

Since colored couplers impart a strong hue to highlight areas of the image, they cannot be used in photographic materials to produce images for viewing. Hence, in these cases other means have to be employed to compensate for the unwanted absorptions of image dyes. With many color reversal films, for example, compensation is achieved by the introduction of so-called *interimage* effects.⁹ These are very complicated chemical effects by which the degree or rate of development in one layer of a multilayer film is made dependent upon the development taking place in other layers. By proper control of these effects a very high degree of compensation for unwanted absorption is often achieved.

Dye Stability

Most of the dyes formed by color development belong to the indoaniline and azomethine classes of dyes. Dyes of these types were known long before the discovery of color development, but none of them gained any practical importance in the dye industry because of their high degree of instability. Despite this serious deficiency, however, these dyes are increasingly successful in color photography largely for these reasons: (1) the conditions of storage of photographic materials are usually not severe; (2) photographic materials need not withstand the cleaning and ironing required by textiles; (3) structural modifications of the dyes, introduced by changes in developers and couplers, have led to higher stability; (4) the dyes in the color images are embedded within a layer of gelatin or other carrier which affords some protection from outside influences;

and (5) the physical structure of the photographic materials has been adjusted to confer marked improvements in the stability of the dye images.

One important consideration is that the stability of dye images is strongly dependent upon the environment in which the dyes find themselves in the processed image. Usually, the manufacturer of any given color product has established the conditions for processing it which will lead to the maximum dye stability. Any deviation from the recommended procedures can have disastrous results with regard to dye stability.¹⁰

The improvements in the stability of color materials which have been brought about over the years have resulted from continued chemical research. Much of this work has been directed toward gaining an understanding of the mechanism of dye-fading reactions which, in turn, permits the chemist to predict what structural and environmental factors might lead to increased dye stability. The problem is all the more complex because chemical changes cannot be made in the system for the sake of improving dye stability if they impair any other attribute. A very stable dye is of little value, for example, if it has an inferior hue.

Conclusion

This discussion of the chemistry of color photography has touched upon only a few of the major chemical aspects of modern color photographic systems. The contributions made by the analytical chemist, the colloid chemist, the surface chemist, the spectroscopist, the solid-state chemist, and many others have not

been described. However, the examples which have been selected may serve to illustrate the contribution of chemical research to the refinement and improvement of color photography. As pointed out at the beginning of this paper, it has been the close cooperation between chemistry and other sciences that has brought color photography to the point where it is today. Further improvements will depend on a continuation and even an extension of this research.

References

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standards and recommended practices

Proposed American Standards

A proposed revision of five American Standards is published here for a trial period. Comments should be addressed to Alex E. Alden, Staff Engineer, at Society headquarters prior to March 1. If no adverse criticism is received by that date, the proposals will be submitted to ASA Sectional Committee PH22 for further processing.

PH22.38-1952, Dimensions for Raw Stock Cores for 16mm Motion-Picture Film, has been modified editorially and enlarged to include 3- and 4-inch diameter sizes. The other dimensions have not been changed. The proposed revision of PH22.53-1953, Method for Determining Resolving Power of 16mm Motion-Picture Projector Lenses; PH22.84-1953, Dimensions for Projection Lamps Double-Contact Medium Ring Base-Up Type; PH22.85-1953, Dimensions for Projection Lamps Single-Contact Medium Prefocus Base-Down Type; and PH22.97-1956, Dimensions of 200-mil Magnetic Sound Record on 16mm Film Base, Perforated 1R-3000, are basically reaffirmations of the previous issues. The proposals have been modified editorially to ensure clarity and assist the reader in using the standards. The technical data and dimensions have not been changed.

A Proposed American Standard, PH22.56a, published here is a supplement to American Standard PH22.56-1961 which contains the first four sections of the American Standard Nomenclature for Motion-Picture Film Used in Studios and Processing Laboratories. Sections 5-7 of PH22.56a define the terminology relative to photographic sound, magnetic sound and release prints.—A.E.A.

During the November 26, 1962, meeting of the ASA Exploratory Committee on the Style Manual, a question was raised as to the advisability of continued inclusion of a statement that has appeared in many American Standards:

"Revision of American Standard Referred to in this Document"

"When the following American Standard referred to in this document is superseded by a revision approved by the American Standards Association, Incorporated, the revision shall apply."

It was pointed out that the statement completely invalidates a standard for legal or contract usage. This decision was based on the fact that it is impossible to accept a standard that has not yet been established.

In compliance with the directive, the section will be deleted from Society-sponsored American Standards.

Raw Stock Cores for 16mm Motion-Picture Film

PH22.38

Revision of
PH22.38-1952

1. Scope

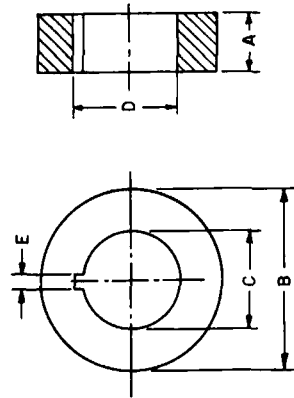
This standard specifies the dimensions of 2-, 3- and 4-in. raw stock cores for 16mm motion-picture film.

2. Dimensions

The dimensions shall be as given in the figure and table below.

Dimensions	Inches	Millimeters
A	0.627 max 0.590 min	15.92 max 14.98 min
B	1.968 ± 0.010	50.00 ± 0.25
C	3.000 ± 0.016	76.20 ± 0.40
D	4.000 ± 0.016	101.60 ± 0.40
E	1.020 ± 0.008*	25.91 ± 0.20*
	1.177 ± 0.016	29.90 ± 0.40
	0.157 ± 0.008	4.00 ± 0.20

* Core C to fit freely to hub with a 1.000 + 0.004 - 0.000 in. (25.40 + 0.1 - 0.0mm) diameter.



3. Concentricity Allowance

The concentricity of the inside and outside diameters of the core shall be within 0.020 in. (0.51 mm), one half of the total dial runout.

APPENDIX

(This Appendix is not a part of Proposed American Standard Dimension of Raw Stock Cores for 16mm Motion-Picture Film, PH22.38, but is included to facilitate its use.)

A nominal 4-in. core is manufactured, though not currently used as a raw stock core, which is used at present for film take-up on high-speed film printing and processing equipment. Such cores are used so as to minimize possible damage to film by reducing the initial starting torque necessary for windup. (This large core reduces the ratio of take-up tension from the outside of the roll to the inside of the roll, thus allowing greater film tension control.)

The keyway is provided as a means of driving the core for take-up or of providing holdback tension on a feed spindle. The dimensions of the keyway shall be adequate to clear a square-ended key.

The manufacturer may, at his discretion, reduce the cross-sectional area of the core, so long as it does not interfere with the stated dimensions, and in addition may provide a slot into which the film may be lapped in order to spool it snugly to the core. Such spooling is usually designated as "wound on." When the film is

spooled on a collapsible mandrel and the core is inserted after spooling, it is usually designated as "core inserted." (This latter designation is not to be taken as referring to whether or not the end of the film is lapped into the core.)

In the spooling of film to be used in high-speed cameras, it is the usual practice to snub the film onto the core without lapping the end in a slot so that the end will not be crimped. Such a crimp passing through a camera mechanism at several thousand frames per second may seriously damage the mechanism.

The maximum value for Dimension A is the minimum width of 16mm film as described by related American Standards. The core should not be wider than the film in order to avoid difficulty with tight-winders, widely used in the industry, which have fixed flanges for guiding. Except for the slot and keyway, the periphery and bore should present smooth, unbraken surfaces.

NOT APPROVED

Resolving Power of 16mm Motion-Picture Projector Lenses

PH22.53

Revision of
PH22.53-1953

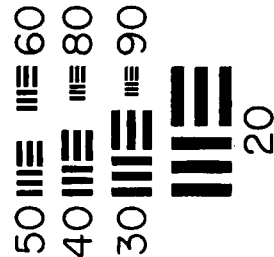


Fig. 1. Resolution test patterns (X100 diameters).¹

1. Scope

This standard describes a laboratory method of determining the resolving power of projection lenses used in 16mm motion-picture projectors. Resolving power, an empirical resultant of several lens characteristics, is only one of several important quality specifications of a lens. It shall be measured in lines per millimeter.

2. Test Method

2.1 The lens to be tested shall be mounted in a special test projector. A glass plate test object, carrying patterns of high-contrast lines, shall be then projected upon a white matte grainless screen located at such a distance from the projector that the projected image of the border of the test object measures 30 x 40 in. The resolving power of the lens is the largest number of lines per millimeter in the test object pattern that an observer standing close to the screen sees resolved in both the radial and tangential directions. Lines shall not be regarded as resolved unless the number of lines in the image is the same as the number of lines in the test object.

2.2 Care shall be taken to ensure that both the screen and the test plate are accurately perpendicular to the projection axis and that the lens is focused to give maximum visual contrast in the fine detail of the central image.

2.3 After the optimum focus position of the lens has been determined, this setting shall be kept fixed throughout the reading of all test patterns on the chart.

3. Test Object

3.1 The patterns on the test object shall be in accordance with Fig. 1.

3.1.1 The patterns of lines shall consist of parallel black lines separated by clear spaces. When X equals the number of lines per millimeter, the black lines shall be 2.5/X mm long and 0.5/X mm wide, with the clear space between parallel lines also 0.5/X mm wide.

3.1.2 The glass photographic plate used for making the test object and all of the steps involved in reducing the master test chart to the test object dimensions (including lenses used in reduction, etc.) shall have sufficiently high resolving power to ensure clear definition of all lines in the patterns on the test object.

3.1.3 This test object is intended to be a high-contrast resolution target. The density difference between black and clear should be as great as possible; at least greater than 2.0, even for the closest lines.

3.1.4 The ratio of the width of the black to the width of the white line, in the final target as used (measured in a filar microscope) shall be 1.0 ± 0.2 for both tangential and sagittal line clusters.

3.2 The size of the test object shall be such that the test object border has a height of 7.21 mm (0.284 in.) and a width of 9.65 mm

NOT APPROVED

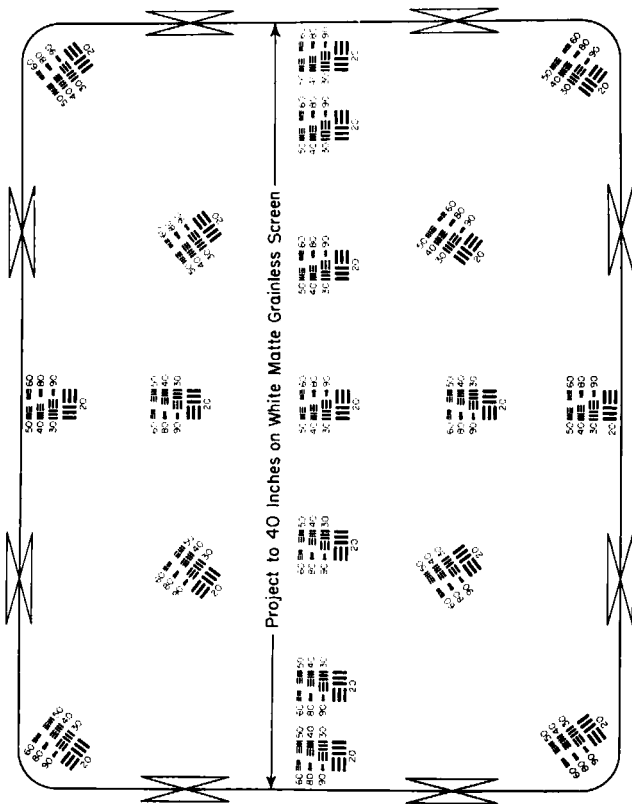


Fig. 2. Resolving power test object (X approximately 15 diameters).

NOTE: The triangular edge patterns are to facilitate alignment of test plates in the projector.

(0.380 in.) with a radius of 0.5mm (0.02 in.) in the corners.

3.2.1 The position of the test patterns on the test object shall be in accordance with Fig. 2 and the definitive note to Fig. 3.

3.2.2 Identification of the positions of the test patterns on the test object shall be in accordance with Fig. 3.

4. Test Projector

4.1 The projector design shall be such that the glass plate test object is held in proper relation to the lens axis. The test projector shall not heat the test plate to a temperature which may cause the plate to be fractured or otherwise damaged. The emulsion side of the test plate shall be toward the projection lens.

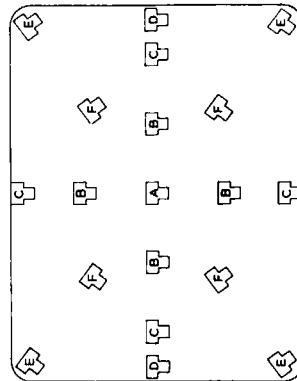


Fig. 3. Identification of test patterns in frame area.

NOTE: When using a 2-inch focal length lens, B corresponds to 2 degrees from the axis, C corresponds to 4 degrees from the axis, D corresponds to 5 degrees from the axis, E corresponds to 6 degrees from the axis, and F corresponds to 3 degrees from the axis.

4.1.1 The cone of light supplied by the projector shall completely fill the aperture of the test lens for all points in the field.

4.1.2 The screen brightness of the viewing screen, measured with the projection lens in position but the test plate removed, shall be approximately 10 + 10 - 5 footlamberts in the center of the screen. Viewing shall be in a darkened room with the ratio of brightness from the test projector to the brightness from the ambient light at least 25 to 1.

APPENDIX

(This Appendix is not a part of Proposed American Standard Method for Determining the Resolving Power of 16mm Motion-Picture Projector Lenses, PH22.53, but is included to facilitate its use.)

A1. This measurement of lens resolving power provides one purely empirical, laboratory tool for the evaluation of a lens as a separate entity apart from the projector, film, etc, and is most useful in comparing one lens with another. It cannot be used to predict the performance of a complete projection system without much more information. Furthermore, resolving power itself is a function of the contrast of the test object, and depends also upon such geometric factors of the target as: length of line, ratio of length to width, and number of lines in the test chart.

A2. Note that in reporting resolving power results, this standard follows the conventions of optics and not those of television.

In optical terminology, the target at the limit of resolution is described by counting the black lines per unit length (measured at right angles to the lines). If the projection lens under test will resolve a target having equally spaced black lines and white spaces each 0.5/Xmm wide, it is said to have a resolution of "X lines per millimeter" at that particular point in its field. In television terminology, the target at the limit of resolution is described by counting both the black lines and the white spaces per unit of frame height. If the limiting component of a television system will resolve, in an image of height, H, a target having equally spaced black lines and white spaces each 0.5Y/H wide, it is said to have a resolution of "ZY television lines" at that particular point in its field.

Proposed American Standard
**Nomenclature for Motion-Picture Film
 Used in Studios and Processing Laboratories**
 (Sections 5-7)

PH22.56a

 Addenda to
 PH22.56-1961

Page 1 of 4 pages

5. Photographic Sound

Note: All definitions in this section will be understood to be photographic unless the term "magnetic" is used.

5.1 Photographic Sound. Photographic sound is a sound record in the form of a photographic image.

5.2 Sound Negative. A sound negative is any film that, after exposure and subsequent processing, produces a negative sound record on the film. This sound record requires the steps of printing and processing of a second film in order to obtain a reasonably faithful reproduction of the original sound, by the conventional scanning system.

Note: The negative image may be obtained by exposure through a positive sound image; by direct recording; or, by the reversal process, from another sound negative.

5.2.1 Original Sound Negative. The original sound negative is the sound negative that is exposed in a film recorder and, after processing, produces a negative sound image on the film.

5.2.2 Sound-Effects Negative. A sound-effects negative is a sound negative upon which sound effects have been recorded. It is ordinarily held in library stock.

5.2.3 Music Negative. A music negative is a sound negative upon which music has been recorded. It is usually an original sound negative but may be a library negative.

5.2.4 Sound Cut Negative. A sound cut negative is a sound negative that is composed of sections of original sound negatives spliced in sequence.

Note: The sound cut negative is generally in exact conformity with the sound work print and produces a single sequentially spliced negative. The print of the sound cut negative provides all, or portions of, the re-recording print.

5.2.5 Re-recorded Negative. A re-recorded negative is a sound negative which is exposed by re-recording and, when processed, produces a negative sound track image.

5.2.6 Sound Release Negative. A sound release negative is a photographic sound negative in the form required for the final printing operation onto the release print raw stock.

Note: The sound release negative may consist of re-recorded negatives, intercut original sound negatives, duplicate negatives of sound records, etc., depending upon the choice of available material or the intended use of the print.

5.2.7 Special Sound Release Negative. A special sound release negative is a sound release negative made for the purpose of obtaining a sound track which has characteristics other than those obtained from the sound release negative.

Note: A special sound release negative may be a sound track for use in foreign-version release, foreign-version-English-language release, or 16mm release from 35mm original material. It usually has undergone an additional recording operation.

5.2.7.1 Special Sound Release Negative for Use in 16mm Release of 35mm Print Material. The special sound release negative for 16mm release of 35mm original material is a photographic sound negative, either 35mm or 16mm, recorded with specific characteristics for reasonably faithful reproduction of the original sound on 16mm reproduction equipment. It may be re-recorded

from a print of the 35mm sound release negative or from the 35mm re-recording print.

5.2.7.2 Special Sound Release Negative, Foreign Release in English. The special sound release negative for use in English version for foreign release is re-recorded from the re-recording print, except that the dialogue track is modified to remove American colloquialisms.

5.2.7.3 Special Sound Release Negative, Foreign-Language Version. The special sound release negative for use in foreign-language-version release is usually re-recorded using all of the re-recording tracks, except the dialogue track, for which is substituted a special synchronized dialogue track in the foreign language for which the release is being made.

5.2.8 Sound Release Dupe Negative. A sound release dupe negative is a duplicate negative of the sound record prepared specifically for printing the sound track of release prints.

5.3 Sound Print. A sound print is any positive obtained by printing from a sound negative, or direct positive recording, or, by the reversal process, from another sound positive. A sound print provides a reasonably faithful reproduction of the original sound through the conventional scanning system.

5.3.1 Sound Daily Print. A sound daily print is the first sound print made from the original sound negative for checking sound quality, technique, etc.

5.3.2 Sound Work Print. A sound work print is a sound print that usually consists of intercut sound daily prints, but may also include other sound tracks of sound effects or music, or both, on the same or separate films, with synchronism constantly maintained with the corresponding picture work print.

5.3.3 Sound-Effects Print. A sound-effects print is a sound print made from a sound-effects negative, or from another sound-effects print by reversal processing.

5.3.4 Music Print. A music print is a sound print made from a music negative.

5.3.5 Re-recording Print. A re-recording print is a sound print prepared specifically for use in re-recording to produce a re-recorded negative.

Note: A re-recording print may be a print from a sound cut negative, a specially intercut print, or a combination of both. It usually consists of several sound records on separate films that include dialogue, sound effects, music, or any other required material. The term is used interchangeably to designate the entire group of associated films or any individual film that is part of the group.

5.3.6 Re-recorded Print. A re-recorded print is a sound print from a re-recorded sound-track negative.

5.3.7 Sound Check Print. A sound check print is a sound print made from the sound release negative for the purpose of checking negative cutting, printing lights, sound quality, etc.

Note: When a sound check print is required, it is usually made prior to the first trial composite print.

5.3.8 Sound Master Positive. A sound master positive is a sound print on special film stock that is usually made from a sound release negative for the purpose of producing duplicate negatives of the sound record for release printing.

5.4 Composite Print (See 3.2)

[3.2 Composite Print. A composite print is a positive film having both picture and corresponding sound on the same film, which may be in editorial or projection synchronism.]

5.4.1 Composite Daily Print (See 3.2.1)

[3.2.1 Composite Daily Print. A composite daily print is made from an original composite negative or original sound and picture negatives, and is used for checking photography, sound quality, action, etc. It is in projection synchronism.]

6. Magnetic Sound

6.1 Magnetic Sound Film (See 1.2)

[1.2 Magnetic Sound Film. Magnetic sound film is a film base having film perforations along one or both edges and bearing a ferro-magnetic coating, either completely across the film or in stripes, the coating capable of accepting and re-producing sound records. Note: Unperforated materials usually are referred to as magnetic tape.]

6.2 Full-Coat Magnetic Film. Full-coat magnetic film has the magnetic-coating compound applied across the film from edge to edge.

6.2.1 Full-Coat Between Perforations Magnetic Film. Full-coat between perforations magnetic film has the magnetic-coating compound across the film from perforation to perforation.

6.3 Magnetic Striping. Magnetic striping is a process by which a magnetic-coating compound is applied in the form of single or multiple stripes, having specific widths and placements, to either surface of a film base which may or may not have a photographic emulsion.

6.4 Balance Stripe. A balance stripe is a magnetic coating or coating of another material that is equal in thickness to, but may be narrower than, the stripe used for recording. It is applied along the opposite edge of the film. Its primary purpose is to equalize the effective thickness of the two edges of the striped film in order to obtain uniform winding. The stripe is sometimes used for the recording of additional sound or control records.

6.5 Magnetic Original. A magnetic original is the original or first sound record on a magnetic film.

6.6 Magnetic Transfer. A magnetic transfer is a magnetic sound record obtained by electrical re-recording of a magnetic original onto another magnetic film.

6.7 Magnetic Master. A magnetic master is a final edited or re-recorded magnetic sound record used for transfer to a magnetic release print or for transfer to a photographic sound negative to be used for manufacturing prints with photographic sound tracks.

6.8 Magoptical Release Print. (See 7.4)

7. Release Prints

7.1 Release Print. (See 1.15.2)

[1.15.2 Release Print. A release print is a print made for general distribution and exhibition. It may be on films of 8mm, 16mm, 35mm or 70mm width. Some release prints are composed of two or more 35mm-width films which are projected simultaneously in lateral alignment.]

7.1.1 Composite Release Print. A composite release print is a print having both picture and sound records in projection synchronism on the same film.

Note: The sound record may be photographic, magnetic, or both.

7.1.2 Domestic Release Print. A domestic release print is a release print intended for distribution within the country where the print was manufactured and having dialogue in the language of that country. It may be a composite print or may have magnetic sound track or tracks on a separate film.

7.1.3 Foreign-Version Release Print. (See 3.2.6)

[3.2.6 Foreign-Version Release Print. A foreign-version release print is a composite print in projection synchronism with dialogue made specifically for the particular language involved. Note: Sometimes superimposed titles in a different language are used on the print. A superimposed title consists of printed words (usually transparent) overlaying the picture image.]

7.2 Anamorphic Release Print. An anamorphic release print is a release print in which the picture image is compressed laterally, requiring a deanamorphosing lens on the projector to cause objects in the projected picture to have correct proportions.

7.3 Wide-Screen Release Print. A wide-screen release print is a print which has no anamorphosis but, when projected, produces a screen image having an aspect ratio greater than 1.33 to 1.

Note: Some prints are made from negatives exposed in a camera aperture having an aspect ratio of 1.33 to 1 but which have been composed for projection to yield a projected picture having an aspect ratio greater than 1.33 to 1. A wide-screen print may also be obtained from an anamorphic negative by deanamorphosing in the printing process.

7.4 Magoptical Release Print. A magoptical release print is a composite release print which has both magnetic and photographic (optical) sound tracks.

Index

Italic numbers refer to paragraphs.

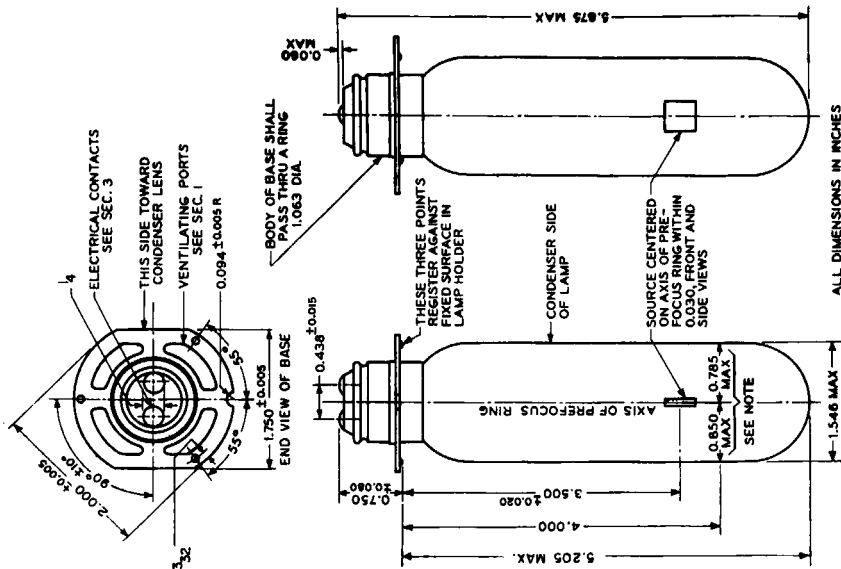
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Proposed American Standard Dimensions of

Projection Lamps
Double-Contact Medium Ring
Base-Up Type

PH22.84
Revision of
PH22.84-1953

Page 1 of 2 pages



1. Scope

This standard establishes the dimensions essential to the interchangeability of lamps of the double-contact medium ring base-up type in 16 and 8mm projectors. It is not intended to prescribe either operating characteristics or details of design, such as the shape of

the ventilation ports or the method of attachment of the prefocus ring to the base.

2. Operating Position

Lamps of this type are intended to be burned with the axis in an essentially vertical position with the base at the top.

NOT APPROVED

3. Electrical Contacts

The figure indicates the area where electrical members of the lamp holder should contact. It is not intended to dictate the shape of the terminals on the lamp; however, the terminals should not exceed boat-shaped areas 0.250 in. wide by 0.410 in. long with the long axes parallel to the flats on the flange. With lamps of this type, the prefocus ring is not an electrical contact.

NOTE: These dimensions define the maximum excursion of the bulb surfaces from the base axis toward the condensing lenses and the mirror, at the points indicated when the lamp is inserted in a holder which rotationally positions the lamp. (See the end view of the lamp base.) Therefore, the mirror, condensing lenses, and their respective mounts must be so located as to ensure adequate clearance between these parts and the bulb surface.

