out for first-generation camera film and all odd generations.

Sensitized side (emulsion) wound in for second-generation duplicate film and all even generations.

Figure 10. Orientation of Microimages on a Reel

ginning and at the end of each roll. To accommodate readers for 16 mm film with automatic threading a minimum length of 700 mm (28 inches) shall be left at the beginning and at the end of each roll.

6.5 Sectional Microfilming. If a document is too large to be microfilmed in a simplex format (see Figure 5), it shall be microfilmed in sections with a minimum of 100 mm (4 inches) overlap of the original material in accordance with Figure 12 (see ANSI/AIIM MS32-1987).

6.6 Microimage Placement. Microimages should not be placed in certain reserved areas on roll microfilm. Additional microimage placement specifications are applicable to certain COM applications.

6.6.1 Reserved Areas of Roll Microfilm. Edges of roll microfilm are reserved to allow for film tracking and edge marking, to minimize the effects of edge fogging during microfilming (See Figures 13a and 13b), or for coding (see Figures 13b and 13c). The area reserved for coding shall contain information for locating and counting microimages, microimage identification codes, or image marks (see ANSI/AIIM MS8-1988). Dimensions are specified in Tables 1 and 2.

6.6.2 Imaging Area. The area not reserved under Section 6.6.1, is available for microimage placement, for applicable technical and other targets, for spacing between

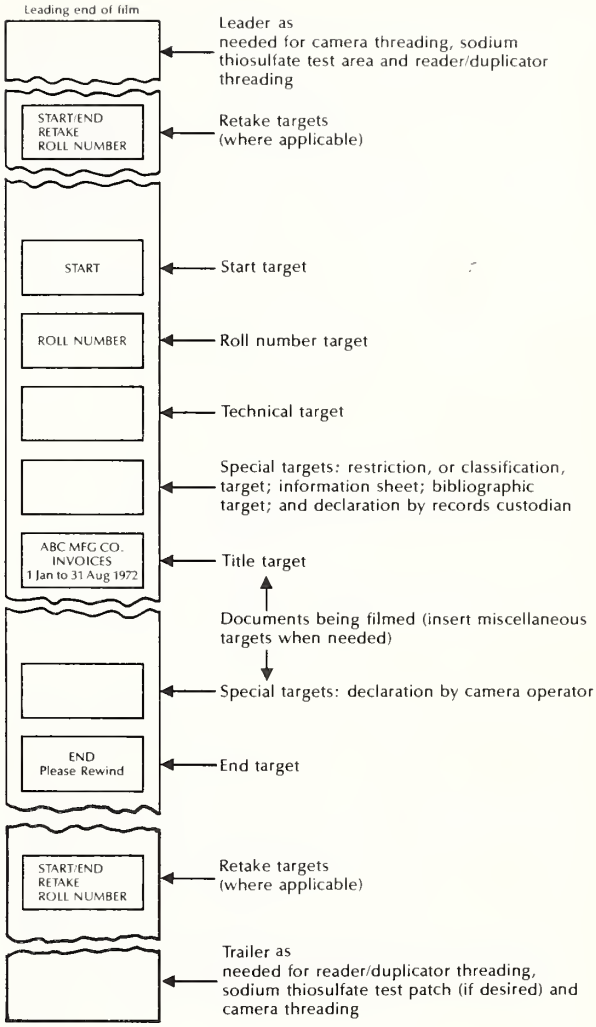


Figure 11. Sequence of Microimages

Table 1. Dimensions for Reserved Areas on Roll Microfilm (Refer to Figures 13a, b, and c)

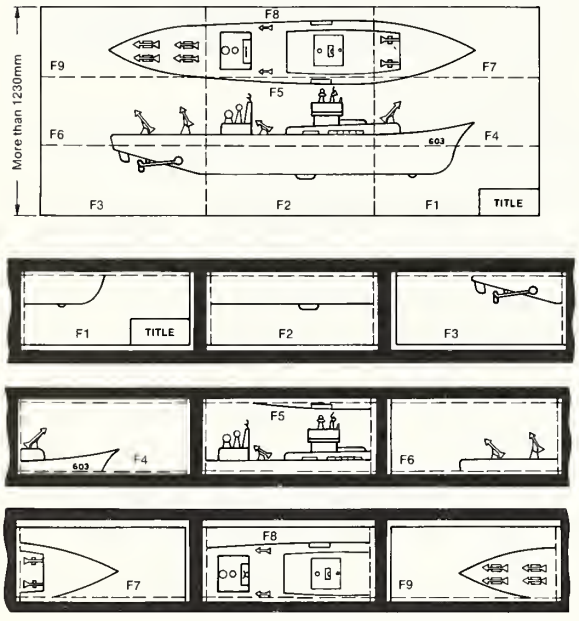
Dimensions	16 mm Microfilm*	35 mm Microfilm*
A or B minimum	0.51 (0.020)	0.97 (0.038)
C_1 maximum	14.90 (0.587)	33.01 (1.300)
C_2 maximum	13.25 (0.522)	31.82 (1.253)
C_3 maximum	11.60 (0.457)	30.63 (1.206)
D minimum	0.51 (0.020)	0.97 (0.038)
E minimum†	2.16 (0.085)	2.16 (0.085)
F maximum‡	15.98 (0.629)	35.00 (1.378)
F aim	15.95 (0.628)	34.98 (1.377)
F minimum	15.92 (0.627)	34.95 (1.376)
G maximum§	12.70 (0.500)	
H §	8.79 ± 0.08 (0.346 ± 0.003)	

*Dimensions are in millimeters; figures in parentheses are in inches
†See ANSI/AIIM MS8-1988
‡See ANSI PH1.51-1983
§For 16 mm COM only

Table 2. Dimensions for Perforated Microfilm (Refer to Figure 13a)

	16 mm Microfilm		35 mm Microfilm
	Perforated		Perforated
Dimensions*	One Edge†	Both edges*	Both Edges*
A minimum	2.79 (0.110)	2.79 (0.110)	5.48 (0.216)
B minimum	0.51 (0.020)	2.79 (0.110)	5.48 (0.216)
C maximum	12.62 (0.497)	10.34 (0.407)	24.00 (0.944)

*Dimensions are in millimeters; figures in parentheses are inches
†Dimensions A applies to the perforated edge



Document as it appears on roll film.*

*The microimage portion extending beyond the dashed line represents overlap of the original document.

Figure 12. Sectional Microfilming

microimages, and for other coding techniques (e.g., bar coding or photo-optical coding located transversely across the microfilm between microimages). See Figure 13 and Tables 1 and 2.

6.6.3 16 mm Computer Output. For alphanumeric COM applications using 16 mm microfilm, Figure 13b specifies additional microimage size and placement dimensions.

6.6.4 35 mm Computer Output. For graphic COM applications using 35 mm microfilm, Figure 14 specifies additional microimage size and placement dimensions. These specifications are primarily based on engineering drawing applications and allow the use of such microimages in aperture cards (see ANSI/AIIM MS38-1987).

6.7 Reduction. The reduction ratio shall be determined by the size of the characters, the quality of the originals, the microfilm format chosen, and the size of the documents to be microfilmed.

6.7.1 Source Document Microfilming. Due to the variety in the sizes and types of documents that are microfilmed, it is not practical to specify reductions to be used. However, any reduction selected shall result in producing the legibility and quality requirements of Section 8.2.

6.7.2 Computer-output Microfilming. Reduction ratios for COM are listed in Tables 3 and 4. For 16 mm microfilm business applications, reduction ratios are based on a standard 8½ inches x 11 inches document and 14 inches x 11 inches computer paper. For 35 mm microfilm graphic applications, reduction ratios are based on standard size A through E engineering drawings.

7. Alphanumeric Characters

7.1 Legibility. In order to produce acceptable and legible microimages of alphanumeric information, the quality requirements of Section 8.2 should be met. Care shall be exercised to ensure that forms used in source documents to be microfilmed or the forms overlay in COM do not interfere with readability.

7.2 Fonts. The use of optical character recognition (OCR) fonts assures human readability and promotes OCR compatibility if shapes and sizes conform to ANSI X3.49-1975 (R1982). Such fonts also reproduce clearly in succeeding microfilm generations. Minimum requirements for the style of characters for use in source document microfilming are contained in AIIM MS35-1987. ANSI X3.45-1982 provides for a font specifically designed for both OCR and hand lettering. For computer-output microfilming, the character shape should be as described in ANSI X3.49-1975 (R1982).

7.3 Character Dimensions for COM. Four sizes of alphanumeric characters should be used for COM. These are designated as character sizes 1 through 4.[1] Applicable dimensions and reduction ratios are contained in Appendix C.

7.4 Information Densities. For optimum legibility, the spacing of alphanumeric characters on a page should be 60 characters per 25.4 mm² (square inch), i.e., 10 characters per 25.4 mm horizontally (horizontal inch) and

[1]Sizes 1 through 4 follow scales different from those specified for OCR-B font in ANSI X3.49-1975 (R1982). Their use with OCR equipment may require modification for automated data entry.

6 lines per 2.54 mm vertically (vertical inch). For COM, dimensions and spacing of characters should be based on standard equivalent paper documents. For 16 mm alphanumeric COM applications, maximum information density should be as specified in Table C3, Appendix C. For 35 mm graphic and engineering documentation applications, the information densities and frame capacities should be as specified in Table C4, Appendix C.

8. Quality Control

8.1 Quality Control Target. Each roll of microfilm containing images of source documents should include a quality control target, unless the inclusion of such a target would break the logical microfilming of a multisheet record by a single frame or would make it necessary to add an additional roll of microfilm to accommodate documents being microfilmed.

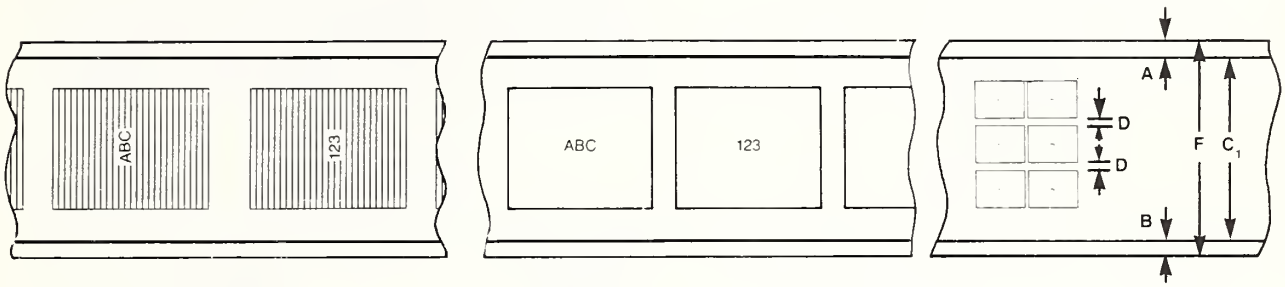


Figure 13a. All Roll Microfilm Formats (without reserved area for identification and coding)

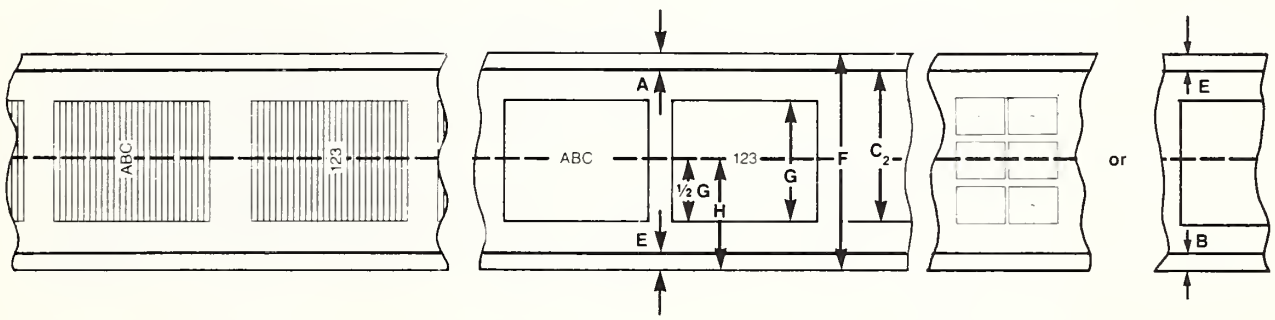
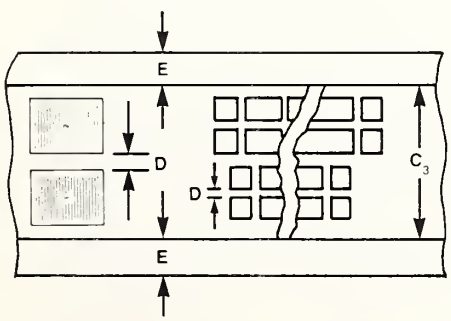


Figure 13b. Simplex, Duplex, and Multiplex Roll Microfilm Formats (area E may be located on either edge of the microfilm)



For values of following dimensions see Tables 1 and 2:
A and B: Areas for film tracking, edge marking and fogging
C: Area for microimages, targets, and certain coding
D: Area between microimages
E: Area for identification and coding
F: Full width of microfilm
G and H: Area for microimage placement for COM (See Table 1)

Figure 13C. Duo and Duo Duplex Roll Microfilm Formats (area E located on both edges of the microfilm)

Figure 13. Reserved Areas and Microimage Locations on Roll Microfilm

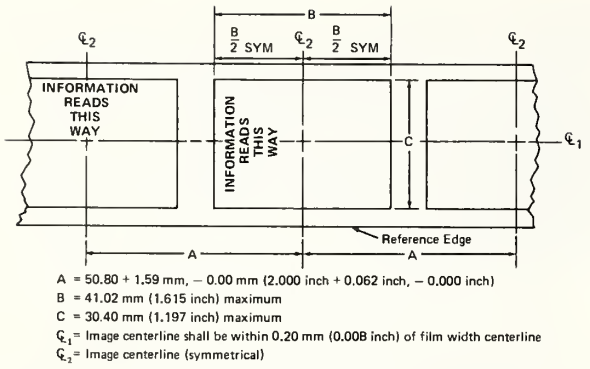


Figure 14. Microimage Placement for 35 mm COM

A quality control test target as described in ANSI/AIIM MS23-1983 (Section 3.5.4 and Figures 3, 4, 5 or 6) shall be used for source microfilm. In addition, it shall contain a round black patch (reflectance of 6 percent or less) at least 70 mm (2.75 inches) in diameter. There shall be two right angle positioning lines (cross hairs) through the center of the patch extending 20 mm (.8 inch) beyond the edge of the patch on each side.

For alphanumeric computer-output microfilm using form slides, the alphanumeric COM quality test form slide, as described in ANSI/AIIM MS1-1988 (Figure 4) shall be used in establishing and maintaining the quality of the output from the COM recorder. See ANSI/AIIM MS39-1987 for quality control methods for graphic COM devices.

Table 3. Reduction for 16 mm COM

Nominal Reduction	Imaginary Document Size	Image Size (Nominal)	Permissible Range
1:24	216 x 279 (8.5 x 11)	9.00 x 11.64 (0.354 x 0.458)	1:23 to 1:25.5
	356 x 279 (14 x 11)	14.81 x 11.64 (0.583 x 0.458)	1:23 to 1:25.5
1:48	216 x 279 (8.5 x 11)	4.5 x 5.82 (0.177 x 0.229)	1:47 to 1:50
	356 x 279 (14 x 11)	7.42 x 5.82 (0.292 x 0.229)	1:47 to 1:50
1:42	216 x 279 (8.5 x 11)	5.13 x 6.65 (0.202 x 0.262)	1:41 to 1:44
	356 x 279 (14 x 11)	8.46 x 6.65 (0.333 x 0.262)	1:41 to 1:44

All dimensions are given in millimeters, figures in parentheses are inch equivalents (see Appendix B for 1:28).

Table 4. Reductions for 35 mm COM

Class	Standard drawing size†	Nominal reduction ±0.25 percent	Microimage dimensions border to border (height times width)*	Approximate 14.5 magnification*	Original imaginary document size‡*
1	A	1:16	16.271 x 12.700 (0.6406 x 0.5000)	235.90 x 184.20 (9.30 x 7.30)	260.35 x 203.20 (10.25 x 8.00)
2	D	1:30	17.780 x 27.940 (0.7000 x 1.1000)	257.80 x 405.10 (10.20 x 16.00)	533.40 x 838.20 (21.00 x 33.00)
3	D	1:24	22.225 x 34.925 (0.8750 x 1.3750)	322.30 x 506.40 (12.70 x 19.90)	533.40 x 838.20 (21.00 x 33.00)
4	E	1:30	27.940 x 36.406 (1.1000 x 1.4333)	405.10 x 527.90 (16.00 x 20.80)	838.20 x 1.092.20 (33.00 x 43.00)

*All dimensions are given in millimeters; figures in parentheses are inch equivalents.
†Standard B- and C-size images are implied by above capabilities; for example, a B-size information area (10¼- x 16¼-inch, border-to-border original reduced 16:1) has dimensions of 16.271 x 25.796 mm (0.6406 x 1.0156 inches), which approximates the D-size (30:1) image. Similarly, the C-size image approximates the E-size (30:1) image, and the F-size drawing is equivalent to an E-size (30:1) image.
‡Border-to-border dimensions for standard drawings.

8.2 Quality Requirements. The legibility of the microimage of a source document shall be determined in accordance with the quality index method outlined and illustrated in ANSI/AIIM MS23-1983. The quality index shall be equal to or greater than 3.6 (marginal quality) in the distribution copy. The method of reading the pattern resolved shall be as specified in ANSI/AIIM MS23-1983 (Section 6.3.7 and Figure 39).

The legibility of the microimage of an imaginary COM document shall be determined in accordance with the quality index method outlined and illustrated in ANSI/AIIM MS1-1988. The quality index shall be equal to or greater than 3.6 (marginal quality) in the distribution copy. (See ANSI/AIIM MS1-1988 for other quality requirements for computer-output microforms.)

Appendix A. Targets and Codes

(This appendix is not part of American National Standard for Information and Image Management—Specifications for 16 mm and 35 mm Roll Microfilm, ANSI/AIIM MS14-1988.)

A1. Purpose. Targets and microfilm codes are used in source document and computer-output microfilming for a variety of identification and control purposes.

A2. Targets. Targets are specially prepared identification or control documents interfiled with other documents. (See also ANSI/AIIM MS23-1983 for more information on commonly used targets.)

A2.1 Retake Target. A target indicating the start or end of a series of documents being refilmed or of documents being microfilmed which had been omitted from the original camera microfilm roll.

A2.2 Start Target. An eye readable indication of the beginning of microfilming, normally consisting of the word START.

A2.3 Identification Targets

A2.3.1 Roll Number Target. An eye readable target identifying a roll of microfilm in a series of rolls.

A2.3.2 Title Target. An eye readable target containing information identifying the microfilmed material.

A2.4 Quality Control Target. A target used for quality control in accordance with Section 8.

A2.5 Special or Miscellaneous Targets. These include:
(1) Declaration by records custodian
(2) Bibliographical data
(3) Microfilm system information
(4) Restriction on access or security classification
(5) Flash targets for identification and retrieval
(6) Commentary on microfilmed material (e.g., missing pages, best available document and so on).

A2.6 End Target. An eye readable indication of the end of microfilming, normally consisting of the word END.

A3. Microfilm Editing Codes. Human readable visual patterns can be recorded on computer-output microfilm using software programs or hardware techniques. Standard patterns should be used to facilitate interchange among microfilm users and to assist in production operations. These codes can also serve as cutting and loading marks.

A3.1 Start of Microform Codes

A3.1.1 Primary Start. A square border with a code letter (R for reel, C for cartridge or cassette, and S for strip)[1] indicates the primary start of a microform.

A3.1.2 Secondary Start. A hexagonal border with a code letter (R, C, or S) indicates the secondary start of a microform, e.g., at the start of a break between optional reels of microfilm.

A3.2 Beginning of Job Code. An eye readable indication of the beginning of microfilming of a job, consisting of a three parallel bar pattern.

A3.3 Identification Information

A3.3.1 Roll Number. An eye readable number identifying a roll of microfilm within a series of rolls within the same or related jobs.

A.3.3.2 Title. Eye readable information identifying the microfilmed material. This may include job identification and optional information that may be used to retrieve additional written instructions.

A3.4 End of Job Code. An eye readable indication at the end of microfilming of a job, consisting of an I pattern.

[1]When required, other sets of microform codes may be used.

A3.5 End of Microform Codes

A3.5.1 Primary End. A dashed square border with a code letter. (R, C, or S) indicates the primary end of a microform.

A3.5.2 Secondary End. A dashed hexagonal border with a code letter (R, C, or S) indicates the end of an optional or secondary microform.

Appendix B. COM 16 mm, 1:28 Reduction

(This appendix is not part of American National Standard for Information and Image Management—Specifications for 16 mm and 35 mm Roll Microfilm, ANSI/AIIM MS14-1988.)

B.1 Reduction. It is recognized that, for certain applications, a 1:28 reduction may be appropriate in the vertical mode. The permissible reduction range should be from 1:27 to 1:30.

B2. Information Density and Document Size. The information density and document size should be as shown in Table B1. All other applicable requirements of this standard remain in effect.

Table B1. Document Size and Information Density

Imaginary document size†	Image size (nominal)†	Maximum characters per line:	Maximum lines per page:
216 x 279 (8½x11)	7.710 x 9.980 (0.304 x 0.393)	70‡	64
356 x 279 (14 x 11)	12.700 x 9.980 (0.500 x 0.303)	132	64

†All dimensions are given in millimeters; figures in parentheses are inch equivalents.

‡Based on a 7-inch line, allowing for left and right margins totalling 1½ inches.

Appendix C. Alphanumeric Character Parameters for COM

(This appendix is not part of American National Standard for Information and Image Management—Specifications for 16 mm and 35 mm Roll Microfilm, ANSI/AIIM MS14-1988.)

Table C1. Character Sizes and Dimensional Standards*

Character size designations	Nominal reduction for original character height (imaginary)			Approx. character ht. at 14.5 magnification	Microimage dimensions†				
	1:16	1:24	1:30		A Minimum height	B Minimum space between successive lines	C Successive line position*‡	D Minimum distance between adjacent characters	E Horizontal distance between character centers*§
1	1.7000 (0.0669)	2.6000 (0.1024)	3.2000 (0.1260)	1.6000 (0.0625)	0.1070 (0.0042)	0.0460 (0.0018)	0.1700 (0.0067)	0.0200 (0.0008)	0.1060 (0.0042)
2	2.6000 (0.1024)	3.9000 (0.1535)	4.9000 (0.1929)	2.4000 (0.0938)	0.1630 (0.0064)	0.0690 (0.0027)	0.2490 (0.0098)	0.0300 (0.0012)	0.1590 (0.0063)
3	3.5000 (0.1378)	5.2000 (0.2047)	6.5000 (0.2559)	3.1000 (0.1250)	0.2160 (0.0085)	0.0940 (0.0037)	0.3280 (0.0129)	0.0410 (0.0016)	0.2120 (0.0083)
4	5.2000 (0.2047)	7.8000 (0.3071)	9.8000 (0.3858)	4.7000 (0.1875)	0.3250 (0.0128)	0.1400 (0.0055)	0.4830 (0.0190)	0.0610 (0.0024)	0.3190 (0.0125)

*All character sizes and dimensions are given in millimeters; figures in parentheses are inch equivalents (rounded off to the nearest ten-thousands of an inch). Figures given for dimensions *C* and *E* are used as multiplication factors. Physical measurements are made to the micron (ten-thousandth of an inch) after appropriately rounding off the calculated value. For example, if one were measuring the required horizontal distance between 99 size 1 characters, the following calculations would be used: 99 characters x 0.106 mm = 10.494 mm (99 characters x 0.0042 inch = 0.4158 inch). The requirement is met if the values measured agree with that calculated within the specified tolerance.

†Accurate positional locations (horizontal and vertical) of characters guarantee separation of characters to insure reproducibility and legibility of subsequnt blowbacks from the film image. Tolerances may be tightened where the requirements of an application dictate. For example, an application anticipating that alphanumeric information be confined between lines of a forms overlay or the eventual use of OCR would require consideration of more stringent limits.

‡Tolerance on dimension *C* (distance between uppermost edges of successive lines of characters) is +0, -0.018 mm (+0, -0.0007 inch). This tolerance is noncumulative; that is, it is applied to the distance from the uppermost edge of any line to any and all successive lines.

§Tolerance on dimension *E* is ±0.010mm (±0.0004 inch). This tolerance is noncumulative; that is, it is applied to the distance from the center of any character on a line to any and all other characters on that line.

C1. Character Font. The character shape should be as specified in ANSI X3.49-1975 (R1982). However, the dimensional standards in Section C2 should apply.[1]

C2. Character Dimensional Standards. The dimensions for the prescribed four sizes, sizes 1 through 4, are shown in Figure C1 and Table C1.

[1]Sizes 1 through 4 follow scales different from those specified for OCR-B font in ANSI X3.49-1979 (R1982). Their use with OCR equipment may require modification for automated data entry.

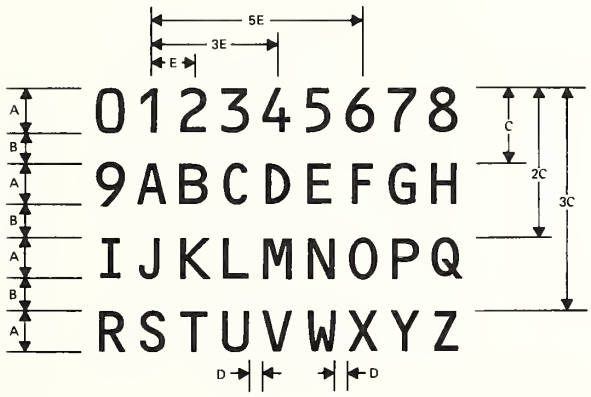


Figure C1. Alphanumeric Characters (refer to Table C1)

Table C3. 16 mm COM Information Density*

Normal characters per line		Normal lines per page	
Vertical	Horizontal	Vertical	Horizontal
70‡	70‡	64	64
110§	132	64	64

‡Based on a 7-inch line, allowing for left and right margins totaling 1½ inches.
§Based on a maximum 11-inch usable width without margins.
*Refer to Table 3 for corresponding document/image sizes

C3. Parameters for 16 mm COM. For 16 mm COM alphanumeric (business) applications, only character size 1 should apply. Additional parameters for this type application are shown in Table C2.

Table C2. 16 mm COM Character Parameters

Dimension nomenclature	Dimension*
Character height, maximum numeric†	2.750 (0.108)
Character height, maximum alpha†	2.700 (0.106)
Character width, maximum numeric	1.750 (0.069)
Character width, maximum alpha	1.750 (0.069)
Lowest descender *p* below base line	0.620 (0.024)
Stroke width	0.350 (0.014)
Stroke width *X* tolerance full set	±0.080 (±0.003)
Stroke width *Y* tolerance (uppercase)	±0.150 (±0.006)
Center line character spacing—constant pitch minimum or vertical stroke width separation between all character edges	2.540 (0.100)
Maximum adjacent character spacing	4.570 (0.180)
Line spacing minimum (between average base lines)	4.000 (0.157)
Line separation—lowest descender to highest ascender	0.640 (0.025)
Misalignment from adjacent character	0.690 (0.027)
Misalignment from a line	1.370 (0.054)
Character skew‡	

*All dimensions are given in millimeters; figures in parentheses are inch equivalents.
†Includes 0.040 mm below base line.
‡Three degrees from reference edge of document.

Table C4. 35 mm COM Information Density

Character size designations	Number of lines per centimeter (per inch)	Number of characters per centimeter (per inch)	Approximate density per square centimeter (square inch)	Image capacity (lines times characters per line)			
				Class 1*	Class 2†	Class 3‡	Class 4§
1	58.7 (149.0)	94.5 (240.0)	5,547 (35,760)	94 x 119	103 x 263	129 x 329	163 x 343
2	40.2 (102.0)	63.0 (160.0)	2,532 (16,320)	64 x 79	70 x 175	88 x 219	111 x 228
3	30.3 (77.0)	47.2 (120.0)	1,430 (9,940)	49 x 59	53 x 131	67 x 164	84 x 171
4	20.5 (52.0)	35.4 (90.0)	725 (4,160)	33 x 39	36 x 87	45 x 109	57 x 114

*Class 1 is the image equivalent of an A-size drawing reduced 16:1
†Class 2 is the image equivalent of a D-size drawing reduced 30:1.
‡Class 3 is the image equivalent of a D-size drawing reduced 23:1.
§Class 4 is the image equivalent of an E-size drawing reduced 30:1.

Appendix D. 105 mm Roll Microfilm

(This appendix is not part of American National Standard for Information and Image Management—16 mm and 35 mm Roll Microfilm, ANSI/AIIM MS14-1988.)

D1. Production and Use. A number of COM recorders and source document microfilm cameras are currently preparing 105 mm roll microfilm. It is often used for very large data files using automated retrieval to access information.

D2. Format. The format of 105 mm roll microfilm should be a microfiche format which consists of a series of contiguous microfiche, as illustrated in Figure D1. The microimages within each microfiche should be in one of the formats prescribed in ANSI/AIIM MS5-1985. All the microfiche in any one roll of 105 mm microfilm should be produced in the same format.

D3. Orientation. Information orientation of microimages should be the same as described in Section 6.1.

D4. Microfilm Cores. The microfilm should be wound on 105 mm plastic cores having a 25.4 mm (1.0 inch) inside diameter.

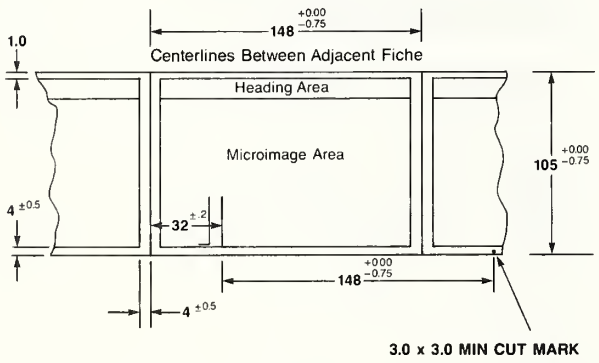


Figure D1. (Dimensions shown are in mm)

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